

2008



West Virginia Integrated Water Quality Monitoring and Assessment Report

West Virginia Department of Environmental Protection's Division of Water and Waste Management



WEST VIRGINIA INTEGRATED WATER QUALITY MONITORING AND ASSESSMENT REPORT 2008

Prepared to fulfill the requirements of Sections 303(d) and 305(b) of the federal Clean Water Act and Chapter 22, Article 11, Section 28 of the West Virginia Water Pollution Control Act for the period of July 2005 through June 2007.

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INTRODUCTION

The federal Clean Water Act contains several sections requiring reporting on the quality of a state's waters. Section 305(b) requires a comprehensive biennial report and Section 303(d) requires, from time to time, a list of waters for which effluent limitations or other controls are not sufficient to meet water quality standards (impaired waters). West Virginia code Chapter 22, Article 11, Section 28 also requires a biennial report of the quality of the state's waters.

This document is intended to fulfill West Virginia's requirements for listing impaired waters under Section 303(d) of the Clean Water Act and the Water Quality Planning and Management Regulations, 40CFR130.7. In addition to the list of impaired waters, it explains the data evaluated in the preparation of the list and methodology used to identify impaired waterbodies. Information is provided that allows the tracking of previously listed waters that are not contained on the 2008 list. EPA has recommended that requirements be accomplished in a single report that combines the comprehensive Section 305(b) report on water quality and the Section 303(d) List of waters that are not meeting water quality standards. The suggested format of this "Integrated Report" includes provisions for states to place their waters in one of the five categories described in Table 1.

This Integrated Report is the combination of the 2008 Section 303(d) List and the 2008 Section 305(b) report. This report includes data collected and analyzed up to June 30, 2007, from the state's 32 major watersheds by the West Virginia Department of Environmental Protection's (DEP's) Watershed Assessment Branch and other federal, state, private and nonprofit organizations. Waters that are included on the 2008 Section 303(d) List are placed in Category 5 of this report.

Table 1 - Integrated Report categories

Category 1	fully supporting all designated uses
Category 2	fully supporting some designated uses, but no or insufficient information exists to assess the other designated uses
Category 3	insufficient or no information exists to determine if any of the uses are being met
Category 4	waters that are impaired or threatened but do not need a Total Maximum Daily Load
	Category 4a waters that already have an approved TMDL but are still not meeting standards
	Category 4b waters that have other control mechanisms in place which are reasonably expected to return the water to meeting designated uses
	Category 4c waters that have been determined to be impaired, but not by a pollutant
Category 5	waters that have been assessed as impaired and are expected to need a TMDL



Middle Fork River in Randolph County
Photo by Nick Murray

WEST VIRGINIA WATER QUALITY STANDARDS

Water quality standards are the backbone of the 303(d) and 305(b) processes of the federal Clean Water Act. Instream data are compared with water quality standards to determine the use attainment status of streams and lakes. In West Virginia, the water quality standards are codified as 47CSR2 – Legislative Rules of the Department of Environmental Protection – Requirements Governing Water Quality Standards, and at 60CSR5 – Legislative Rules of the Department of Environmental Protection – Antidegradation Implementation Procedures. Impairment assessments conducted for the West Virginia 2008 Integrated Water Quality Monitoring and Assessment Report are based upon water quality standards that have received EPA approval and are currently considered effective for Clean Water Act purposes.

A waterbody is considered impaired if it violates water quality standards and does not meet its designated uses. It is then placed on the 303(d) List and scheduled for TMDL development. Use attainment is determined by the comparison of the instream values of various water quality parameters to the numeric or narrative criteria specified for the designated use (See the Assessment Methodology section for more information on use attainment determination).

Some examples of designated uses are water contact recreation, propagation and maintenance of fish and other aquatic life, and public water supply. Designated uses are described in detail in Section 6.2 of 47CSR2 and are summarized in Table 2. Each of the designated uses has associated criteria that describe specific conditions that must be met to ensure that the water can support that use. For example, the “propagation and maintenance of fish and other aquatic life” use requires that the pH remain within the range of 6.0 to 9.0 standard units at all times. This is an

Table 2 - West Virginia designated uses

Category	Use Subcategory	Use Category	Description
A	Public Water	Human Health	Waters, which, after conventional treatment, are used for human consumption.
B1	Warm Water Fishery	Aquatic Life	Propagation and maintenance of fish and other aquatic life in streams or stream segments that contain populations composed of all warm water aquatic life.
B2	Trout Waters	Aquatic Life	Propagation and maintenance of fish and other aquatic life in streams or stream segments that sustain year-round trout populations. Excluded are those streams or stream segments which receive annual stockings of trout but which do not support year-round trout populations.
B4	Wetlands	Aquatic Life	Propagation and maintenance of fish and other aquatic life in wetlands. Wetlands generally include swamps, marshes, bogs and similar areas.
C	Water Contact Recreation	Human Health	Swimming, fishing, water skiing and certain types of pleasure boating such as sailing in very small craft and outboard motor boats.
D1	Irrigation	All Other	All stream segments used for irrigation.
D2	Livestock Watering	All Other	All stream segments used for livestock watering.
D3	Wildlife	All Other	All stream segments and wetlands used by wildlife.
E1	Water Transport	All Other	All stream segments modified for water transport and having permanently maintained navigation aides.
E2	Cooling Water	All Other	All stream segments having one or more users for industrial cooling.
E3	Power Production	All Other	All stream segments extending from a point 500 feet upstream from the intake to a point one-half mile below the wastewater discharge point.
E4	Industrial	All Other	All stream segments with one or more industrial users. It does not include water for cooling.

example of a numeric criterion. Numeric criteria are provided in Appendix E of the water quality standards.

Numeric criteria consist of a concentration value, exposure duration and an allowable exceedance frequency. The water quality standards prescribe numeric criteria for the “propagation of fish and other aquatic life” use in two forms: acute criteria that are designed to prevent lethality, and chronic criteria that prevent retardation of growth and reproduction. The numeric criteria for acute aquatic life protection are specified as one-hour average concentrations that are not to be exceeded more than once in a three-year period. The criteria for chronic aquatic life protection are specified as four-day average concentrations that are not to be exceeded more than once in a three-year period. The exposure time criterion for human health protection is unspecified but there are no allowable exceedances.

Water quality criteria also can be written in a narrative form. For example, the water quality standards contain a provision that states that wastes, present in any waters of the state, shall not adversely alter the integrity of the waters or cause significant adverse impact to the chemical, physical, hydrologic, or biological components of aquatic ecosystems. Narrative criteria are contained in Section 3 of 47CSR2. More information regarding the use of narrative criteria is contained in Section 5 under the discussions of decision criteria for biological impairment data and fish consumption advisories.

Ohio River criteria

For the Ohio River, both the Ohio River Valley Water Sanitation Commission (ORSANCO) and West Virginia water quality criteria were considered, as agreed upon in 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 DEP 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. In support of those efforts, West Virginia has and will continue to work with ORSANCO and the other member states through a workgroup charged with improving consistency of 305(b) reporting among compact states.

SURFACE WATER MONITORING AND ASSESSMENT

This section describes West Virginia’s strategy to monitor and assess the surface waters of the state. The DEP’s Division of Water and Waste Management collects most of the state’s water quality data. The Watershed Assessment Branch of DWWM is responsible for general water quality monitoring and watershed assessment. The remainder of this section describes the monitoring and assessment activities conducted by the Watershed Assessment Branch.

Streams and Rivers

West Virginia has a comprehensive strategy for monitoring the flowing waters of the state, by far the most prevalent surface waterbody type in the state. The Watershed Assessment Branch utilizes a tiered approach, collecting data from long-term monitoring stations, targeted sites within watersheds on a rotating basin schedule, randomly selected sites, and sites chosen to further define impaired stream segments in support of TMDL development. The following paragraphs present these approaches in further detail.

Probabilistic (random) sampling

Probabilistic sampling began in 1997. This program utilizes sites that are selected randomly by EPA’s Western Ecology Division Laboratory in Corvallis, Ore. The data collected at these sites can be subjected to statistical analysis to provide an overall characterization of a watershed. This analysis can then be used to predict the probability of a condition occurring within a watershed. The initial probabilistic sampling cycle, which concluded in 2001, was conducted in accordance with the five-year Watershed Management Framework cycle. Thirty sites were sampled within each watershed. A second round of probabilistic sampling, initiated in 2002, modified the framework cycle to a statewide approach. The objective for the second round was to collect 30 samples from each watershed over a five-year period (six sites are collected from each watershed annually). Importantly, at the end of the five-year cycle, each of the state’s major watersheds will continue to be independently characterizable.

This departure from the framework cycle minimizes the effects of extreme conditions, such as periodic droughts and flooding and allows for annual updates of statewide stream conditions. Data collection

protocols are similar to those applied to watershed assessment sampling. However, probabilistic sampling includes more rigorous water quality and habitat analysis. Benthic macroinvertebrates are collected for biological community analysis.

The ambient water quality monitoring network

The ambient water quality monitoring network concept was established in the early 1960s. The network currently consists of 26 fixed stations that, starting in 2006, are sampled bi-monthly. Sampling stations are located at the mouths of the state's larger rivers and additional sites are situated to isolate the impacts from major industrial complexes and other potential sources of impairment. The data provides information for trend analyses, general water quality assessments and pollutant loading calculations, and allows water resources managers to quickly gauge the health of the state's major waterways.

Targeted sampling

Targeted sampling has been a component of West Virginia's assessment toolbox since the Watershed Assessment Program's inception in late 1995. Streams are sampled according to a five-year rotating basin approach. Sites are selected from the watersheds targeted for each particular year. Each site is subjected to a one-time evaluation of riparian and instream habitat, basic water quality parameters, and benthic macroinvertebrate and periphyton communities.

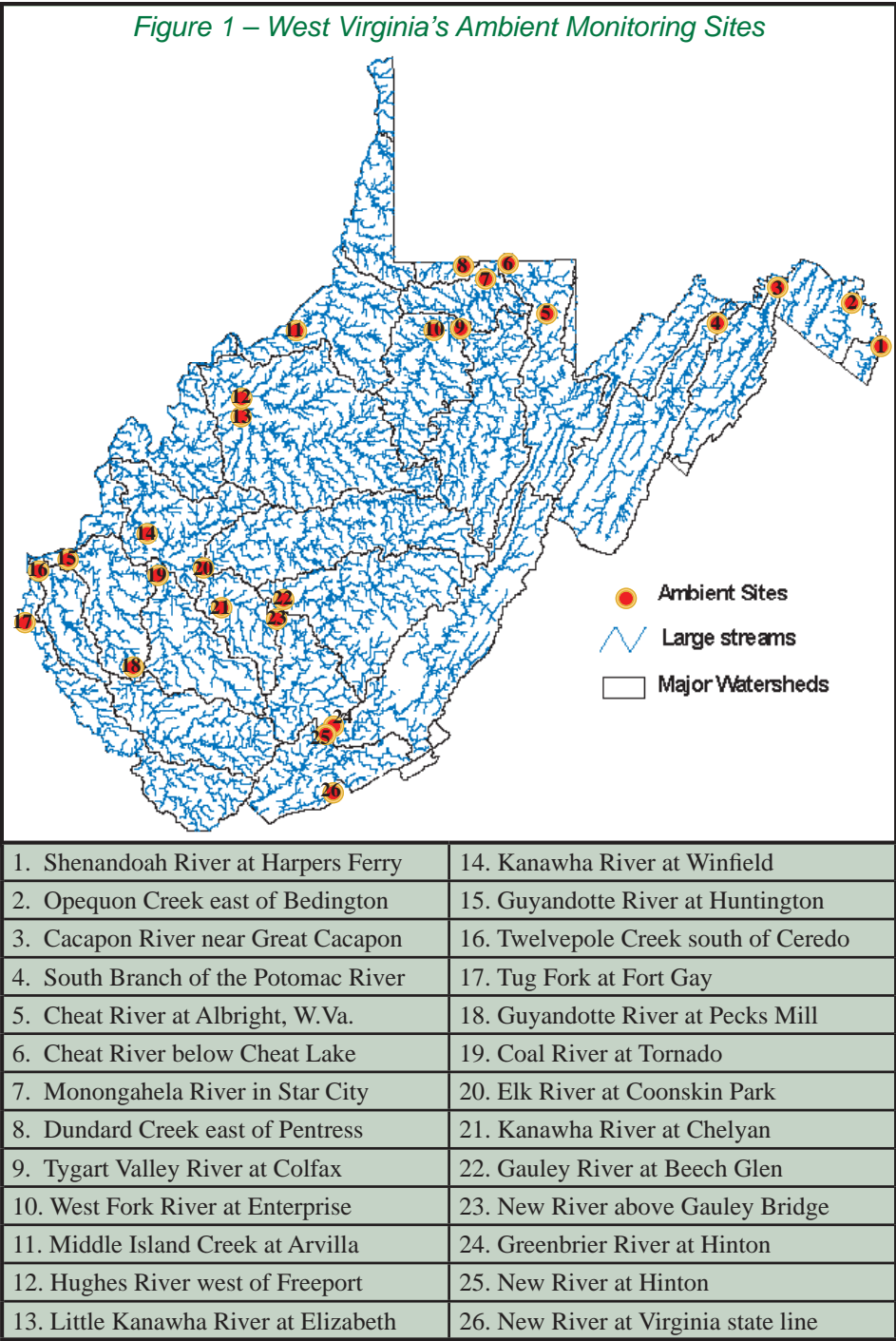
Sites are selected to meet a variety of the stakeholders' needs and include the following classifications:

- ⬆ Impaired streams
- ⬆ Reference (minimally impacted) streams
- ⬆ Spatial trends (multiple sites on streams exceeding 15 miles in length)
- ⬆ Areas of concern as identified by the public and stakeholders
- ⬆ Previously unassessed streams

Pre-TMDL development sampling

As DEP started the process to assume TMDL development responsibility from EPA, the need for more and newer data in developing useful TMDLs was obvious. The objective of this effort is to collect sufficient data for TMDL modelers to develop stream restoration plans. Pre-TMDL sampling follows the framework cycle, i.e., impaired streams from watersheds in

Figure 1 – West Virginia's Ambient Monitoring Sites



hydrologic group A will be sampled in the same year as the targeted sampling.

The 303(d) List is the basis for initial site selection and additional sites are added to comprehensively assess tributary waters and to allow identification of the suspected sources of impairment. Benthic macroinvertebrate sampling is conducted in 303(d) listed streams having aquatic life impairments. Assessment of water quality impaired streams is more intensive and consists of monthly sampling for parameters of

concern. This method captures data under a broad variety of weather conditions and flow regimes. Pre-TMDL sampling also includes an effort to locate the specific sources of impairment, with particular attention to identify non-point land use stressors as well as any permitted facilities that may not be meeting their requirements. For more information, see TMDL Development Process.

Lakes and Reservoirs

West Virginia does not make a distinction between lakes and reservoirs. By state definition, a 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. The DEP conducted lake water quality assessments from 1989 through 1996. This program was funded by the federal Clean Lakes Program, which was phased out in 1995. With additional financial support being provided to enhance state’s monitoring strategies, DEP added a lake monitoring component in 2006. This program focuses on water quality, collecting field parameters (dissolved oxygen, pH, temperature, and conductivity), nutrient data, clarity, and Chlorophyll A. Multiple sites

Biological Indicators

Benthic macroinvertebrates are collected from riffle substrate in wadeable streams and identified to genus level. This assemblage of aquatic life organisms provides a direct means of assessing the aquatic life use support and can be collected and identified cost effectively. It has the advantage over one-time water quality samples in that the benthic community is affected by and provides indications of past water quality conditions. The DEP currently uses the West Virginia Stream Condition Index, a family-level multimetric index developed specifically for use in West Virginia. This is the primary means of assessing attainment of the aquatic life use.

per lake are sampled and profile data for temperature and dissolved oxygen are obtained.

Many of West Virginia’s largest reservoirs are controlled by the U.S. Army Corps of Engineers. Although the Corps’ primary mission is to manage structures to provide navigation and flood control, the agency also is committed to water quality management. Data generated by the Corps has been used for assessment purposes. Additional lake information is available from the West Virginia Division of Natural Resources. The DNR, one of the signatory agencies in the Partnership for Statewide Watershed Management, conducts fish community surveys on many of the state’s reservoirs.

Wetlands

The State of West Virginia takes great interest in the management of its wetlands both large and small. According to figures from the National Wetlands Inventory (NWI 1980-86), there are 102,000 wetland acres in West Virginia comprising less than 1% of the State’s total land area. Current wetland information can be found in a booklet entitled West Virginia’s Wetlands...Uncommon, Valuable Wildlands (Tiner 1996). Currently, management efforts are geared toward protection of wetlands by regulatory proceedings or acquisition. The permitting authority for activities impacting wetlands (Section 404) lies with the U. S. Army Corps of Engineers. In addition, the West Virginia Department of Environmental Protection ensures protection through an active Section 401 certification program.

Since the 2006 Integrated Report, certain changes have occurred in the status of West Virginia’s wetlands program. Although limiting these changes are intended to be the start of a larger and more comprehensive program. DEP’s Watershed Assessment Branch personnel have been researching and developing assessment and monitoring strategies in conjunction with the U.S. Environmental Protection Agency and other states. DEP is also maintaining contact with EPA in preparation for the National Wetlands Assessment in 2011. This national assessment will encompass the entire United States with DEP and West Virginia Division of Natural Resources (DNR) combining efforts to assess sites in West Virginia. In support of this effort, DNR’s Wildlife Resources Section is currently evaluating aerial photography to identify wetlands not included in the original National Wetlands Inventory (NWI 1980-86) due to size or

age. The results of this project will provide updated information similar to that of the NWI 1980-86, but will also include wetlands created since 1986 and wetlands smaller than those which could be detected in the NWI 1980-86 (<1-3 acres).

The EPA plans to advise states on assessment methods and actual site locations by September 1, 2009. As a result of the 2011 NWI, additional valuable information on the number and condition of West Virginia's wetlands will be available from EPA, DEP and DNR.

Citizen monitoring

The fourth stream assessment project is the West Virginia Save Our Streams volunteer monitoring program. Initiated in 1989, this program encourages citizens to become involved in the improvement and protection of the state's streams. The focus is largely on nonpoint source pollution abatement. Save Our Streams has two objectives. First, it provides the state with enhanced ability to monitor and protect its surface waters through increased water quality and benthos data collection. Second, it improves water quality through educational outreach to the state's citizens. After citizens are actively involved in stream monitoring and restoration activities, they can initiate improvement projects within their

own watersheds. Training workshops are conducted annually to provide quality assurance. A recent improvement in data accessibility for the program has been the development of an online Volunteer Assessment Database. As an example of the functions of the new database, volunteer stream reports are now available online at <http://www.wvdep.org/dwwm/wvsos/vad/index.htm>.

Volunteer monitors can register on the database and enter their own data online, or continue to submit the information to the coordinator for a quality assurance review. The coordinator also is the database administrator, and has tools to verify the quality of the information before it is approved. The database is available for public viewing without registration. In addition, the program prepares an annual "State of Our Streams" report.^{jl}

Table 3 - Current and future monitoring activities

26 Ambient sites will be monitored bi-monthly from July 2007 through June 2009
A third round of probabilistic monitoring that began in the spring of 2007 will continue through 2011.
Pre-TMDL development monitoring for Group B – 419 sites from 279 streams were sampled from July 2007 through June 2008. (179 sites from the Elk River Watershed, 176 from the Lower Kanawha River Watershed, and 64 from the North Branch Potomac Watershed)
TMDL development for Group C – 419 sites from 267 streams will be sampled from July 2008 through June 2009.
Group B Targeted Sampling – 76 targeted sites were sampled in 2007.
Group C Targeted Sampling – Approximately 75 sites will be sampled during the 2008 summer sampling season.
Lakes – Ten lakes within Group C will be sampled four times during the 2008 growing season (May through October) and approximately 10 Group D Lakes will be sampled in 2009.

DATA MANAGEMENT

Assessed data

All readily available data was used during the evaluation process. In preparation for the development of this report, the agency sought water quality information from various state and federal agencies, college and universities, private individuals, businesses, organizations and others. News releases and public notices were published in state newspapers. Specific requests for data were made to state and federal agencies known by the DEP to be generators of water quality data. Table 4 identifies the entities that contributed water quality data. The DEP's staff reviewed data from external sources to ensure that collection and analytical methods, quality assurance and quality control and method detection levels were consistent with approved procedures. In addition, DEP has developed guidance for those wishing to submit data. The document contains a list of requirements for submitted data along with helpful internet links and a checklist for data submitters. The guide can be found on DEP's Web site using the following link:

[http://www.wvdep.org/Docs/13395_QA%20Guidelines%20\(PIO%20revised\).doc](http://www.wvdep.org/Docs/13395_QA%20Guidelines%20(PIO%20revised).doc)

Analytical methodology is normally limited to the procedures contained in the federal regulations of 40CFR136. In limited instances, where 40CFR136 does not include sampling or analytical techniques for a particular pollutant, or where 40CFR136 techniques cannot effectively characterize water quality, results obtained from alternative, scientifically-defensible analytical methodologies have been accepted. Although it is a primary consideration in the evaluation of the acceptability of monitoring results, monitoring and analysis pursuant to 40CFR136 approved methods is not mandated for Section 303(d) or 305(b) processes. 40CFR136 does not always contain approved methods for parameters with water quality criteria. In such instances, monitoring and analysis under other scientifically valid methodologies may be appropriate. For example, "free cyanide," which is commonly required in NPDES permits to be analyzed by the weak acid dissociable cyanide method contained in "Standard Methods," is similarly qualified as appropriate. In other scenarios, 40CFR136 methods may not provide the analytical sensitivity necessary for assessment, and data from alternative scientifically defensible methodologies may be accepted. ORSANCO's use of high volume monitoring techniques for assessment of dioxin in the Ohio River is a primary example.

Table 4 - Data providers for the 2008 303(d) List and Integrated Report*

Alex Energy (Massey Energy Company)	Alliance Coal, LLC	Alpha Coal and Coastal Coal
Bio-Chem Testing, Inc.	Cacapon Institute	Consolidation Coal Company
Cranesville Stone, Inc.	Friends of Cheat	Friends of Deckers Creek
Greenbrier River Watershed Association	Green Valley (Massey Energy Company)	National Park Service
New Land Leasing Company	Orchard Coal	ORSANCO
Pace Carbon West Virginia Synthetic	Patriot Mining Company, Inc.	Peerless Eagle (Massey Energy Company)
Plateau Action Network	Preston County Coal and Coke Corporation	DEP Stream Restoration Group
Upper Guyandotte Watershed Association	U.S. Army Corps of Engineers	U.S. Geological Survey
WVU Water Research Institute	West Virginia Bureau for Public Health	West Virginia Department of Agriculture
West Virginia Department of Environmental Protection	West Virginia Division of Natural Resources	West Virginia Wesleyan College

* Additional entities provided data during the draft 303(d) comment period, March 24, 2008 until June 6, 2008. See the Public Participation and Responsiveness Summary

Assessment decisions are made using the most accurate and recent data available to the agency. For stream water quality assessments, DEP generally used water quality data generated between July 2002 and June 2007. The use of data more than five years old is intentionally limited. In the absence of new information, previous assessments are carried forward even if the data becomes older than five years. Additionally, if a water quality criteria change is approved which affects an older assessment, the new assessment will only reflect the current criteria.

Waters are not deemed impaired based upon water quality data collected when stream flow conditions are less than 7Q10 flow (the seven consecutive day average low flow that recurs at a 10 year interval) or within regulatory mixing zones. Further, waters are not deemed impaired based upon “not-detected” analytical results from methodologies that have detection limits that are not sensitive enough to confirm criteria compliance.

Water Analysis Database - WabBase

The Division of Water and Waste Management has generated the majority of the available water quality data. Currently all targeted, probabilistic, and pre-TMDL development monitoring data is managed in an inhouse database (WabBase). WabBase houses most water quality, habitat, watershed characteristics, macroinvertebrate data (both raw data and calculated metrics) and supporting information collected by the Watershed Assessment Section.

External data providers

Data submitted from sources outside of the Watershed Assessment Section were considered in the development of this report. This also includes data from other DEP programs. The external data providers are listed in Table 4. Once data was submitted, the DEP performed the following:

- 💧 Determined quality and quantity
- 💧 Formatted data for evaluation
- 💧 Determined stream codes and mile points
- 💧 Used qualified data from external sources to make assessment decisions

USE ASSESSMENT PROCEDURES

The primary focus of the Integrated Report is to assess water quality information and determine if the designated uses of state waters are supported. After use assessment, waters are placed into one of five categories as described in the introduction. This section describes the various protocols used to determine use impairment and place waters on the Section 303(d) List and in Category 5 of this report. It also describes the protocols to categorize the remaining waters where uses have not been determined to be impaired. If a water has any impaired use, it is placed in Category 5. Other waters may be placed in Category 1, 2, 3, or 4 depending upon the available water quality data and TMDL development requirements and status.

303(d) Listing Methodology

Numeric water quality criteria

The EPA's most recent guidance for assessment and listing encourages decision criteria commensurate with the implementation provisions of a state's water quality standards, such as the concentration value, exposure duration and allowable exceedance frequency as described in the Water Quality Standards section. Previously, EPA has encouraged 303(d) listing decisions relative to numeric water quality criteria to be based primarily upon the frequency of exceedance of the numeric criteria and the "10-percent rule." Usually, if more than 10 percent of the observed values exceeded the concentration value of an applicable numeric criterion, then the water was considered impaired and placed on the 303(d) List.

Typically, if an ample data set exists and exceedances of chronic aquatic life protection and/or human health protection criteria occur more than 10 percent of the time, the water is considered to be impaired. If the rate of exceedance demonstrated is less than or equal to 10 percent, then the water is considered to be meeting the designated use under evaluation. Ample data sets are defined as sets with 20 or more distinct observations. If fewer than 20 samples per station or representative area exist and three or more values exceed a criterion value, then the water also is considered to be impaired. For this scenario (three observed violations), if additional non-exceeding monitoring results were available that would increase the data set size to 20 observations, a greater than 10 percent exceedance frequency would still exist.

Under West Virginia Water Quality Standards, acute aquatic life protection criteria have associated exposure durations of one hour and may be exceeded once every three years. The normal practice of "grab-sampling" ambient waters is generally consistent with the one-hour exposure duration specified in the standards. Therefore, a direct application of the allowable exceedance frequency provided in the standards is made when assessing impairment relative to acute aquatic life protection criteria. If two or more exceedances of acute criteria are observed in any three-year period, the water is considered to be impaired.

If the data being evaluated is generated as part of a comprehensive network being monitored for a specific purpose, the data may be assigned a higher level of assessment quality, and the "10-percent rule" may be applied with confidence to data sets containing less than 20 observations per station. The primary example of an intensified monitoring program that generates higher assessment quality data is that which is conducted by DEP to support TMDL development. The pre-TMDL monitoring format includes flow measurement and monthly water quality monitoring for one year at multiple locations throughout a watershed. Information is generated over a range of stream flow conditions and in all seasons. Habitat assessment and biological monitoring is performed in conjunction with water quality monitoring. The information generated under this format is among the most comprehensive available for assessing water quality. Upon conclusion of monitoring, it is then necessary for agency personnel to make a definitive judgment relative to impairment. In most instances, application of the "10-percent rule" to the pre-TMDL monitoring data sets result in the classification of waters as impaired if two or more exceedances of a criterion are demonstrated.

Table 5 summarizes the criteria used to make 303(d) impairment decisions relative to numeric water quality criteria.

Segmentation of streams

For the 2008 listing cycle, DEP has chosen to represent the majority of newly listed streams as impaired for their entire length and has only segmented newly listed streams in limited situations.

First, segmentation may be justified when a sizable impoundment is located on the stream. An impoundment acts as physical barrier between the upper and lower reaches of a stream thereby interrupting natural

Table 5 - Numeric water quality decision criteria for listing of impaired waters

Water Quality Criteria	Impairment Thresholds	Exceptions
Acute Aquatic Life Protection (Use Category B)	The water is impaired if two exceedances of acute aquatic life protection numeric criteria occur within any three-year period.	If, in the most recent three-year period, no exceedances of criteria are evidenced and at least 12 monitoring results are available, then the water is not considered impaired.
Chronic Aquatic Life Protection (Use Category B) Human Health Protection (Use Categories A and C)	<p>The water is impaired if a greater than 10% frequency of exceedance is demonstrated in an ample dataset (20 or more available observations).</p> <p>The water is impaired if three exceedances of criteria occur with less than 20 available monitoring results.</p> <p>The water is impaired if a greater than 10% frequency of exceedance is demonstrated with less than 20 available observations, if the data being evaluated is of high assessment quality (> two violations)</p>	If, for waters with regularly scheduled monitoring, in the most recent two-year period, no exceedances of criteria are evidenced and at least eight observations are available, then the water is not considered impaired.

stream flow and changing water quality. Certain physical characteristics, such as temperature and dissolved oxygen, can vary widely based on the depth at which the discharge water is drawn. Often a properly maintained impoundment removes excess sediment which can be responsible for violations of iron water quality criteria. This type of situation results in a stream being listed for violations of iron criteria above the impoundment with no violations or listings noted downstream of the impoundment.

Secondly, stream segmentation may occur when DEP has knowledge of a specific source of impairment or where biological assessments allow DEP to distinguish between impaired and clearly unimpaired segments and present the information.

Thirdly, segmentation of large watersheds, such as the Ohio River, is often necessary to provide a clear understanding of water quality impairments. It allows the presentation of information for each segment detailing the length and type of impairment. In addition, this type of segment specific information is often helpful in locating pollutant sources.

Finally, segmentation is useful in understanding changes in a stream's designated use. For example, the headwaters of certain streams are designated as trout waters based on characteristics such as temperature,

habitat and the fact they hold year round populations of trout. Occasionally, as those waters flow downstream, both temperature and habitat change to a point that they no longer support trout. As a result of these changes, the lower portion of the stream is classified as a warm water fishery. Since trout water criteria differ significantly from warm water criteria, stream segmentation is used to reflect the change in designated use.

Except for the above-mentioned scenarios, segmentation at the time of listing is generally not pursued. If segmentation is based solely upon the limited amount of water quality monitoring data that is usually available, it may not accurately portray the extent of impairment and may contradict the ultimate findings of the TMDL that the listing mandates. The DEP believes the TMDL development process, which links water quality monitoring with pollutant sources through computer modeling, provides the best assessment of criterion attainment and the most accurate identification of the watershed sources for which pollutant reductions are necessary. TMDL modeling predicts water quality over a wide range of climatic and stream flow conditions and prescribes pollutants allocations that will result in attainment of criteria in all stream segments. In contrast to the "grab sampling" associated with water quality monitoring, TMDL modeling incorporates the specific exposure duration and exceedance frequency terms of water quality criteria.

Evaluation of fecal coliform numeric criteria

Fecal coliform assessments were based on the previously described decision criteria for numeric water quality criteria. Given the complexity of this particular criteria, most assessments are performed by comparing observations to the “maximum daily” criterion value of 400 counts/100ml. Evaluation of the monthly geometric mean fecal coliform criterion (200 counts/100ml) occurs only where five or more individual sample results are available within a calendar month.

Numeric fecal coliform water quality criteria are applicable to the Water Contact Recreation and Public Water Supply designated uses. Section 8.13 of Appendix E of the West Virginia Water Quality Standards states: *Maximum allowable level of fecal coliform content for Primary Contact Recreation shall not exceed 200/100ml as a monthly geometric mean based on not less than five samples per month; nor to exceed 400/100ml in more than 10 percent of all samples taken during the month.*

A practical difficulty exists in accurate assessment of criteria compliance due to the resource commitment that would be necessary to perform monitoring at a sufficient frequency to make determinations using the geometric mean criteria, since the monthly geometric mean criterion is conditioned upon the availability of at least five distinct sample results in a month. The “maximum daily” criterion is not conditioned by a minimum sample set requirement, but practical use of the apparent 10 percent exceedance allowance would involve at least 10 samples per month.

The most frequent and regular fecal coliform water quality monitoring conducted by the Watershed Assessment Section is once per month. That monitoring frequency precludes assessment of the monthly geometric mean criterion and hampers accurate assessment of the maximum daily criterion. Due to limited resources, more frequent fecal coliform monitoring could only be accomplished by significantly reducing the number of West Virginia streams and/or stations where water quality assessments are performed. The DEP does not consider that to be a reasonable alternative.

The DEP uses the following protocols when making assessments relative to fecal coliform numeric criteria:

💧 *No assessments are based upon the monthly geometric mean criterion (200 counts/100ml) unless an available data set*

includes monitoring at five per month or greater frequency. When data sets are available, the listing decision criteria for numeric water quality criteria are applied, considering each monthly geometric mean as an available monitoring result.

💧 *The listing decision criteria are applied to the maximum daily criterion (400 counts/100ml) and available individual monitoring results, but without the monthly prejudice. For example, if twice per month monitoring is conducted for a year and two results in two separate months are greater than 400, the stream would be assessed as fully supporting (2/24 – 8.3 percent rate of exceedance) rather than insufficient data (two months per 12 months exceedance). If five samples per month monitoring is conducted for one year and four daily results greater than 400 are measured in four different months, the stream would be assessed as fully supporting (4/60 – 6.7 percent rate of exceedance) rather than nonsupporting (four months per 12 months exceedance), provided that the monthly geometric means were below the 200 counts/100 ml criteria.*

The decision criteria does not provide for 303(d) listing of waters with severely limited data sets and exceedance (i.e., one sample in a five-year period > 400 counts/100ml). Such waters would be classified as having insufficient data available for use assessment. DEP will target these “fecal one-hit” waters for additional monitoring by incorporating them into the pre-TMDL monitoring plans at the next opportunity for TMDL development in their watershed. Where the intensified pre-TMDL monitoring (monthly sampling for one year) indicates impairment, TMDL development will be immediately initiated, even though the water may not be included in Category 5 of the current Integrated Report.

Evaluation of pH numeric water quality criteria data

For the 2006 303(d) List, the DEP evaluated all recent (July 2000 – June 2005) pH water quality data under the previously described listing criteria requirements for numeric water quality criteria. Waters were identified as impaired for pH if the data exceeded listing requirements criteria or if the water was previously listed and insufficient new data were available to reassess the water. The impaired lengths of certain streams were adjusted to recognize ongoing limestone treatment operations that have resulted in the attainment of the pH criterion in the treated segments.

Narrative water quality criteria – biological impairment data

The narrative water quality criterion of 47CSR2 – 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. Streams with WVSCI scores of less than 60.6 are considered biologically impaired and included on the 303(d) List. Benthic macroinvertebrates are collected with a 500 mm mesh rectangular dip net. The kick sample is collected from the 1.0 m² area of substrate. Identifications are completed for a 200-organism subsample. The WVSCI was developed from data using these methods. Streams are listed as being biologically impaired only if the data was comparable (e.g., collected utilizing the same methods used to develop the WVSCI, adequate flow in riffle/run habitat, and within the current index period).

Most streams with low biological scores are listed as having an unknown

source/cause of impairment on the 303(d) List and most are listed, by default, for their entire length. It is doubtful that the entire length of every 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 causative stressor(s) of the impairment and the contributing sources of pollution also will be identified during the TMDL development process. If the stressor identification process demonstrates that the biological impairment is not caused by a pollutant, then no TMDL will be developed.

Certain biologically impaired streams have been evaluated but they were not immediately placed on the 303(d) List or in Category 5. The impairment source for these streams has been linked to a pollutant for which a TMDL has already been developed. An example scenario would be a low biological score on a stream that has a TMDL developed for mine drainage. If the pollutant reductions specified by the TMDL are achieved, the biological community would likely restore itself. In these cases, after careful evaluation, the stream was not listed or placed in Category 5 because the full implementation of an existing TMDL is expected to correct the problem. If implementation of the TMDL resolves the pollutant



Nick Murray working on collecting a benthic sample in Glady Fork in Randolph County
Photo by Jeff Bailey

specific impairment but biological scores remain low, then the biological impairment would be listed and the stream would return to Category 5.

Narrative water quality criteria – fish consumption advisories

The narrative water quality criterion of 47CSR2 – 3.2.e prohibits the presence of materials in concentrations that are harmful, hazardous or toxic to man, animal or aquatic life in state waters. Fish consumption advisories are used to inform the public about potential health risks associated with eating fish from West Virginia's streams. The DEP, DNR, and the Bureau for Public Health have collaborated on fish contamination issues since the 1980s; however, an executive order by the governor in 2000 mandated a formal collaborative process to issue fish consumption advisories. Fish consumption advisories are developed and issued in accordance with an interagency agreement. In the absence of specific body-burden criteria, the presence of contaminants in fish tissue in amounts equivalent to a two meal per month advisory is considered sufficient evidence of impairment.

Risk-based principles are used to determine whether fish consumption advisories are necessary. These advisories are used as a public education tool to help citizens make informed decisions about eating fish caught in state streams. The risk-based approach estimates the probability of adverse health effects and provides a statement on the health risk facing the angler and high-risk groups including women of childbearing age and children. West Virginia's fish consumption advisories include guidelines on the number of meals to eat and information on proper fish preparation to further minimize risk.

Waterbody-specific fish consumption advisories are on 13 state streams and four lakes for a variety of fish species and contaminants. Additionally, there is a general statewide advisory that recommends limiting the consumption of certain sport-caught fish from all West Virginia waters in relation to low-level mercury and/or polychlorinated biphenyl (PCB) contamination. The statewide advisory provides species-specific recommendations ranging from one meal per week to one meal per month.

The listing of waters based on fish consumption advisories is strongly supported by EPA. For PCBs, waters are considered impaired if at least one monitoring result for tissue from a commonly consumed species exceeds the two meal per month advisory trigger. In regard to mercury,

West Virginia water quality standards contain a numeric body-burden criterion for methylmercury in fish tissue. The criterion for protection of public water supply and water contact recreation designated uses is 0.5 µg/g. In the Ohio River, the applicable ORSANCO body-burden criterion is 0.3 µg/g. Fish tissue mercury impairment decisions are based upon a direct comparison of available observations to the body-burden criteria.

Categorization of nonimpaired waters

The following paragraphs describe protocols used to determine use support and to place waters in either Category 1, 2, or 3.

Use support

Stream segments that support all of the designated uses are placed in Category 1. This section describes the guidelines used by the DEP to demonstrate use-support for each of the designated uses.

Not all parameters with applicable numeric criteria must be monitored to determine use support. A supporting assessment is made if certain mandatory parameters have been monitored and those results demonstrate compliance with criteria. If monitoring results are available for "non-mandatory" parameters, they also must indicate compliance with the criteria for those parameters if a fully supporting assessment is made. For limited data sets (less than 20 samples per station), no criteria exceedances can be evident. If 20 samples per station or more are available, then compliance would be determined by application of the listing criteria (i.e., less than 10 percent exceedance rate for chronic aquatic life and human health criteria, less than two violations of acute criteria in a three-year period, no violations in the most recent two- or three-year period, as applicable).

Category B (aquatic life) designated uses

For this use to be supported, biomonitoring must have been performed and results must show a WVSCI score > 68.0. Also, there must not be any exceedance of any other aquatic life protection water quality criteria (less than 20 samples per station) or any exceedance of listing criteria (20 samples per station or more).

The WVSCI methodology can be applied only to wadeable streams. Most nonwadeable streams are part of the Ambient Water Quality Monitoring Network and are sampled every two months for a variety of pollutant

parameters. If no exceedance of listing criteria (for aquatic life criteria) is demonstrated and no other information demonstrates adverse impact to aquatic ecosystems, then the aquatic life use is considered supported.

Category A (public water supply) and C (contact recreation) designated uses

For these uses to be supported, at least one fecal coliform monitoring result less than 400 counts/100ml must be available. Also, there must not be any exceedance of any other human health protection water quality criteria (less than 20 samples per station) or any exceedance of listing criteria (20 samples per station or more) for the uses to be supported.

Category D (agriculture and wildlife) and E (water supply industrial, water transport, cooling and power) designated uses

For these uses to be supported, pH and dissolved oxygen must have been monitored and results must indicate compliance with criteria. Also, there must not be any exceedance of any other Category D and E water quality criteria (less than 20 samples per station) or any exceedance of listing criteria (20 samples per station or more).

Insufficient data

Stream segments without sufficient data to determine use support or impairment may be placed in either Category 2 or 3. Category 2 houses waters with some uses determined to be supported, but lacking sufficient information to assess other uses. Waters are placed in Category 3 if insufficient or no information exists to determine if any of the uses are being met.

The use is not assessed when there is some water quality data available, but not enough to conclude that the use is fully supporting or not supporting. The following situations produce an insufficient data designation:

- 💧 Instream monitoring results demonstrated criteria exceedances, but at a frequency insufficient to deem the use impaired
- 💧 Water quality data is available for some parameters but is not available for mandatory parameters
- 💧 Biological assessment returned a gray result (WVSCI score between 60.6 and 68.0)

A use is not assessed if a stream has not been sampled within the last 15 years for any parameter that has an applicable water quality criteria for the use being evaluated.



Cow Creek in Putnam County
Photo by Doug Wood

ASSESSMENT RESULTS

This section contains the results from all the data that has been assessed for West Virginia waterbodies. Table 6 shows a summary of the classification of West Virginia waters under the five “Integrated Report” categories (see page 5). The results reveal that 27% of West Virginia’s stream miles are in either Category 1 or 2 (fully supporting all or some assessed uses).

Table 6 - 2008 Category Summary Report for West Virginia					
LAKES					
Type	CATEGORY	# of lakes	% lakes	acres	% acres
Lake	1	27	21	1055	5
Lake	2	42	32	5219	24
Lake	3	41	32	77	0
Lake	4a	9	7	193	1
Lake	5	11	8	15036	70
	TOTAL	130	100	21580	100
STREAMS					
Type	CATEGORY	# of stream segments	% stream segments	miles of streams	% miles
Stream	1	1295	12	4831	16
Stream	2	875	8	3250	11
Stream	3	6779	62	12066	40
Stream	4a	999	9	3981	13
Stream	4b	2	0	2	0
Stream	4c	36	0	35	0
Stream	5	971	9	6157	20
	TOTAL	10957	100	30322	100

Category 3, streams with insufficient data, makes up 40% of stream miles, the largest percentage of the five categories. However, that number is somewhat deceiving. The streams with limited data are typically small unnamed tributaries, which usually contribute to the larger waterbodies which have been assessed. All major rivers in the state; the Kanawha,

Monongahela and Little Kanawha rivers, have data and have been assessed and placed into one of the other four categories. One-third of West Virginia’s streams are impaired and fall into either Category 4 or 5.

Category 1, Category 2, and Category 3 waters are quite large, therefore, they are not published in this document. The three categories can be viewed on DEP’s website, www.wvdep.org. Waters listed in category 4 are included in the supplements toward the back of this document in Supplemental B, B1, and D sections. Category 5 waters are included in the document and is the 303(d) List. 2

Category 5 includes 971 impaired stream segments, covering approximately 6,157 stream miles that are impaired and need TMDLs developed. This number has decreased from 6,595 miles of impaired streams identified on the 2006 list. The decrease is due, in part, to numerous TMDLs that have been developed and approved since publication of the 2006 report.

Table 7 contains a detailed breakdown of use support specific to the use categories for West Virginia waters as set forth in the Water Quality Standards (47CSR2).

The most common impairments of West Virginia waters are:

- 💧 Biological impairment, as determined through application of the West Virginia Stream Condition Index
- 💧 Bacterial contamination evidenced by exceedance of numeric water quality criteria for fecal coliform
- 💧 Exceedance of numeric water quality criteria for pollutants associated with mine drainage (low pH, and high concentration of iron, aluminum, and/or manganese)
- 💧 Hg and PCB fish tissue contamination, and
- 💧 Low pH associated with acid rain

The list and the summary results of Tables 8 and 9 provide an overview of the impairment status of West Virginia waters. An alternative mechanism for assessing general status and the relative impacts of various causes and sources is provided by DEP’s Probabilistic Monitoring Program. The program and assessment results are described in the Probabilistic Data Summary section.

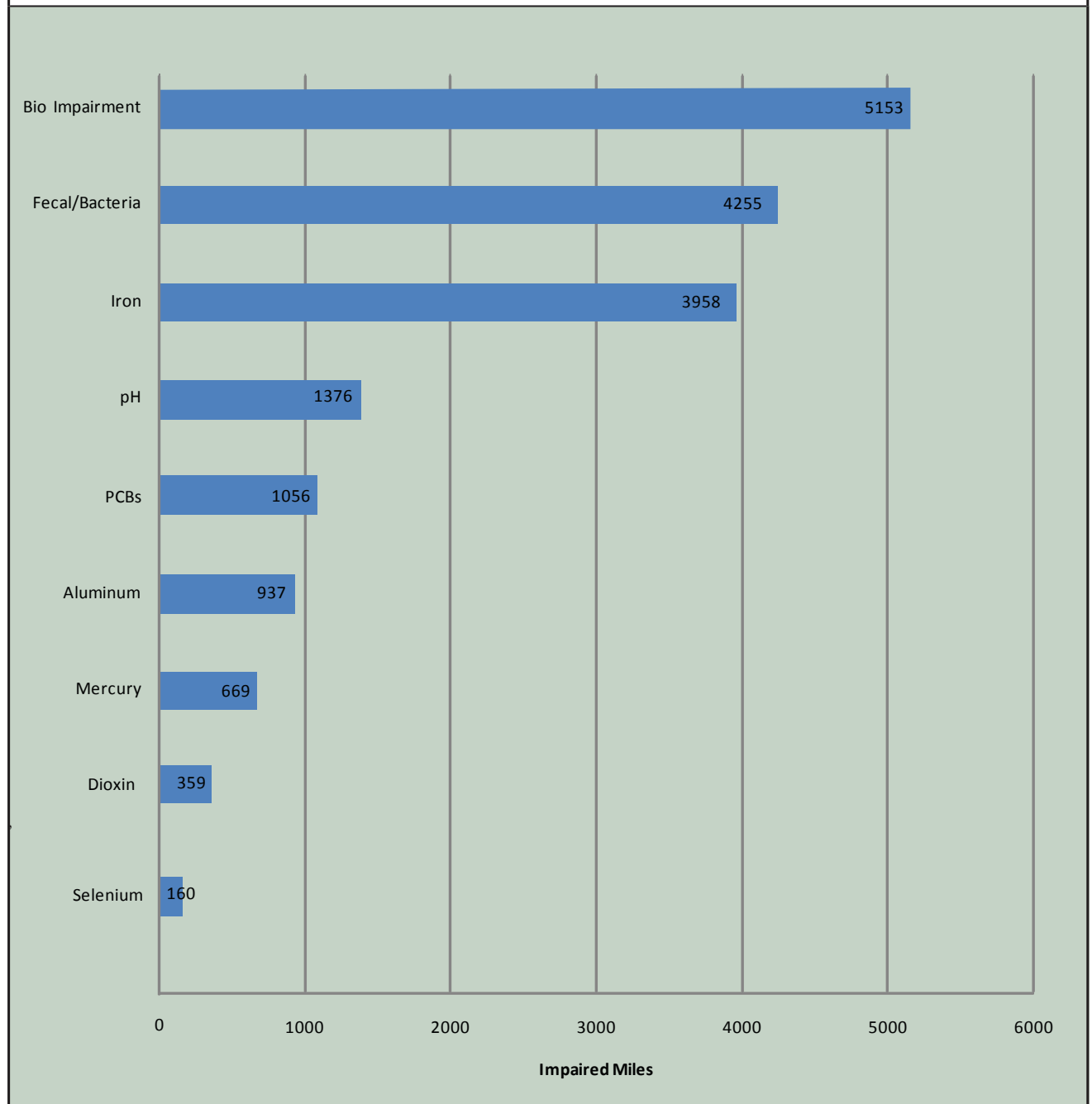
Table 7 - West Virginia use support summary

LAKES																		
Designated Use	Number of Lakes	Size (acres)	Fully Supporting				Insufficient Data				Not Assessed				Not Supporting			
			#	%	Acres	%	#	%	Acres	%	#	%	Acres	%	#	%	Acres	%
A - Public Water	130	21580	27	21	1055	5	43	33	5263	24	40	31	33	0	20	15	15229	71
B1 - Warm Water Fishery	111	16241	26	23	1065	7	27	24	4114	25	40	36	33	0	18	16	11029	68
B2 - Troutwater	19	5339	12	63	1014	19	5	26	125	2	0	0	0	0	2	11	4200	79
C - Contact Recreation	130	21580	66	51	3878	18	5	4	2452	11	47	36	206	1	12	9	15044	70
D - Agriculture and Wildlife	130	21580	70	54	6994	32	2	2	56	0	50	38	5324	25	8	6	9206	43
E -Industrial	130	21580	70	54	6994	32	2	2	56	0	50	38	5324	25	8	6	9206	43
Total	130	21580																
STREAMS																		
Designated Use	Number of Stream Segments	Size (miles)	Fully Supporting				Insufficient Data				Not Assessed				Not Supporting			
			#	%	Miles	%	#	%	Miles	%	#	%	Miles	%	#	%	Miles	%
A - Public Water	10954	30316	2329	21	9150	30	498	5	2098	7	6682	61	11749	39	1445	13	7319	24
B1 - Warm Water Fishery	9986	25466	1131	11	4115	16	955	10	3142	12	6385	64	11049	43	1515	15	7160	28
B2 - Troutwater	971	4856	360	37	1986	41	125	13	766	16	294	30	694	14	192	20	1410	29
C - Contact Recreation	10957	30322	2589	24	10058	33	586	5	2514	8	6698	61	11780	39	1084	10	5970	20
D - Agriculture and Wildlife	10956	30322	3524	32	15407	51	228	2	650	2	6698	61	11780	39	507	5	2485	8
E -Industrial	10957	30322	3524	32	15407	51	227	2	650	2	6698	61	11780	39	508	5	2485	8
Total	10957	30322																

Table 8 - Summary of the causes for impaired streams

TYPE	CAUSE	SIZE (acres)
Lake	Mercury	12018
Lake	PCBs	9198
Lake	Sedimentation/ Siltation	193
Lake	Trophic State Index	100
Lake	Iron	54
Lake	DO	8
TYPE	CAUSE	SIZE (miles)
Stream	Fluoride	0.2
Stream	Temperature, water	2.3
Stream	Ammonia	5.4
Stream	Chloride	21.6
Stream	Lead	23.3
Stream	DO	23.4
Stream	Nitrite	30.7
Stream	Low Flow Alterations	44.3
Stream	Manganese	78
Stream	Zinc	92.1
Stream	Selenium	160
Stream	Dioxin	359
Stream	Mercury	669
Stream	Aluminum	937
Stream	PCBs	1056
Stream	pH	1376
Stream	Iron	3958
Stream	Fecal/Bacteria	4255
Stream	Bio-Impairment	5153

Table 9 - Number of miles for the leading causes of West Virginia impaired streams



Probabilistic Data Summary

The probabilistic design used for this report was stratified to ensure adequate coverage across all watersheds and allows the state to characterize overall water quality conditions at the watershed (USGS 8-digit HUC) level in addition to providing statewide estimates of condition. The goal of any probabilistic program is to provide statistically unbiased estimates of stream condition throughout a particular region (i.e., watershed, ecoregion or state) without assessing every single stream mile in that region. This approach can be used to describe various aspects of stream conditions including, the proportion of stream miles with biological impairment, the proportion of stream miles with specific water quality criteria violations, and to characterize the relative importance of stressors such as sedimentation or acid precipitation.

In 2006, West Virginia completed its second 5-year cycle using a sample design that provided data from 750 sites from wadeable streams statewide. The target population for this effort was small to medium sized (1-4th order) wadeable streams. Ninety-eight percent of West Virginia's stream miles are of this size class and approximately 70% of these are wadeable. This level of effort allows for estimations of conditions across the state with a high degree of confidence. The sites are spread across 25 watersheds and watershed groupings (some small watersheds are combined with adjacent ones) and allow estimates of conditions at this scale, but with lesser confidence. Six sites were sampled in each of the 25 watersheds each year, resulting in 30 samples per watershed at the end of the five-year design. While this design does allow for watershed level characterizations following the completion of the cycle, describing these estimates for the more broad classification of Level 3 Ecoregions reduces the uncertainties around the different estimates of condition. Results for this second 5-year effort (2002-2006) have been summarized for this report and are described in terms of Ecoregions.

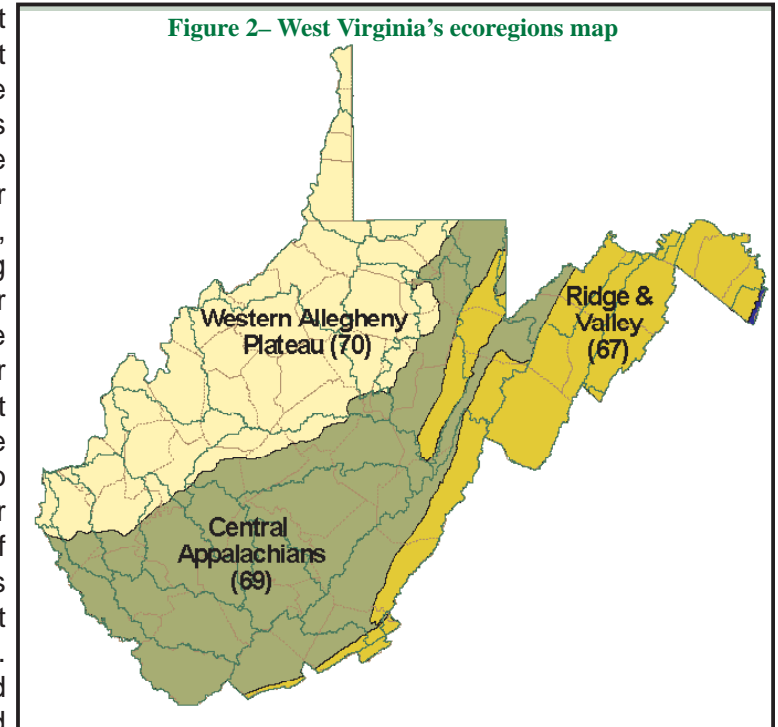
The sites for this second 5-year effort were selected with slightly different design criteria than the first cycle and problems developed in trying to compare one data set with the other. The first 5-year cycle included more of the larger order streams, which was a result of both the fact that the original target universe included up to 5th order streams and the fact that several watersheds were sampled in drought years that forced assessments into

the larger streams because they were the only ones with flows adequate to sample. These differences in approach are most evident when looking at stream characteristics that would be expected to have an upstream / downstream gradient. For example, sedimentation problems often are not evident in headwater streams because the slope of these streams is such that sand and silt don't settle out until it reaches the slower, flatter sections. So, by sampling a higher percentage of headwater streams, it might be expected to see a lower percentage of stream miles with sediment problems. The 3rd 5-year round

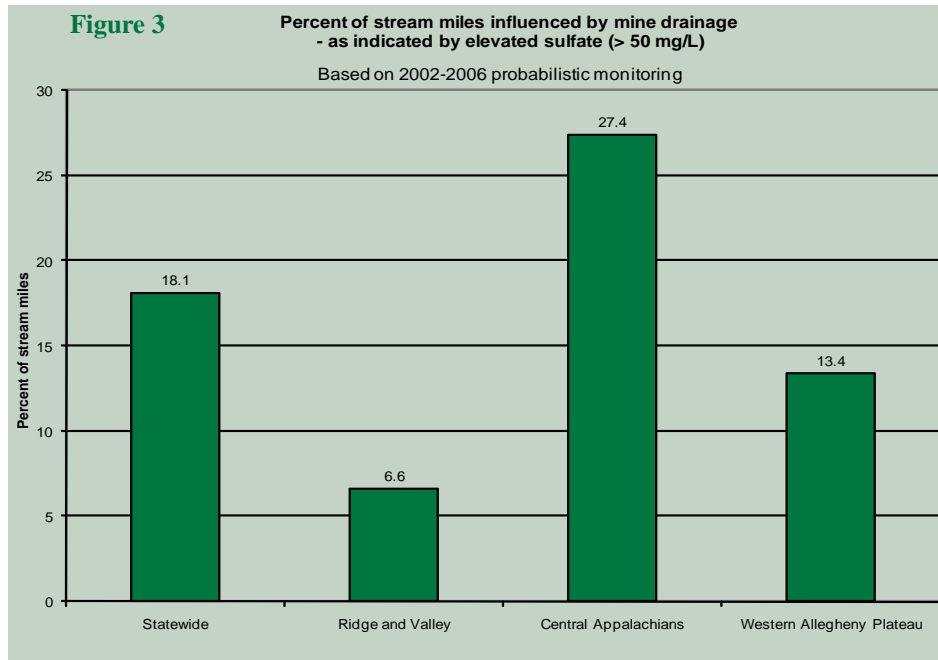
of probabilistic monitoring was started in 2007 and will allow statistically valid trend analyses to be possible in the future.

Mine drainage

Mine drainage streams may be impaired by low pH and/or elevated concentrations of metals, including iron, aluminum, and manganese. Other dissolved ions such as sulfate may also be present in concentrations above ambient levels. A sulfate concentration greater than 50 mg/L was used to identify probabilistic sites influenced by mine drainage. Following this guideline, approximately 18.1% of the stream miles statewide are influenced by mine drainage (Figure 3). Observed on an ecoregional basis, mine drainage influences a greater proportion of stream miles in the coal rich Central Appalachians (Ecoregion 69) than in the Ridge and Valley (Ecoregion 67) or Western Allegheny Plateau (Ecoregion 70). About

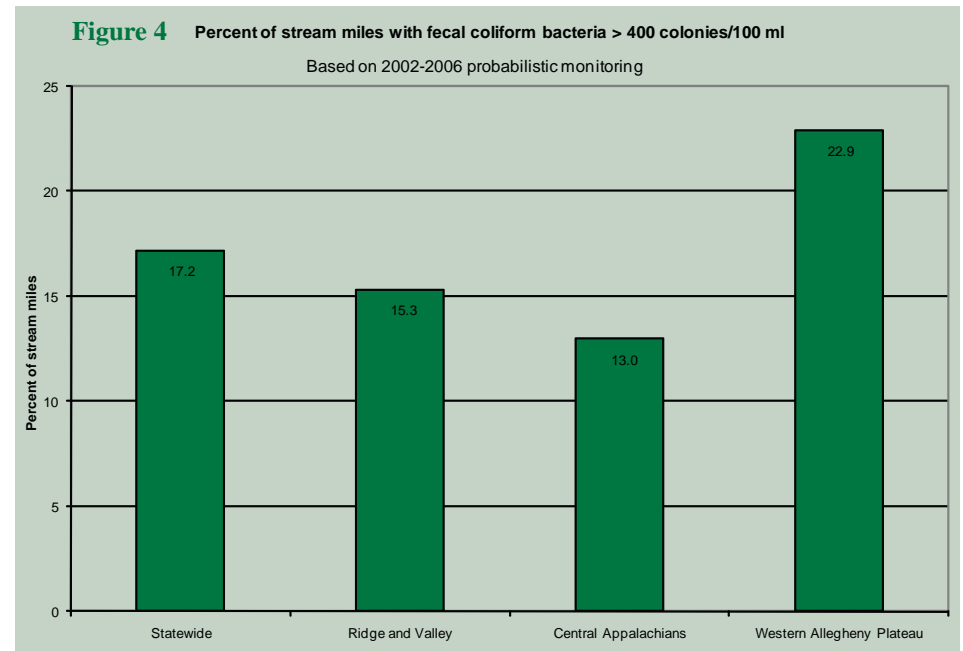


27.4% of the stream miles in the Central Appalachians are influenced by mine drainage. Contrastingly, about 6.6% and 13.4% of stream miles are influenced by mine drainage in the Ridge and Valley and Western Allegheny Plateau, respectively.



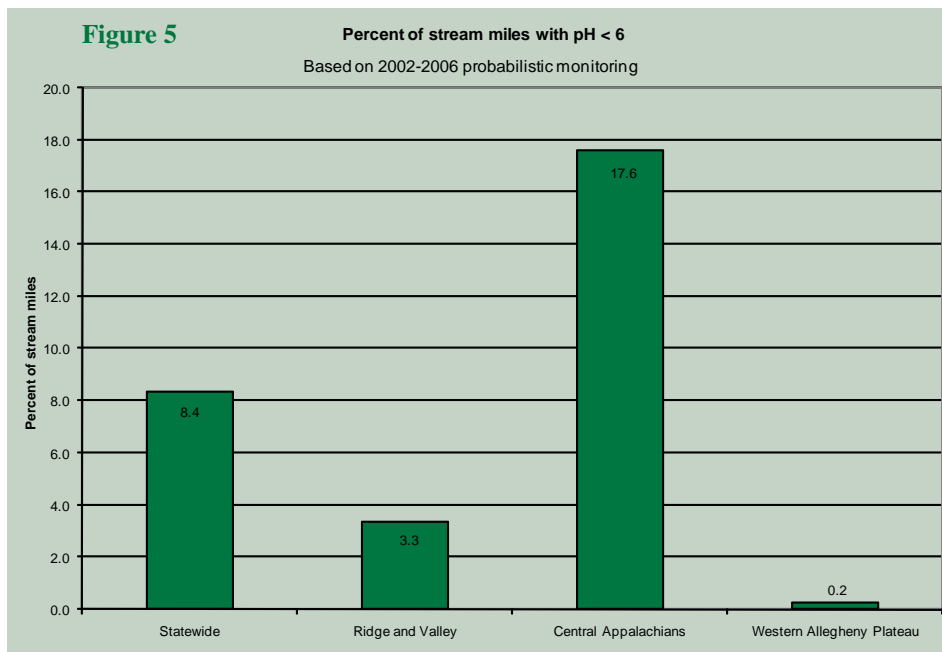
Bacterial contamination

Many West Virginia waters contain elevated levels of fecal coliform bacteria. Contributors to the problem include leaking or overflowing sewage collection systems, illegal homeowner sewage discharges by straight pipes or failing septic systems, and runoff from urban or residential areas and agricultural lands. Based on probabilistic data, about 17.2% of stream miles in the state have fecal coliform bacteria levels that exceed the criterion of 400 colonies/100mL (Figure 4). In general, watersheds in the more developed regions of the state had a greater proportion of stream miles exceeding the criterion. The proportion of stream miles violating the criterion was highest in the Western Allegheny Plateau ecoregion (22.9% of stream miles) and somewhat lower in the Central Appalachians (13.0% of stream miles) and the Ridge and Valley ecoregions (15.3% of stream miles). It should be noted that the probabilistic monitoring is performed at baseflow conditions. Because samples are not collected during storm runoff events, bacteria levels that would likely increase under these higher flow conditions are not accounted for in this assessment.



Acidity

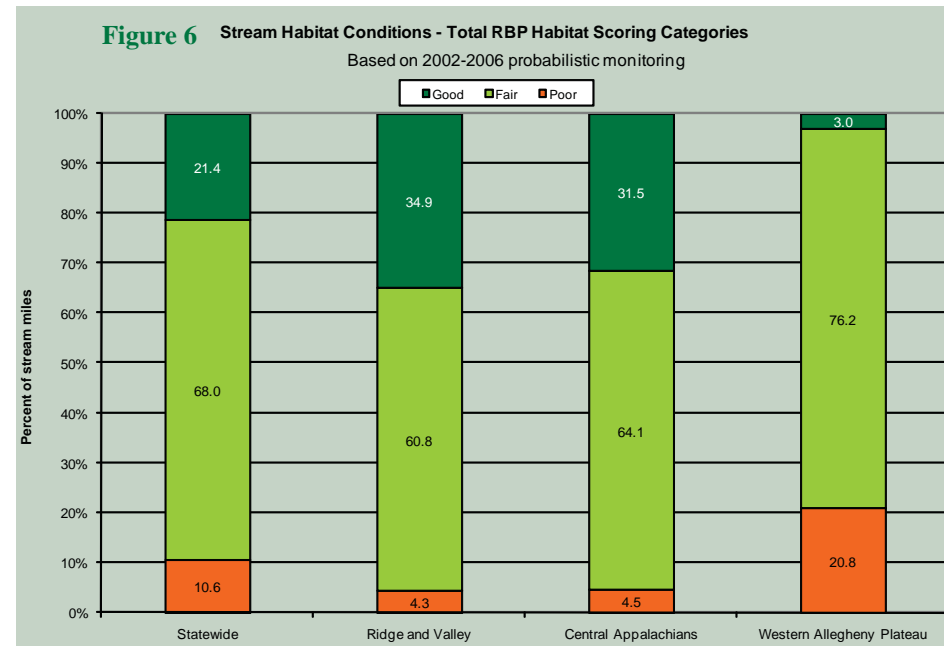
The aquatic life communities in the headwater sections of many West Virginia waters continue to be impacted by low pH acidic water quality. The impairment is most prevalent in watersheds with soils of low buffering capacity and most often caused by acid precipitation and less often (but more severely) by acid mine drainage. An evaluation of probabilistic data indicates that approximately 8.4% of the stream miles in the state have pH values below 6.0 (Figure 5). Most of the stream miles identified as impacted by acidic waters are in the Central Appalachians ecoregion, representing 17.6% of the stream miles within this area. Specifically, the Forested Hills and Mountains section of this ecoregion are largely susceptible to acid deposition impacts due to infertile soils and resistant sandstones of the Pottsville group. The Ridge and Valley ecoregion is less susceptible to the impacts of acid deposition with geologic materials such as limestone and shale providing more buffering capacity to neutralize acid precipitation. Nonetheless, probabilistic data indicates that approximately 3.3% of the stream miles in this ecoregion are impacted by acidic conditions. There are almost no stream miles with impacts attributed to acidic conditions in the Western Allegheny Plateau ecoregion. Again, this ecoregion has well buffered soils that limit the impacts of acid precipitation and acid mine drainage.



Habitat quality

It is nearly impossible to accurately interpret the biological health of streams without measuring various aspects of habitat quality. During the course of probabilistic sampling, DEP personnel collected data on many features of both riparian and instream habitat known to be important to the biological communities of streams. Habitat parameters from U.S. EPA's Rapid Bioassessment Protocol (RBP) were measured. These include measures of the amount of sediment and embeddedness in the stream channel as well as measures of the vegetation along the bank and riparian zone in the stream corridor. Specifically, ten characteristics are scored (0-20) based on their quality and then combined to assess the overall physical habitat condition of the site. The overall scores (Total RBP Habitat) were categorized as good, fair, or poor (Figure 6). Based on probabilistic data, about 21.4% of stream miles have good habitat quality (Total RBP score of 160 or greater), 68.0% of stream miles have fair habitat quality (110–159), and 10.6% of stream miles have poor habitat quality (< 110). While these categorical thresholds are somewhat arbitrary, they do provide a good comparison of one area to another.

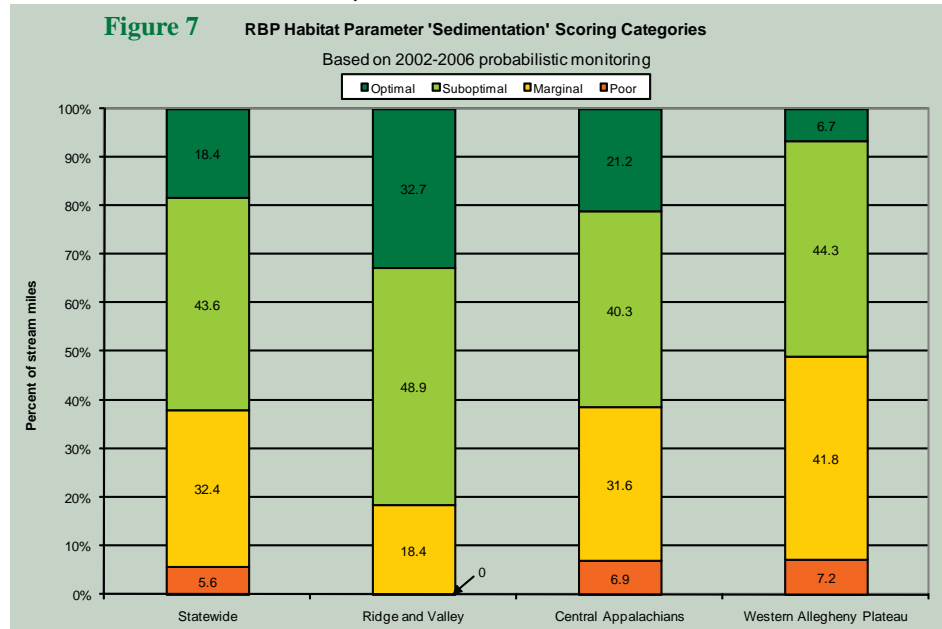
The Ridge and Valley and Central Appalachians ecoregions are similar with respect to overall habitat quality. Over 30% of stream miles in each



of these ecoregions are of good quality and less than 5% are poor with respect to overall habitat quality. In comparison, habitat quality scores are lower in the Western Allegheny Plateau. The presence of more widespread development and factors such as higher rates of soil erosion in this ecoregion are potential causes for only 3% of its stream miles being rated as good in overall habitat quality. Additionally, the proportion of stream miles with poor habitat quality (20.8%) is substantially higher in this ecoregion. It is important to consider that the greatest proportion (over 75%) of stream miles in the state are in the fair or lower habitat categories. This indicates that most of the state's stream miles have at least some degree of habitat perturbation degradation.

Although DEP may gain insight into overall habitat conditions by combining the individual measures, it is useful to examine specific habitat characteristics. Sedimentation is one of the most important problems facing West Virginia streams. Important sources of increased sedimentation include agricultural activities, mining, logging, oil/gas, roads, urban and suburban development, and removal of stream bank and riparian vegetation. The effects of sediment deposition on stream biota are well known and include interference with respiration and the smothering of physical habitat. The categories used to rate the individual habitat

characteristics are labeled as optimal, suboptimal, marginal, and poor (which match the field assessment forms). Sedimentation results for the state as a whole indicate that 5.6% of stream miles are in poor condition, 32.4% stream miles are marginal, 43.6% of stream miles are suboptimal, and 18.4% of stream miles are in optimal condition (Figure 7). As with the overall habitat scores, the widespread impacts of sedimentation in West Virginia are apparent in that over 80% of the wadeable streams miles in the state score less than optimal.



The Ridge and Valley Ecoregion is better than both the Central Appalachian or the Western Allegheny Plateau ecoregions regarding sedimentation. In the Ridge and Valley ecoregion, 32.7% of stream miles are in optimal condition and zero are in poor condition. Results for the Central Appalachians are poorer than the Ridge and Valley ecoregion but better than the Western Allegheny Plateau ecoregion, with 21.2% of stream miles in optimal condition and 6.9% of stream miles in poor condition. The Western Allegheny Plateau continued to show substantial problems in habitat quality. In contrast to the Ridge and Valley, less than 7% of stream miles in this ecoregion are in optimal condition and just under 50% of stream miles are in poor or marginal condition in terms of sedimentation. The presence of more widespread development and higher rates of soil erosion in this ecoregion are potential causes of the observed increase in sedimentation and resultant decrease in habitat quality.

Biological impairment

The biological communities living in West Virginia streams are exposed to many stressors, including toxic contaminants, sedimentation, nutrient enrichment, and acid precipitation. DEP uses benthic macroinvertebrates to assess the biological condition of streams in the state. These organisms provide reliable information on water and habitat quality in streams. They are extremely diverse and exhibit a wide range of tolerances to pollutants. Further, they serve as an excellent tool for measuring overall ecological health, especially when summarized into a single index of biological integrity. In West Virginia, the health of benthic macroinvertebrate communities are rated using a multimetric index developed for use in wadeable streams. The WVSCI is composed of six metrics (each measuring a different aspect of the community) that were selected to maximize discrimination between streams with known impairments and reference streams. Based on the WVSCI impairment threshold of 60.6 (0–100 scale) WVSCI, about 24.4% of wadeable stream miles in the state are in poor condition (i.e. impaired), while 66.5% of stream miles are not impaired and 9.1% are inconclusive (Figure 8). More than 30% (32.2%) of the wadeable stream miles in the Western Allegheny Plateau were impaired. In contrast, the Ridge and Valley and Central Appalachians ecoregions had substantially lower percentages (15.2% and 21.8%, respectively) of wadeable stream miles rated as impaired biologically. Poorer habitat conditions in the Western

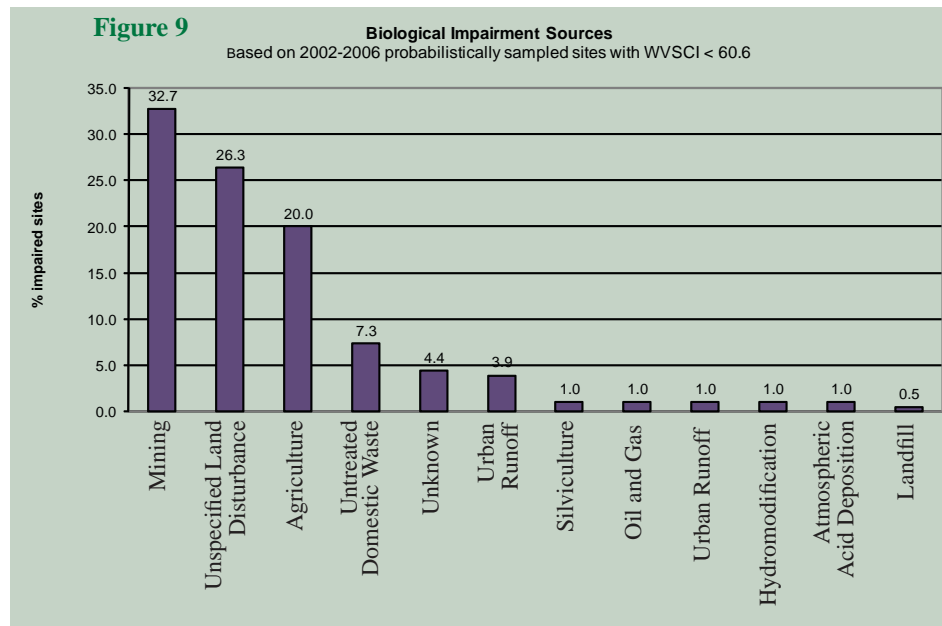


Allegheny Plateau, especially those related to sedimentation, are likely to be at least partially responsible for the higher proportion of stream miles rated as impaired biologically.

Sources of bio-impairment

The results of the 2002-2006 probabilistic sampling revealed that 205 out of 753 samples received a WVSCI score of 60.6 or less. Benthic macroinvertebrate communities that score within this range are considered impaired, and the DEP would describe them as not supporting their aquatic life use designation.

Twelve categories of major sources of biological impairment were determined using water chemistry analyses, narrative descriptions by sampling personnel, benthic community characteristics, and several Geographic Information System data layers depicting landuse activities. Each of the 205 sites was assigned a primary source of impairment from one of the 12 categories. For sites with possibly more than one source of impairment, the most obvious source was listed. Of the 205 bio-impaired sites, mining affected almost 33 percent. The next highest sources of impairment are 'unspecified land disturbance' and agriculture. Unspecified land disturbances are characterized by heavy sand and sedimentation associated with dirt roads, poor riparian zones, and highly eroded areas.



Major Basin Summaries

Guyandotte River

The Guyandotte River is divided into upper and lower sections. The confluence of Island Creek and the Guyandotte River defines the boundary between the Upper and Lower Guyandotte watersheds - The impairments of the Upper Guyandotte River mainstem (fecal coliform, total iron and biological impairment) and the Lower Guyandotte River mainstem (fecal coliform, total iron) are addressed by TMDLs developed by EPA Region III in 2004. In that effort, EPA also developed TMDLs for numerous Guyandotte River tributaries predominantly impaired by mine drainage. Currently, there are 44 streams within the Upper Guyandotte Basin and 52 streams in the Lower Guyandotte Basin which are listed as biologically impaired and in need of TMDLs.

Kanawha River and major tributaries (New, Bluestone, Greenbrier, Gauley, Elk and Coal rivers)

The Kanawha River is divided into two major sections with the break occurring at the mouth of the Elk River. The Upper Kanawha Basin extends upstream to the confluence of the New and Gauley Rivers in Gauley Bridge. The Lower Kanawha Basin begins at the mouth of the Elk River and extends downstream to its confluence with the Ohio River in Point Pleasant.

The entire Kanawha River mainstem, Bluestone River and Bluestone Lake are listed as impaired because of fish consumption advisories related to elevated fish tissue concentrations of Polychlorinated Biphenyls (PCBs).

Fecal coliform impairments have been identified in portions of the Lower Kanawha River mainstem and in all of the major tributaries of the Kanawha River. Affected segments include the New River (mouth to Bluestone Dam), the Elk River (mouth to river mile 27.2), and the entire lengths of the Bluestone, Coal, and Greenbrier Rivers.

Previous EPA TMDL development efforts addressed dioxin impairments of the Lower Kanawha River and tributaries (September 2000) and metals impairments of the Elk River and tributaries (September 2001). The West Virginia Department of Environmental Protection finalized numerous TMDLs for impaired tributaries of the Upper Kanawha River in January 2005. Additionally, DEP developed TMDLs for the Coal River

and numerous impaired tributaries that were approved by the EPA in September 2006. DEP also developed numerous TMDLS in the Gauley, New, Greenbrier and Bluestone watersheds in 2008.

Monongahela River and major tributaries (Cheat, Tygart and West Fork rivers)

Between March 2001 and September 2002, EPA developed TMDLS addressing the iron, aluminum, manganese and pH impairments of the Monongahela, Cheat, Tygart and West Fork Rivers and numerous tributary waters.

Fecal coliform impairments have been identified in the Monongahela River (entire length), the Tygart Valley River (entire length), and the West Fork River (mouth to Stonewall Jackson Lake Dam). The same segment of the West Fork River is also biologically impaired, has a dissolved zinc water quality criteria impairment, and a consumption advisory related to elevated fish tissue concentrations of Polychlorinated Biphenyls (PCBs). Additionally, the entire length of the Monongahela River continues to be listed for PCBs. Stonewall Jackson Lake, Cheat Lake and Tygart Lake are all listed as impaired for mercury. Cheat and Tygart Lakes are listed for PCBs. The mercury and PCB listings of these lakes are based on elevated fish tissue concentrations and fish consumption advisories.

Cheat River Watershed TMDLS

The DEP and the EPA have initiated a large-scale revision of the Cheat River watershed TMDLS that the EPA developed in 2001. At present, pre-TMDL monitoring, impairment assessments, and source tracking and characterization activities have been completed and a work directive issued to perform water quality modeling. This effort is scheduled to be finalized in December 2009. The revision will involve re-evaluation of the metals and pH impairments associated with the 2001 TMDLS, in light of the aluminum and manganese water quality standard revisions that have occurred and the various water quality improvement projects in place throughout the watershed. In addition to the re-evaluation component, the new effort will also develop TMDLS for streams in the watershed where fecal coliform bacteria and/or biological impairments have been identified. It is important to note that the pH water quality conditions of the Cheat River mainstem and Cheat Lake have shown drastic improvement in recent times. The West Virginia Division of Natural Resources' limestone drum station on the Blackwater River and its application of limestone fines

to headwater streams impacted by acid rain have restored many miles of trout water and recent pH data at the head of Cheat Lake has consistently indicated no impairment for the last four years. Several AMD restoration projects have also been completed in the watershed.

Little Kanawha River

A small headwater section from river mile 162 upstream to the headwaters is currently listed for pH impairment. The segment of the river from Burnsville Dam (river mile 132.6) downstream to the mouth is impaired by fecal coliform and mercury, due to a fish consumption advisory. Finally, the entire river is now listed for PCB due to a fish consumption advisory.

Previously, EPA developed iron and aluminum TMDLS for the mainstem and several tributaries. The previously developed total aluminum TMDLS are now obsolete due to the criteria revisions that occurred in 2006. In addition, DEP has received approval from EPA for TMDLS on four additional tributaries for total iron, pH and biological impairments.

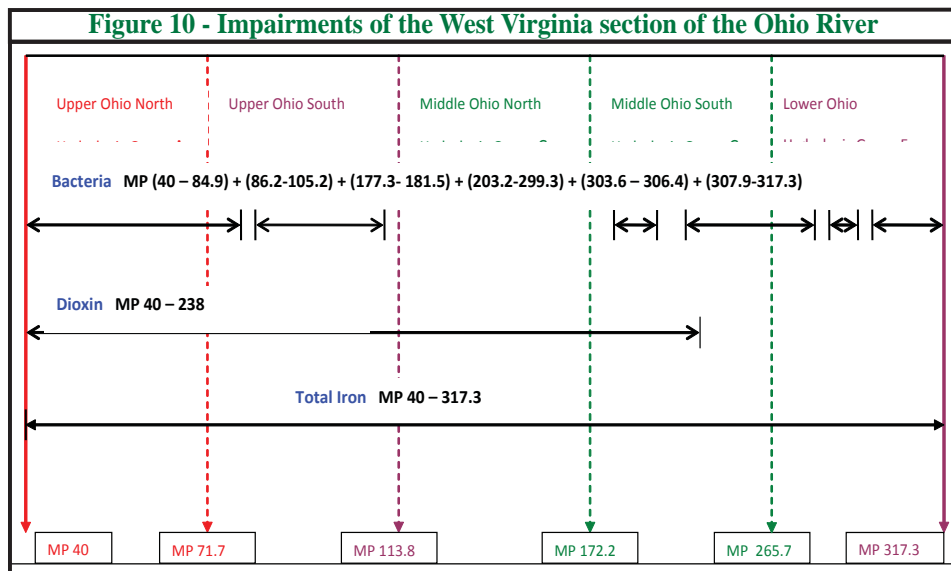
Ohio River

In 2000 and 2002, EPA developed TMDLS for dioxin and PCBs, respectively for the Ohio River mainstem. The EPA TMDLS for dioxin included only sections of the Ohio River from the mouth of the Kanawha River downstream to the Kentucky state line. Additional sections of the river above the Kanawha River remain listed as impaired by dioxin. Currently, TMDLS have been or are being developed to address various impairments on many of the tributary streams.

The Ohio River Valley Water Sanitation Commission does extensive water quality monitoring of the Ohio River annually. In addition, every two years ORSANCO publishes a 305(b) report that provides assessments of the water quality based on ORSANCO water quality standards. As in the past, DEP has reviewed the data and incorporated these assessments into the West Virginia Section 303(d) List.

When both West Virginia and ORSANCO have an established criterion for a particular pollutant the most stringent standard is applied for assessment purposes and included in West Virginia's Section 303(d) List. For example, the bacteria impairment identified for various Ohio River segments is based upon both ORSANCO's E. coli. water quality criteria and West Virginia's fecal coliform criteria. In addition, the river has been

identified as iron-impaired based upon the application of West Virginia's warmwater aquatic life criterion of 1.5 mg/l. The following graphic depicts the currently listed segments of the Ohio River bordering West Virginia.



Tug Fork River

In 2002, EPA developed TMDLs for total iron and total aluminum for the Tug Fork River mainstem. In addition, total iron, total aluminum, total manganese and pH TMDLs were developed for its impaired tributaries. As noted earlier, subsequent revisions to the aluminum and manganese criteria have created uncertainty relative to the impairment status of affected waters and, as such, the validity of many the total aluminum and manganese TMDLs.

Currently, the Tug Fork is identified on the 2008 West Virginia Section 303(d) List for violations of the fecal coliform criteria and biological impairment. The fecal coliform impairment extends from the mouth to river mile 35.7 and the biological impairment reaches from river mile 51.6 to the headwaters.

Interstate Water Coordination

Joint PCB monitoring and TMDL development effort with Virginia

DEP has been working with the Virginia Department of Environmental Quality (Va. DEQ) to assess Polychlorinated Biphenyls (PCBs) impairment along the Virginia section of the Bluestone River. As part of a cooperative project, DEP and Va. DEQ placed a number of semi-permeable membrane devices (SPMD) throughout the Bluestone watershed in Virginia and West Virginia. Several SPMDs were placed in streams that are known or suspected to be historical sources of PCBs. DEP and Va. DEQ are working with both the United States Geological Survey (USGS) and Region III EPA on this project. EPA provided the funding through its RARE grant program while USGS supplied the SPMDs and did the analysis of samples. The product of this cooperative will be a TMDL for the Bluestone River and tributaries with loadings and allocated reductions for sources in both Virginia and West Virginia. The USGS report detailing analytical method and sample results can be found at <http://pubs.usgs.gov/of/2007/1272/pdf/OFR2007-1272.pdf>

Ohio River Valley Water Sanitation Commission – ORSANCO

As with previous reports, DEP's 2008 Integrated Report includes assessments based on data provided by ORSANCO. Throughout the development of ORSANCO's 2008 Biennial Assessment, DEP has been involved with ORSANCO's efforts to standardize assessments among the "compact" states. DEP personnel continue to participate in several standing committees, along with representatives from other Compact states, charged with helping direct ORSANCO's water quality and biological monitoring efforts.

Chesapeake Bay

The Chesapeake Bay is impaired by nutrients and sediment from multiple sources originating locally and in upstream states. This large and biologically diverse waterbody is an important economic and recreational resource.

The need to restore this waterbody is a high priority for many agencies, organizations and the public in general. Fourteen percent of the West Virginia's waters drain into the Potomac River and on into the Bay. In addition, portions of the James River Watershed in West Virginia contribute flow to the Bay.

In June 2002, Governor Bob Wise signed the Chesapeake Bay Program Water Quality Initiative Memorandum of Understanding and committed West Virginia to the nutrient and sediment load reductions. The West Virginia Potomac Tributary Strategy, developed in November 2005, includes plans for nutrient and sediment reductions from a variety of West Virginia point and nonpoint sources. All other Bay jurisdictions have developed and are implementing similar plans.

Interstate Commission on Potomac River Basin

The Commission is a non-regulatory agency of basin states (Maryland, Pennsylvania, Virginia and West Virginia), Washington, D.C. and the federal government. The Commission promotes watershed-wide solutions to the pollution and water resources challenges facing the basin and its more than 5.3 million residents. Examples of current commission efforts include Chesapeake Bay Program involvement, stream biological assessments, support of selected stream gages, the Potomac Groundwater Assessment, Potomac Basin Drinking Water Source Protection Partnership coordination and Potomac Watershed Toxic Spill Model support. In addition, the Commission's public outreach program supports and helps coordinate an annual watershed-wide clean up effort and produces and distributes 150,000 copies of the newsletter Potomac

Basin Reporter. The commissioners are appointed by their respective jurisdictions and provide policy guidance and oversight for a skilled staff of scientists and educators.

Ohio River Basin Commission

The Commission, in its current form, was founded in 1981. The Commission shall be to: (1) provide a forum for Ohio River Basin states to study, discuss, and develop regional policies and positions on common interstate issues concerning water and related land resources; (2) coordinate to the extent possible water and related land resources planning in the Ohio River Basin; (3) provide representation of regional interest to the federal government; (4) investigate, study and review water related problems of the Basin; (5) assist in water and related land resources training for Basin representatives. The Commission welcomes membership from all states draining to the Ohio river including Illinois, Indiana, Kentucky, Maryland, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia.



Gauley River in Fayette County
Photo by Mike Whitman

Total Maximum Daily Load (TMDL) Development Process

From 1997 until 2003, EPA Region III 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. The lawsuit resulted in a consent decree between the plaintiffs and the EPA that specifies TMDL development requirements and compliance dates. While the EPA was working on developing TMDLs, the DEP concentrated on building its own TMDL program. With the help of the TMDL stakeholder committee, the agency secured funding from the state legislature and created the TMDL section within the Division of Water and Waste Management.

The TMDL section is committed to implementing a TMDL process that reflects the requirements of TMDL regulations, provides for the achievement of water quality standards, and ensures that ample stakeholder participation is achieved in the development and implementation of TMDLs. The DWWM's approach to TMDL development allows 48 months to develop a TMDL from start to finish. This approach enables the agency to carry out an extensive data generation and gathering effort to produce scientifically defensible TMDLs, and allows ample time for modeling, report drafting and frequent public participation opportunities.

The DEP TMDLs are developed according to the Watershed Management Framework cycle. The framework divides the state into 32 major watersheds and operates on a five year, five-step process. The watersheds are divided into five hydrologic groups (A - E). Each group of watersheds is assessed once every five years. A map depicting the 32 watersheds and hydrologic groupings is provided as an attachment to this document before the List Key. The TMDL process begins in the first year of the cycle with pre-TMDL sampling and public meetings in the affected watersheds. The data is compiled and TMDL development begins in year two of the cycle. In the third year, TMDL development continues and the TMDL is drafted. The TMDL is finalized in the fourth year. In the fifth year of the cycle, TMDL implementation is initiated through the NPDES permitting process and efforts toward limiting nonpoint source loading. Throughout the TMDL development process, there are numerous opportunities for public participation and input.

The West Virginia TMDL program must also accomplish TMDL development in accordance with the consent decree between EPA and the Ohio Valley Environmental Coalition, et. al., which requires all streams impaired by mine drainage to have TMDLs developed by September 30, 2009. Each year, the agency selects waters within the targeted hydrologic group where mine drainage TMDL development is mandated by the consent decree. Other geographically proximate impairments are added to those selections until the agency's annual resources for TMDL development are consumed. In this way, statewide TMDL development by regulatory deadlines is efficiently and systematically accomplished. Barring unforeseen circumstances, all consent decree impairments will have TMDLs developed and approved by September 30, 2009.

The 303(d) list identifies and prioritizes the waters and impairments for which TMDLs will be developed over the next four years by specifying the year in the "Projected TMDL Year" column. The impaired waters intended for TMDL development in 2009, 2010, 2011 and 2012 are known and identified on the list. The remaining legacy mine drainage impairments that, per the consent decree, must have TMDLs developed by 2009 are also specified. For other waters and impairments, where the timing of TMDL development is less certain, the "Projected TMDL Year" is identified as the most future year when opportunity exists per the DEP's plans to develop TMDLs in concert with the Watershed Management Framework.

At any point in time, DEP is working on TMDLs in each of the five hydrologic groups (A-E). Each set of TMDLs moves through several stages of development prior to finalization and the EPA's approval. Table 3 shows the state's TMDL development progress.

The DEP's webpage contains all approved TMDL documents and the draft TMDL documents currently out for public comment. These documents can be found at <http://www.wvdep.org/wvtmdl>.

Water Pollution Control Programs

Division of Mining and Reclamation

The mission of the Division of Mining and Reclamation (DMR) is to regulate the mining industry in accordance with federal and state law. Activities include issuing both National Pollutant Discharge Elimination System and Surface Mining Control and Reclamation Act permits for mineral extraction sites and related facilities, inspecting facilities for compliance, monitoring water quality, tracking ownership and control, and issuing and assessing violations. DMR is responsible for the computer databases that tracks DMR's activities - Environmental Resources Information System and Applicant Violator System the federal database. The Permitting Unit is responsible for reviewing permit applications for surface and underground coal mines, preparation plants, coal loading facilities, haulage ways, and coal-related dams. This unit also reviews permit applications for non-coal quarry operations (sand, gravel, limestone, etc). Permit review teams staffed with geologists, hydrologists, engineers and others are located in each regional office throughout the state and in the headquarters office.

DMR's Inspection and Enforcement unit is responsible for inspecting all coal mining and quarry operations in the state. It enforces compliance through regular inspections and Notices of Violation, and ensures site reclamation through final release of the operation. This unit is also responsible for civil penalty assessments, show cause proceedings, bond forfeiture and collection.

DMR's Program Development unit is responsible for implementing a proactive approach to policy issues, legislation and training. This unit is designed to keep the Division staff current with technological advances and to provide clear direction through development of cogent policy and guidance to meet legal and regulatory requirements. This unit provides regulatory interpretation and support to field offices, develops and updates handbooks and forms, drafts legislation and initiates regulation changes. Other responsibilities of this unit include Small Operators Assistance Program, public relations, including responses to Freedom of Information Act requests, special projects, employee training and research of laws regulations and policy.

Division of Water and Waste Management

The Division of Water and Waste Management's mission is to preserve and enhance West Virginia's watersheds for the benefit and safety of all.

DWWM strives to meet its mission through implementation of programs controlling surface and groundwater pollution caused by industrial and municipal discharges as well as oversight of construction, operation and closure of hazardous and solid waste and underground storage tank sites. In addition, the division works to protect, restore and enhance the state's watersheds through comprehensive watershed assessments, groundwater monitoring, wetlands preservation, inspection and enforcement of hazardous and solid waste disposal and proper operation of underground storage tanks.

In January 2006, Environmental Enforcement became a branch of the Division of Water and Waste Management. Environmental Enforcement promotes compliance with the Solid Waste Management Act, Water Pollution Control Act, Groundwater Protection Act, Hazardous Waste Management Act, Underground Storage Tank Act, and Dam Safety Act by providing assistance, inspecting regulated sites, and enforcing conditions required by these acts.

National Pollution Discharge Elimination System (NPDES) Program

The DWWM's primary mechanism for controlling point sources is the West Virginia NPDES permitting program. This program, administered by the Permitting Branch, regulates activities and facilities involved in the installation, construction, modification, and operation and maintenance of wastewater treatment systems as well as their discharges. Individual and general permits are used to implement the program. Most permits include effluent limits and requirements for facility operation and maintenance, discharge monitoring and reporting. Other permits require the installation and implementation of best management practices in lieu of effluent limitations and discharge monitoring requirements.


The Permitting Branch also administers a pretreatment program in conjunction with the NPDES program, which outlines procedures for regulating proposed industrial wastewater connections to publicly owned treatment works. The program imposes discharge limitations for indirect discharges and requires the installation of pretreatment facilities where necessary to prevent interference with POTW operations and sludge disposal practices and to ensure that the pollutants contributed by industrial users do not pass through the POTW and violate water quality standards. The National Combined Sewer Overflow (CSO) Policy is implemented as a component of the NPDES Permits for POTWs with CSOs. Other

activities administered by the Permitting Branch include the regulation of industrial solid waste landfills and the land application of sewage sludge, and developing wasteload allocations for new or expanding sewage treatment facilities.

In addition to permitting, compliance assessment and enforcement activities are coordinated between the Permitting Branch and Environmental Enforcement. Noncompliance is initially addressed by administrative actions to compel compliance. These may include warning letters, notices to comply, enforcement orders, or referrals for civil action.

Below is a list of permit actions for the time period beginning in July 2005 and ending in June 2007.

Figure 11 - Permit action report

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION DIVISION OF WATER AND WASTE MANAGEMENT Report Date 04/16/2008												
NPDES PERMITTING - PERMIT ACTION REPORT (7/1/2005 - 6/30/2007)												
	Applications Received This Period	Applications Denied this Period	Permits Registrations and Modifications Issued This Period	Permits Registrations and Modifications Issued Year-to-Date for Current Fiscal 2008	Withdrawn and Voids This Period	Applications Pending as of 6/30/2007				Greater Than 180 total days	Average DEP Time to Issue Permits This Period (in Days)	Average Total Time to Issue Permits This Period (in Days)
						Greater Than 180 dep days	Less Than 180, > 90 dep days	Equal to 90 dep days	Total (dep days)			
INDIVIDUAL PERMITS	212	1	179	86	10	16	14	27	57	24	131	185
GENERAL PERMITS												
Home Aeration Units	1064	7	1038	265	10	0	0	125	125	107	21	60
Sewage General	151	0	184	12	4	0	0	14	14	4	49	127
Storm Water Construction	1436	0	1441	474	47	0	1	68	69	11	22	43
All Others	346	2	346	144	16	0	2	47	49	23	49	107
MODIFICATION PERMITS	467	4	415	172	39	10	6	57	73	30	53	93
TRANSFER PERMITS	360	0	332	151	3	2	1	25	28	5	12	19
TOTAL - PERMITS	4036	14	3935	1304	129	28	24	363	415	204		
NOTE: The permits used to calculate for the "Average DEP Time" column are those that were submitted after June 30, 1999, when ERIS was deployed for Division of Water and Waste Management.												

Clean Waters State Revolving Fund Program

Clean Water State Revolving Fund (CWSRF) program is a funding program administered by the State Revolving Fund Branch to address water quality problems through wastewater facility construction, upgrades, or expansions. The branch is charged with general oversight, fiscal management and administrative compliance review of local governmental

entities that receive funds and provides information and guidance on what administrative actions are needed to process a loan through the program. When a community has been recommended by the West Virginia Infrastructure and Jobs Development Council to seek the CWSRF program for financial assistance, that community will be contacted by a financial manager. A meeting may be scheduled to advise the community leaders about the overall program requirements and specifically what they should do next to obtain a CWSRF loan. There are federal, state, and program requirements that must be met prior to scheduling a loan closing.

The CWSRF currently has three financial assistance programs available. These programs are described below.

Low Interest Loan Program

A low interest loan program for construction of municipal wastewater treatment works is available for municipalities and public service districts to build, upgrade, or expand treatment facilities and collection systems. Conventional loans with a repayment period of 20 years are available with an interest rate and annual administrative fee not exceeding 3% for certain communities. Loans with repayment periods from 21 to 40 years are available for disadvantaged communities where financial affordability is an issue. The interest rate and annual administration fee on these loans do not exceed 1/2%. From July 2005 through June 2007, twenty-two wastewater treatment facility loans totaling \$102,274,781 dollars were funded.

Agriculture Water Quality Loan Program

The Agriculture Water Quality Loan Program is a partnership with the West Virginia Conservation Agency developed to address pollution from nonpoint sources using Best Management Practices approved by the U.S. Environmental Protection Agency. CWSRF money is loaned to participating banks so they can offer below market rate low interest loans to qualifying applicants. For more information, contact your local Conservation District office, <http://www.wvca.us/directory/cdo.cfm>. From July 2005 through June 2007, 46 nonpoint source agriculture BMP loans totaling \$1,079,287 dollars were funded.

Onsite Systems Loan Program

In cooperation with the West Virginia Housing Development Fund, a new low interest loan program has been established to address onsite sewage

disposal problems. Called the “Onsite Systems Loan Program,” loans up to \$10,000 are available to replace malfunctioning septic systems and to install new onsite sewage systems for homes that have direct sewage discharges to ditches and streams.

Nonpoint Source Control Program

Many of the streams being listed on the state’s list of impaired waters are affected by nonpoint sources. The majority of the Total Maximum Daily Loads (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. Since then, the Nonpoint Source Program has developed 16 watershed based plans that address a variety of nonpoint sources of pollution. These plans are developed in cooperation with the stakeholders, including federal, state and local government agencies, within the watershed. As a result of these plans, numerous nonpoint source remediation projects for acid mine drainage, agriculture, streambank erosion, and dirt roads have been undertaken. The goal of the watershed based plans is to restore the impaired streams to meet water quality standards. The successes to date

emphasize the need to focus more resources on voluntary installation of best management practices in identified priority watersheds where local stakeholders are interested in making a difference.

The Nonpoint Source Control Program focuses on restoration and protection of streams from nonpoint source pollution. The Program assesses nonpoint source impacts, then develops and implements watershed based plans and projects designed to reduce pollutant loads from agricultural, silviculture, resource extraction, urban runoff, construction activities, and failing septic systems. Program initiatives are based upon education, technical assistance, financial incentives, demonstration projects, and enforcement, as necessary. The division’s Nonpoint Source Program supports overall administration and coordination of the nonpoint source activities through these participating state agencies: the West Virginia Conservation Agency, the Office of Oil and Gas, and the Division of Health and Human Resources. Each year, specific activities are funded under the Nonpoint Source Program.

Groundwater Program

Under the Groundwater Protection Act, West Virginia Code Chapter 22,



**Eroded stream bank along
Little Fivemile Creek
in Mason County**
Photo by Andrew Johnson

Article 12, Section 6.a.3, DEP is required to provide a biennial report to the Legislature on the status of the state's groundwater and groundwater management program, including detailed reports for each agency that has groundwater regulatory responsibility. The current biennial report to the Legislature covers the period from July 1, 2005 through June 30, 2007. This is the eighth report completed since the passage of the act in 1991. Copies of the report "Groundwater Programs and Activities: Biennial Report to the West Virginia 2008 Legislature" may be obtained by contacting the Groundwater Program at the Division of Water and Waste Management, 601 57th St., Charleston, WV 25304. The report also may be reviewed at http://www.wvdep.org/Docs/14320_2008_106_Report.pdf

The Groundwater Program is responsible for compiling and editing information submitted for the biennial report. The DEP, the West Virginia Department of Agriculture and the West Virginia Department of Health and Human Resources all have groundwater regulatory responsibility and contribute to the report. These state boards and six standing committees currently share the responsibility of developing and implementing rules, policies and procedures for the Ground Water Protection Act (1991). The Environmental Quality Board, the Groundwater Coordinating Committee, the Groundwater Protection Act Committee, the Groundwater Monitoring Well Drillers Advisory Board, the Well Head Protection Committee, and the Nonpoint Source Coordinating Committee are the standing committees. The report provides a concise, thorough overview of those programs that are charged with the responsibility of protecting and ensuring the continued viability of groundwater resources in West Virginia.

The Ambient Groundwater Quality Monitoring Network was established by the DWWM in cooperation with the USGS in 1992 and is an ongoing project. The network provides critical data needed for proper management of West Virginia's groundwater resources. The major objective of this USGS study is to assess the ambient groundwater quality of major systems (geologic units) within West Virginia and to characterize the individual systems. Characterization of the quality of water from the major systems helps to:

- 💧 Determine which water quality constituents are problems within the state
- 💧 Determine which systems have potential water quality problems
- 💧 Assess the severity of water quality problems in respective systems
- 💧 Prioritize these concerns

Only by documenting present ambient groundwater quality of the state's major systems can regulatory agencies assess whether water quality degradation has occurred in certain areas and whether potential degradation is a result of natural processes or those associated with human activity. Spatial variability in water quality is determined for specific geologic units based on sampling of approximately 30 wells annually. The sampling continues over a period of approximately six years and provides a database of more than 200 wells from which comprehensive water samples are collected. Wells are selected in specific drainage basins in given years, rotating annually to new basins, thus providing sampling of groundwater in all watersheds of the state over the five year period. Then, the cycle of sampling begins again. All associated groundwater quality data for each well sampled and summaries of groundwater quality for each respective watershed are published in the USGS Water Resources Data for West Virginia annual report.

Public Participation and Responsiveness Summary

The draft Section 303(d) List was advertised for public comment from March 24, 2008 through June 6, 2008. This period included a 30-day extension granted by the agency after requests for additional time to fully develop comment submissions were received from multiple entities. Notices of the availability of the draft document were placed in newspapers statewide, including requests for public comment. The draft document was promoted via news release, e-mail and the Internet. At the conclusion of the public comment period, DEP considered all comments and made adjustments to the list where appropriate.

Table 10 identifies all entities that provided comments. All comments have been compiled and responded to in this responsiveness summary. The DEP appreciates the efforts commenters have put forth to improve West Virginia's listing and TMDL development processes. Comments and comment summaries are bold and italicized. Agency responses appear in plain text.

Table 10 - 2008 Section 303(d) List Commenters	
Argus Energy WV, LLC	McDowell County Wastewater Treatment Coalition
Appalachian Center for the Economy and the Environment	Mettiki Coal (WV), LLC
Consol Energy Inc.	R.E.I Consultants, Incorporated
Fola Coal Company, LLC	West Virginia Coal Association
Massey Coal Services, Inc.	

The classification of the entire length of Beaver Creek (WVMC-60-D-5) as a trout stream was disputed and the removal of iron (trout) and aluminum (trout) impairment listings was requested.

The commenter correctly stated that available water quality monitoring data for Beaver Creek does not indicate impairment pursuant to iron and aluminum criteria for warmwater fisheries and that the classification of Beaver Creek as a trout stream was based upon a non-agency, 2002 fisheries evaluation in the Beaver Creek watershed that found one adult brook trout at one Beaver Creek headwater location and no trout at two other downstream Beaver Creek locations.

Beaver Creek is located in an area of the state where unimpaired streams would be expected to support a coldwater fishery and trout. Beaver Creek is tributary to Blackwater River, which is a trout stream and the fisheries evaluation also documented the presence of brook trout in some of its tributaries. Those facts notwithstanding, Beaver Creek is subject to anthropogenic impacts, particularly those related to acid mine drainage, that jeopardize its ability to support trout.

DEP applies the trout water designated use and associated criteria to specific streams that meet the definition of "Trout waters" at 47CSR2 – 2.19:

"Trout waters" are waters which sustain year-round trout populations. Excluded are those waters which receive annual stockings of trout but which do not support year-round trout populations.

Alternatively, a stream that currently does not support year-round trout populations may also be properly classified as a trout water if that use was documented to be an existing use pursuant to the definition of "Existing uses" at 47CSR2 – 2.6 and the Tier 1 protection requirements of the Antidegradation Policy at 47CSR 2 – 4.1.a:

(2.6) "Existing uses" are those uses actually attained in a water on or after November 28, 1975, whether or not they are included in the water quality standards.

(4.1.a.) Tier 1 Protection. Existing water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected. Existing uses are those uses actually attained in a water on or after November 28, 1975, whether or not they are included as designated uses within these water quality standards.

When classifying trout waters, DEP relies heavily on the guidance of the Division of Natural Resources.

After receipt of the comment, DEP reviewed available documentation and consulted with the Division of Natural Resources. Both agencies agree that Beaver Creek was historically a trout stream, but available information is insufficient to classify the present condition of Beaver Creek as a trout stream pursuant to 47CSR2 – 2.19. Also, the lack of historical DNR trout surveys and uncertainty regarding the timing of the degradation of the use preclude evaluation of the existing use provisions of the Antidegradation Policy. As such, DEP has decided to consider the entire length of Beaver

Creek as a warmwater fishery for 303(d) and 305(b) evaluations in the 2008 cycle, and the trout water iron and aluminum impairments were removed from the Section 303(d) list. The aquatic life use classification of Beaver Creek may be revisited in future cycles if new information becomes available.

A compilation of industry-generated, stream monitoring data was provided for specific streams with a request to list selenium impairments.

The submitted data was qualified and evaluated, and the following impairments have been added to the West Virginia 2008 Section 303(d) List:

Stream Name	Code	Impairment	Impaired Reach
Sandlick Creek	WVBST-109	Selenium AQ	Entire Length
Left Fork/Right Fork/ Trace Fork	WVBST-24-K-4-A	Selenium AQ, HH*	Entire Length
Tenmile Fork	WVK-61-L	Selenium AQ, HH*	Entire Length
UNT/Tenmile Fork RM 3.98	WVK-61-L-4	Selenium AQ, HH*	Entire Length
Hughes Creek	WVK-66	Selenium AQ, HH*	Entire Length
Sixmile Hollow	WVK-66-D	Selenium AQ, HH*	Entire Length
Smithers Creek	WVK-72	Selenium AQ, HH*	Mouth to RM 5.6
Rockhouse Creek	WVKC-47-A	Selenium AQ, HH*	Entire Length
*Available water quality data indicates exceedence of the currently effective, 20 (ug/L), selenium criterion for the public water supply use. The 2008 Legislature revised that criterion to 50 (ug/L), but the revision has not yet been approved by EPA and, therefore, is not effective for Clean Water Act purposes. Upon EPA approval, available selenium water quality data will be reevaluated with respect to the public water supply use and impairment decisions will be modified as appropriate in the next listing cycle.			

Bacteria water quality data was submitted that requested the listing of fecal coliform impairments of specific streams in the Tug Fork River watershed.

The submitted data was qualified and evaluated and the following impairments have been added to the West Virginia 2008 Section 303(d) List:

Stream Name	Code	Impairment	Impaired Reach
Tug Fork (revised reach)	WVBST	Fecal Coliform	Entire Length
Dry Fork	WVBST-70	Fecal Coliform	Entire Length
Bradshaw Creek	WVBST-70-M	Fecal Coliform	Entire Length
Little Slate Creek	WVBST-70-N	Fecal Coliform	Entire Length
Clear Fork	WVBST-76	Fecal Coliform	Entire Length
Davy Branch	WVBST-85	Fecal Coliform	Entire Length
Trail Fork	WVBST-98-B	Fecal Coliform	Entire Length

The use of the West Virginia Stream Condition Index (WVSCI) in the assessment of impairment relative to aquatic life designated uses was protested. Commenters contended that the WVSCI is an inappropriate assessment mechanism because it has not been promulgated as a water quality standard by the West Virginia Legislature and has not been subjected to peer-review or public notice and comment.

The basis for biological impairment listings is the narrative water quality criterion at Title 47 Series 2 Section 3.2.i of the Code of State Rules, which prohibits significant adverse impact to the chemical, physical, hydrologic, or biological components of aquatic ecosystems. This narrative criterion is a valid water quality standard that was promulgated by the West Virginia Legislature and approved by the EPA.

Under the Clean Water Act and implementing regulations, DEP must assess State waters with respect to attainment of water quality standards via comparison of available information to both numeric and narrative water quality criteria. DEP initiated biological integrity assessments in the 1998 Section 303(d) list. The WVSCI was first used in the 2002 Section 303(d) listing process and has remained as an integral component of all subsequent 303(d) lists. The DEP's position has not changed relative to its responsibility to list waters where available data indicates significant adverse impact to their biological components. Furthermore, list approval by the EPA is expected to be contingent upon our continued implementation of this practice.

The WVSCI was specifically designed to accomplish assessment with respect to the 47CSR2 - 3.2.i criterion and remains the best scientific tool available to DEP for that purpose. It was developed for EPA and DEP by national experts in the assessment of biological integrity through the

evaluation of benthic macroinvertebrate communities. It is similar to the multi-metric indices used by many states and its component metrics are both validated and widely used nationally when assessing biologic health of aquatic systems.

Over the long period of WVSCI application, there have been numerous opportunities for public notice and comment. Prior to the 2008 effort, the WVSCI has been applied in three West Virginia Section 303(d) lists and each of those processes included public notice and comment provisions. Previous Section 303(d) lists have generated public comments relative to biological impairment and application of the WVSCI. DEP conscientiously considered and responded to all such comments. EPA reviewed public comments and DEP responses and, in their list approvals, concluded that DEP properly assessed biological data and properly considered and responded to public comments.

Certain comments proclaimed that the Division of Water and Waste Management is being disingenuous in its assessment of the biological integrity of state waters to “inflate the list as much as possible to present a perception as the ‘sky is falling’ in regards to the quality of West Virginia streams and rivers,” to “generate more money for future TMDL projects” and to “specifically target mining operations.”

DEP does not agree with the above assertions. The current list reflects DEP's responsibility under the Clean Water Act to objectively assess use attainment in West Virginia waters. The biological assessment methodologies associated with the 2008 effort are essentially the same as those used in the preparation of 303(d) lists over the past ten years. In the very limited instances where the source of biological impairment was identified as “mining,” source determinations were made through consideration of scientific information generated in TMDL development processes.

Flaws in WVSCI development were suggested regarding metric variability, failure to use a statewide dataset, lack of a sensitivity evaluation in metric selection, and an improper mechanism to select reference and impaired sites.

WVSCI was developed following the procedures outlined in the EPA guidance manual, Rapid Bioassessment Protocols for Use in Wadable Streams and Rivers (EPA 841-B-99-002). It included a determination

of the metrics that best discriminated between reference and stressed benthic communities (determined abiotically). These metrics were reduced down to six distinct metrics so that the variability of metrics is minimized. DEP revised the best standard values for each of the six metrics in 2001 after collecting benthic macroinvertebrate data from throughout the state. Evaluation of sensitivity was addressed by selecting those metrics with the highest discrimination efficiencies (i.e., those that are most sensitive to stressors). The reference and stressed streams were selected based on several abiotic criteria, resulting in groups of benthic communities that would be expected to have different characteristics. It would be inappropriate to use data from all streams in the metric selection process. However, all data was used in determining best standard values for scoring individual metrics.

It was suggested that DEP should not use a single biological sampling event at a single sampling location to assess the biological integrity of an entire stream reach, because biological communities are subject to substantial variability and a single sampling event may reflect a recent drought, a scouring flood, or localized impact. An alternative methodology that incorporates multiple collections and consideration of the magnitude and frequency of exceedances was suggested.

Given the magnitude of the DEP's responsibilities for watershed assessment, it would not be practical to demand multiple biological monitoring events at a single location prior to assessment. The design of the WVSCI allows an individual sample, qualified as comparable per its methodology, to discriminate departure from the reference condition and to be used for impairment decisions pursuant to the narrative criterion of 47CSR 2 - 3.2.i.

The DEP does not conduct a biological assessment when suspect conditions jeopardize the validity of assessment under the WVSCI. For example, if it is known that streams have been dry for extended periods or have been scoured by a recent flood, the DEP does not perform biological monitoring. Additionally, to be considered comparable, the depth of sample areas cannot be greater than the height of the net and the flow must be sufficient to carry dislodged macroinvertebrates into the net. All biological monitoring data is extensively screened for comparability to WVSCI thresholds before it is used.

In many instances, multiple biological assessments at varying points along a stream's continuum are not available. In streams with severely limited assessment locations, DEP assumes the biological condition measured at a specific location is maintained in both upstream and downstream directions until contradicted by another measurement. "Entire length" is the default segment for an impairment determined by a single assessment at a single location, but segmentation does occur when a sufficient number of samples sites are available and the data provide a clear distinction between impaired and non-impaired segments.

TMDL development for biological impairment is preceded by an intensified monitoring and source assessment effort, under which biological condition is reevaluated and information necessary to refine impaired reaches and identify stressors and thresholds is generated. Previous biological listings without specification of stressors or sources have not directly impacted permitted facilities, and pollutant reductions have been directed only after causative sources have been determined and TMDLs have been developed, and only for sources that contribute pollutants associated with identified biological stressors.

Benthic macroinvertebrate data for streams in the East Fork of Twelvepole Creek watershed were provided with requests that the data be deemed accurate and valid, and that the data be accepted by DEP and considered in listing decisions, particularly in the segmentation of biologically impaired waters. Additionally, the commenter requested that DEP accept the validity and accuracy of the WVSCI score as calculated from rarefied, whole kick-net samples with equal credence as the WVSCI calculated from 200-organism count kick-net subsamples.

DEP performed an initial review of the submitted data and then arranged and conducted a field visit with the commenter to evaluate sampling methodology and the suitability of sampling locations. DEP also requested and received specific benthic macroinvertebrate collections to evaluate the proficiency of the commenter's taxonomic identification.

In general, appropriate riffle/run habitats were observed at the field-reviewed sampling locations. The commenter's descriptions of field sampling, laboratory sorting and sub-sampling methodologies were consistent with the WVSCI protocols for the most-recent collections (October 2007). Sampling methodology prior to October 2007 was described as a "whole

kick" sample from which all benthic macroinvertebrates were identified; assemblages generated under this methodology required rarefaction to be comparable to the WVSCI index. Concern was noted with the commenter's October 2007 sampling. The described practice of benthic collection after a period of extended drought would not provide WVSCI comparable assemblages if stream channels were dry for a two-to-three month period prior to collection.

In DEP's pursuit of taxonomic identification validation, the agency was advised by the data provider that the submitted assemblages were not saved in a manner appropriate for re-evaluation. As such, validation was precluded and the data was not used in the impairment assessments for the 2008 303(d) List. The provider committed to improve quality assurance and quality control procedures for sampling, sorting, identification and storage of benthic macroinvertebrate samples that would allow data to be used in future assessment cycles. DEP will work with the provider in that regard and is agreeable to joint assessment activities in the subject streams and watersheds.

A second commenter provided the same benthic macroinvertebrate data, but requested the delisting of the following biologically impaired streams: East Fork Twelvepole Creek (RM 4.4 to RM 10.5), East Fork Twelvepole Creek (RM 25.1 to HW), Kiah Creek, Right Fork Cub Branch, Copley Trace Branch, Honey Branch, Parker Branch, Rollem Fork.

The requests were based upon general arguments that the use of the WVSCI is inappropriate and that insufficient data exists to assess biological impairment, and included one or more of the following points:

- ① *Impairment decisions should not be based upon old assessments.***
- ② *The WVSCI methodology should not be applied downstream of ponds or lakes because the impairment may be caused by the impoundment (and not by a pollutant).***
- ③ *The WVSCI methodology should not be applied to previously mined areas or to shortened stream segments below valley fills.***

④ Impairment determinations should not be made based upon a single assessment, because “no long term data was used to determine the variability and reproducibility of the use of WVSCI to determine stream impairment” and because of the high spatial and temporal variability demonstrated in the commenter’s dataset.

Some of the subject biological impairment listings had assessments performed by DEP in calendar year 2000 and were first listed on the 2002 Section 303(d) list. The ages of the assessments are recognized, but the subject impairments were promptly listed on the next Section 303(d) list after assessment results became available. New data demonstrating non-impaired conditions is not available. EPA closely evaluates the removal of waters from the 303(d) list without TMDL development. Excluding extenuating circumstances such as a criterion change or a determination that the original listing was made in error, delisting is approvable only where new information demonstrates attainment of water quality standards. TMDL development is preceded by a comprehensive water quality and biological monitoring effort. If new monitoring indicates that a stream is not impaired, then TMDL development will not be initiated and the new data will be used to support delisting of the impairment in the next available Section 303(d) List.

For some of the waters for which delisting was requested, a component of the argument involved the presence of impoundments in the watershed and an implication that the observed biological impairments might be caused by the impoundment rather than by pollutants in the water. DEP recognizes that impairments that are not caused by a pollutant need not be included on the Section 303(d) list. In the Integrated Report format, such impairments can be placed in Category 4C rather than Category 5. Applicable EPA guidance states that waters should be listed in relation to biological assessments unless the state can demonstrate that non-pollutant stressors **cause** the impairment or that **no** pollutant(s) causes or contributes to the impairment. While DEP accepts that the upstream habitat alteration associated with impoundments might negatively impact downstream biological scores, seldom is there sufficient information to properly discern the causative stressors at the time of assessment and listing. Uncertainty of the causative source of biological impairment at the time of assessment, as is most often the case, is not a sufficient reason to exclude the impairment from the 303(d) list. Consistent with EPA guidance, DEP lists waters as biologically impaired if available monitoring results fall

below the WVSCI threshold. Causative stressors are identified at the front end of the TMDL development process. If the stressor identification process determines that a pollutant does not cause the impairment, then a TMDL will not be developed. In regard to this issue, the methodologies employed in the 2008 process are identical to those approved in the three previous 303(d) lists.

The commenter suggested the WVSCI methodology should not be applied to previously mined areas or to shortened stream segments below valley fills. Assessment of the 47CSR2-3.2.i criterion via the WVSCI methodology is appropriate in wadable waters of the state, provided that a comparable riffle/run habitat is available. The narrative criterion is equally applicable as the numeric water quality criteria that drive “criteria end-of-pipe” permit limitations in the discharges from instream treatment structures. There is no mechanism to remove water quality standard applicability in streams “on previously mined and permitted areas” or in stream reaches downstream of valley fills or sediment control ponds.

The commenter also contends that biological impairment determinations should not be made based upon a single assessment because “no long term data was used to determine the variability and reproducibility of the use of WVSCI to determine stream impairment” and because of the high spatial and temporal variability demonstrated in the commenter’s dataset. WVSCI variability has been measured and addressed in the listing methodology. Duplicate sampling (2 samples collected at the same location and time) has been a routine component of DEP’s biological monitoring program since the initiation of WVSCI implementation. The observed variability forms the basis for a precision estimate that, in turn, creates the “gray zone” concept that is applied in the listing methodology for biological impairment. Streams with WVSCI scores falling below the true impairment threshold of 68 (5th percentile of reference) and above 60.6 (5th percentile of reference minus the precision estimate) are not initially listed but are targeted for re-evaluation. Because a gray zone WVSCI result does not provide sufficient information for classification of aquatic life use attainment, DEP also does not interpret it as a demonstration of improved biological condition in delisting decision-making.

Temporal variability of WVSCI reference sites has also been evaluated. Multiple biological resampling events have been performed at reference stations. The unchanged watershed conditions and consistent WVSCI

scores demonstrate acceptable variability and reproducibility of the WVSCI methodology. Conversely, WVSCI temporal variability cannot be effectively assessed in disturbed watersheds without specific knowledge of changing watershed activities that may impact biological condition.

As described in the response to the previous comment, the commenter's submitted dataset could not be validated. As such, the purported, extreme WVSCI variability cannot be substantiated with the data submitted.

DEP maintains that the WVSCI protocol for assessment of the 47CSR2-3.2.i criterion is scientifically sound and that the arguments presented by the commenter do not support its abandonment.

A request was received to revise the impaired reach of Rollem Fork (WVO-2-Q-18-E) because of the presence of instream ponds in the watershed.

A field investigation of Rollem Fork confirmed the presence of the first instream pond at approximate mile point 0.9. As such, the biological impairment indicated by the benthic macroinvertebrate collection near the mouth of Rollem Fork was considered to be representative of the stream segment between the mouth and milepoint 0.9. The impaired reach of Rollem Fork was revised from 1.9 miles to 0.9 miles in the Section 303(d) list.

A request was received to delist the biological impairment for Open Fork (WVO-2-Q-27). A previous biological assessment indicated an unimpaired condition near the mouth of the stream, whereas a new assessment at mile point 0.9 indicated impairment. DEP was advised that the more recent assessment location appears to be within a sediment pond such that the collected assemblage is not comparable to the WVSCI.

The more recent biological assessment of Open Fork was conducted under the probabilistic monitoring program. Under that program design, specific sampling sites are selected randomly by computer. To maintain program integrity, pre-selected sites are not relocated in the field. After receipt of the comment and evaluation, DEP concurs that the sampling location is located immediately upstream of a pond and could have been periodically inundated with backwater prior to sample collection. As such, uncertainty exists regarding the comparability of the collected assemblage and the impairment was removed from the Section 303(d) list.

Delisting of the manganese impairment of Kiah Creek (WVO-2-Q-18) was requested. The commenter stated that most of the observed manganese exceedances in the dataset upon which the listing decision was based occurred in 2003, and very low level exceedances were reported on 10/1/04 and 8/21/06. An anomaly associated with the specific conductance value reported for the 8/21/06 sampling event was identified and, due to that anomaly, the validity of the overall dataset was questioned. The commenter also provided additional manganese water quality data collected in Kiah Creek at approximate milepoint 3.1 that indicates a non-impaired condition.

The water quality data available for the original assessment was that which was generated by the Division of Mining and Reclamation in the "Trend Station" monitoring program. The zone of applicability of the manganese criterion in Kiah Creek is from the mouth upstream 3.3 miles. The trend station is located 0.6 miles upstream of the mouth. The original assessment and listing conformed with the listing methodology in that greater than 10% of the available manganese results (6/51) exceeded the criterion value over the data evaluation period associated with the 2008 effort (July 1, 2002 – June 30, 2007).

Upon receipt of the comment, DEP specifically re-evaluated the August 21, 2006 Trend Station analytical results but could not conclude that the low specific conductance reported for that date should disqualify the measured manganese concentration. DEP evaluated and accepted the commenter's additional manganese data collected at milepoint 3.1. Furthermore, DEP determined that no additional manganese sources are present in the Kiah Creek watershed downstream of milepoint 3.1 and that the manganese concentrations in Kiah Creek should not differ appreciably between the commenter's sampling location and that of the Trend Station. The newly submitted data was combined with that from the Trend Station and reassessed. The recalculated exceedance rate did not meet the impairment threshold of the listing methodology and a Kiah Creek manganese impairment was not included on the Section 303(d) list.

One commenter provided references to the Programmatic Environmental Impact Statement for Mountaintop Mining and Valley Fills in Appalachia (MTM/VF EIS), a supplemental study supplied by a member of the coal industry, and an academic study published after the MTM/VF EIS. The commenter contended that the referenced

documents show that mountain top mining and valley fills do not cause biological impairment and therefore, DEP's assessment of biological impairment through the use of the WVSCI is flawed. Based upon the supplemental studies, the commenter characterized the WVSCI as a "measure of change, not impairment" and opined that "a mere shift" in the biological community should not be equated to impairment because the designated use of the stream remains viable.

The following reference to the MTM/VF EIS was provided: Further, the EIS studies did not conclude that impacts documented below MTM/VF operations cause or contribute to significant degradation of waters of the U.S. (Programmatic Environmental Impact Statement. Corps, EPA et.al. Pg. II. D-9).

The overwhelming majority of biological impairment listings in the 2008 West Virginia Section 303(d) List do not have associated sources identified and, in no instances, are the specific mining activities evaluated in the MTM/VF EIS identified as source of biological impairment. More importantly, the referenced statement, extracted from thousands of pages of documentation, does not wholly reflect the findings of the MTM/VF EIS.

The MTM/VF EIS clearly recognizes biological impairment in certain waters downstream from evaluated mining activities, as evidenced by the following language that is contained within the same paragraph as the referenced statement:

Biological conditions in the streams with only valley fills represented a gradient of conditions from poor to very good; streams with valley fills and residences were most impacted. Impacts could include several stressors, such as valley fills, residences, and/or roads.

The recognition of biological impairment is also evidenced in the Responses to Comments section of the MTM/VF EIS:

Studies do indicate that aquatic communities downstream of surface coal mining operations and valley fills are impaired in some cases. Certain chemical parameters (sulfates, specific conductance, selenium) are sometimes elevated downstream of mining or valley fills. Stream reaches below mining and valley fills may have changes in substrate particle size distribution from increased fine material due to sedimentation. Some macroinvertebrate communities change in terms of diversity, population

size, and pollution tolerance. However, the sample size and monitoring periods conducted for the PEIS were not considered sufficient to establish firm cause-and-effect relationships between individual pollutants and the decline in particular macroinvertebrate populations. Impairment could not be correlated with the number of fills, their size, age, or construction method. See Section II.C. Action 5 in the PEIS recognizes the value of continued evaluation of the effects of mountaintop mining operations on stream chemistry and biology.

In regard to the supplemental studies, the MTM/VF EIS clearly indicates that the opinions and views expressed by the individual authors of referenced studies do not necessarily reflect the position or view of the agencies preparing the EIS. DEP does not interpret the cited studies as demonstrations of universal biological integrity in streams below evaluated activities and disagrees with the commenter's characterization of the WVSCI. A "shift" in the benthic macroinvertebrate community of a stream can constitute biological impairment pursuant to 47CSR2 – 3.2.i, and the WVSCI (recognized as a "best science method" in the MTM/VF EIS) provides a sound scientific basis for assessment.

It was contended that an inaccurate acute-to-chronic ratio was used in EPA's water quality criteria development for chloride, that if rectified would increase the chloride chronic criterion from 230 mg/l to 441 mg/l.

The West Virginia 2008 Section 303(d) List is based upon the currently effective water quality standards. Impairment assessments must compare water quality data and information to the currently effective chronic criterion for chloride (230 mg/l). Future requests for criteria revisions can be considered by DEP, but must be adopted by the Legislature and approved by EPA before they become effective.

The identification of "mining" as the source of impairment for the streams included on the 303(d) list was discouraged. Commenters urged consideration of all potential sources of biological impairment instead of targeting the mining industry and requested that source identification be withheld until stressor identification is performed in TMDL process.

The West Virginia 2008 Section 303(d) list attributes only 17 of 574 biological listings and 7 of 585 numeric water quality listings to mining. DEP recognizes that there are multiple possible sources of biological

impairment and identifies sources as unknown for most initial listings.

However, all of the biologically impaired streams with “mining” identified as the source have undergone stressor identification in a TMDL development process. For each stream, the stressor identification process has identified ionic toxicity as a significant stressor. As documented in each TMDL report, DEP decided to defer biological TMDL development until better information became available regarding the causative pollutants and their associated impairment thresholds, and retained those waters on the Section 303(d) list. In each case, water quality data indicates elevated conductivity and sulfates contributed by mining discharges. Additionally, land use in affected watersheds is overwhelmingly dominated by mining activities. Many of the watersheds have no logging operations, oil and gas wells, or houses.

“Mining” is also identified as source of chloride impairment in seven streams. Each stream is a receiving stream for active mining discharges which exceed appropriately calculated water quality-based effluent limitations. The permittee has sought, but has not been granted, variances from the applicable chlorides water quality criteria. As such, the sources of the chlorides impairment are clear. Those same streams are biologically impaired and it is likely that ionic stress will be identified as a stressor in the TMDL development process. However, since the TMDL-based stressor identification is not yet final, the sources of the biological impairments are specified as “unknown.”

Specific requests were received to delist biological impairments for Boardtree Branch (WVKG-5-M) and Stillhouse Branch (WVKG-5-O) and/or to identify the sources of biological impairment as unknown until such time that stressor identification is performed in the TMDL process. The commenter indicated that the biological impairments of the subject streams might be related to habitat deficiencies or influences other than mining operations.

The requested stressor identification process was accomplished during the development of TMDLs for the Gauley River watershed (approved March 2008). The stressor identification process involved a thorough evaluation of water chemistry, habitat, and the benthic macroinvertebrates collected. Under that process, ionic toxicity was identified as the most important biological stressor in each stream. In addition to the ionic toxicity, instream habitat impacts related to manganese precipitation and substrate fusion

were also documented.

The streams were sampled between July 2003 and June 2004, as a component of the “Pre-TMDL” monitoring program for the Gauley River watershed. In addition to biological and habitat assessments, monthly water quality samples for multiple pollutant parameters were collected and analyzed. The water quality data for both streams indicates extremely elevated conductivity and sulfates contributed by mining discharges. Over the pre-TMDL sampling period, specific conductance in Boardtree Branch ranged from 2544 to 3341 (umhos/cm) and sulfates ranged from 1575 to 2307 (mg/l). In Stillhouse Branch, specific conductance ranged from 2678 to 3964 (umhos/cm) and sulfates ranged from 1673 to 2915 (mg/l).

Both streams were first identified as biologically impaired on the 2006 West Virginia Section 303(d) list. As described previously, DEP decided to defer biological TMDL development until better information became available regarding the causative pollutants and impairment thresholds associated with ionic stress, and retained those waters on the Section 303(d) list.

Stoneflies were completely absent in the biological assemblages collected in both streams and Stillhouse Branch contained zero mayflies. The severe impacts to those important insect orders are not observed in relation to the alternative stressors suggested by the comment. The landuse assessment conducted in the TMDL process indicates active mining accounts for 99.32% and 99.63% of the Boardtree Branch and Stillhouse Branch watersheds, respectively. The negligible presence of non-mining activities, the predominant contribution of ions from the mining discharges and the mining related habitat impacts clearly support the identification of “mining” as the source of the biological impairments.

The biological impairments of the subject streams have been retained on the Section 303(d) list.

U.S. EPA Approval and Resultant Revisions

The DEP submitted an initial report to the EPA Region III office on October 17, 2008. This submission contained revisions based on EPA's review of the draft 303(d) document noticed for public comment. In addition, EPA Region III provided e-mail comments on subsequent issues that arose during their review of the October 17 submittal. The DEP made necessary revisions and resubmitted the document to EPA Region III on December 5, 2008. The EPA determined the report, as revised, met the applicable requirements of Section 303(d) of the Clean Water Act. EPA approved West Virginia's 2008 Section 303(d) list on January 16, 2009.

A copy of the EPA approval letter and rationale follows, along with DEP's submission letters from October 17 and December 5, 2008. EPA's Approval Rationale documents the applicable statutory and regulatory requirements and explains how West Virginia's 2008 Integrated Water Quality Monitoring and Assessment Report complies with each requirement.

NOTE: The contents of the letters have not been altered in any way, but have been reformatted to fit this document. Actual signed copies of the letters are available upon request.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Mr. Scott Mandirola, Acting Director
Division of Water and Waste Management
West Virginia Department of Environmental Protection
601 57th Street SE
Charleston, West Virginia 25304-2345

Dear Mr. Mandirola:

Thank you for the West Virginia Department of Environmental Protection's (WVDEP) final submission on October 21, 2008, of its identification of waters under Section 303(d) of the Clean Water Act (2008 Section 303(d) List).

The U.S. Environmental Protection Agency (EPA), Region III, has reviewed the submission and supporting documentation and, pursuant to Section 303(d) of the Act, 33 U.S.C. §1313(d), hereby approves West Virginia's 2008 Section 303(d) List of water quality limited segments still requiring a Total Maximum Daily Load (TMDL). The enclosed narrative provides an explanation of the basis for EPA's approval.

Thank you again for this submission. If you or your staff have any questions, please feel free to contact Mr. Larry Merrill at 215-814-5452, or Ms. Jennifer Sincock at 215-814-5766 for assistance.

Sincerely,

Signed January 16, 2009
Jon M. Capacasa, Director
Water Protection Division

Enclosure

cc: Patrick Campbell, WVDEP DWWM
David Montali, WVDEP DWWM

Approval Rationale
West Virginia Department of Environmental Protection
2008 Section 303(d) List

Introduction

U.S. Environmental Protection Agency (EPA) has conducted a complete review of West Virginia's 2008 Section 303(d) List and supporting documentation and information. Based on this review, EPA has determined that West Virginia's list of water quality limited segments ("WQLSs") still requiring Total Maximum Daily Loads (TMDLs) meets the requirements of Section 303(d) of the Clean Water Act (CWA or "the Act") and EPA's implementing regulations. Therefore, by this order, EPA hereby approves West Virginia's 2008 Section 303(d) List. The statutory and regulatory requirements, and EPA's review of West Virginia's compliance with each requirement, are described in detail below.

Statutory and Regulatory Background

Identification of WQLSs for Inclusion on Section 303(d) List

Section 303(d)(1) of the Act directs the states to identify those waters within their jurisdiction for which effluent limitations required by Sections 301(b)(1)(A) and (B) are not stringent enough to implement any applicable water quality standard, and to establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters. The Section 303(d) Listing requirement applies to waters impaired by point and/or nonpoint sources, pursuant to EPA's long-standing interpretation of Section 303(d).

EPA regulations provide that states do not need to list waters where the following controls are adequate to implement applicable standards: (1) technology-based effluent limitations required by the Act; (2) more stringent effluent limitations required by state or local authority; and (3) other pollution control requirements required by state, local, or Federal authority. See 40 CFR §130.7(b)(1).

West Virginia developed an Integrated Report which identifies the assessment status of all of West Virginia's waters combining EPA's Section 303(d) and Section 305(b) requirements. The Integrated Report compartmentalized the waters of West Virginia into five distinct categories. All stream segments or assessment units fall into one of the following categories:

- Category 1 – Fully supporting all designated uses.
- Category 2 – Fully supporting some designated uses, but insufficient or no information exists to assess the other designated uses.
- Category 3 – Insufficient or no information exists to determine if any of the uses are being met.
- Category 4 – Waters that are impaired or threatened but do not need a TMDL.
- Category 4a – waters that already have an approved TMDL, but are still not meeting standards.
- Category 4b – waters that have other control mechanisms in place which are reasonably expected to return the water to meeting designated uses.

- Category 4c – waters that have been determined to be impaired by pollution or other natural factors.
- Category 5 - Waters that have been assessed as impaired and are expected to need a TMDL.

West Virginia's Section 303(d) List of impaired waters is in Category 5 of West Virginia's 2008 Integrated Report. West Virginia also provided the 2008 Section 303(d) List in the same format as the 2006 Section 303(d) List consisting of the Section 303(d) List of impaired waters and six supplemental tables that track previously listed waters. The format of the 2008 Section 303(d) List follows the Watershed Management Framework with five hydrologic groups (A-E). Within each hydrologic group, watersheds are arranged alphabetically and impaired waterbodies are listed alphabetically within their appropriate watershed. The information that follows each impaired stream includes the stream code, the affected water quality criteria, the source of the impairment (where known), the impaired size (or, by default, the entire length), the reach description, the projected timing of TMDL development and whether or not the stream was on the 2006 list.

Six supplemental tables were provided to track previously listed waters that are not present on the 2008 Section 303(d) List. "Supplemental Table A - Previously Listed Waters – No TMDL Developed" is a list of previously listed waters which have been reevaluated and determined not to be impaired and, therefore, not in need of a TMDL. Causes for revision of the impairment status include recent water quality data demonstrating improved water quality condition, revision to the water quality criteria associated with the previous listing, or a modification of the listing methodology. Decisions regarding the need for TMDL development were made in accordance with the requirements of 40 CFR §130.7(b)(1) and the state's listing criteria. In the Integrated Report, these waters have been moved from Category 5 to Category 1, 2, 3, or 4, as appropriate.

"Supplemental Table B - Waters with TMDLs Developed" is a list of previously listed impaired waters for which a TMDL has been developed and approved by EPA. Waters included in this supplement have had a TMDL developed, but water quality improvements are not yet complete and/or documented. Since the Section 303(d) List is a list of water quality limited segments still requiring TMDLs (see 40 C.F.R. §130.7(b)), EPA's Integrated Water Quality Monitoring and Assessment Report Guidance recommends classification of such waters in a category separate from the Section 303(d) List. The West Virginia Department of Environmental Protection (WVDEP) developed this supplemental table to track previously listed impaired waters for which TMDLs have been developed. In the Integrated Report, these waters have been listed in Category 4a, which includes waters that already have an approved TMDL but are not meeting standards. Supplemental Table B has a sublist called "Supplemental Table B1 – 2007 TMDLs," which is a list of previously listed waters for which a TMDL was developed and are awaiting EPA approval.

"Supplemental Table C - Water Quality Improvements" is a list of previously listed impaired waters with improved water quality due to TMDL implementation or pre-TMDL stream restoration work that resulted in delisting. These waters are included in Category 1 (meeting all uses), provided that impairments for other uses or pollutants are not present.

"Supplemental Table D - Impaired Waters - No TMDL Development Needed" is a list of impaired waters for which either other control mechanisms are in place to control pollutants or the water is impaired by pollution (i.e., flow alterations caused by mining). These are the same waters contained in Category 4b and 4c, respectively.

"Supplemental Table E - Total Aluminum TMDLs Developed" is a list of previously listed impaired waters for which a total aluminum TMDL has been developed and established by EPA. Due to the criteria change from total aluminum to dissolved aluminum, West Virginia placed total

aluminum TMDLs on a separate table from Supplemental Table B. All waters contained on Supplemental Tables B and E are included on Category 4a of the Integrated Report.

“Supplemental Table F – New Listings for 2008” is a list of impaired waters that were not previously included on the 2006 Section 303(d) List.

Consideration of Existing and Readily Available Water Quality-Related Data

In developing Section 303(d) Lists, states are required to assemble and evaluate all existing and readily available water quality-related data and information; including, at a minimum, consideration of existing and readily available data and information about the following categories of waters: (1) waters identified as partially meeting or not meeting designated uses, or as threatened, in the state’s most recent Section 305(b) report; (2) waters for which dilution calculations or predictive modeling indicate nonattainment of applicable standards; (3) waters for which water quality problems have been reported by governmental agencies, members of the public, or academic institutions; and (4) waters identified as impaired or threatened in any Section 319 nonpoint assessment submitted to EPA. See 40 CFR §130.7(b)(5). In addition to these minimum categories, states are required to consider any other data and information that is existing and readily available. EPA’s 1991 Guidance for Water Quality-Based Decisions describes categories of water quality-related data and information that may be existing and readily available. See Guidance for Water Quality-Based Decisions: The TMDL Process, EPA Office of Water, Appendix C (1991) (EPA’s 1991 Guidance). While states are required to evaluate all existing and readily available water quality-related data and information, states may decide to rely or not rely on particular data or information in determining whether to list particular waters.

In addition to requiring states to assemble and evaluate all existing and readily available water quality-related data and information, EPA regulations at 40 CFR §130.7(b)(6) require states to include as part of their submissions to EPA, documentation to support decisions to rely or not rely on particular data and information and decisions to list or not list waters. Such documentation needs to include, at a minimum, the following information: (1) a description of the methodology used to develop the list; (2) a description of the data and information used to identify waters; and (3) any other reasonable information requested by the Region. West Virginia’s 2008 Integrated Water Quality and Assessment Report identified the state’s assessment methodology and its use of data.

Priority Ranking

EPA regulations also codify and interpret the requirement in Section 303(d)(1)(A) of the Act that states establish a priority ranking for listed waters. The regulations at 40 CFR §130.7(b)(4) require states to prioritize waters on their Section 303(d) Lists for TMDL development, and also to identify those WQLSs targeted for TMDL development in the next two years. In prioritizing and targeting waters, states must, at a minimum, take into account the severity of the pollution and the uses to be made of such waters. See Section 303(d)(1)(A). As long as these factors are taken into account, the Act provides that states establish priorities. States may consider other factors relevant to prioritizing waters for TMDL development, including immediate programmatic needs, vulnerability of particular waters as aquatic habitats, recreational, economic and aesthetic importance of particular waters, degree of public interest and support, and state or national policies and priorities. See 57 Fed. Reg. 33040, 33045 (July 24, 1992) and EPA’s 1991 Guidance.

Analysis of West Virginia's Submission

Identification of Waters and Consideration of Existing and Readily Available Water Quality-Related Data and Information

EPA has reviewed West Virginia's submission, and has concluded that West Virginia developed its 2008 Section 303(d) List in compliance with Section 303(d) of the Act and 40 CFR 130.7. EPA's review is based on its analysis of whether West Virginia reasonably considered existing and readily available water quality-related data and information and reasonably identified waters required to be listed.

A. Description of the methodology used to develop this list, Section 130.7(b)(6)(i)

West Virginia's 2008 Section 303(d) List was developed using all existing and readily available data. In West Virginia, the WVDEP's Division of Water and Waste Management (DWWM) is responsible for the collection and compilation of this information. In preparation for the Section 303(d) Listing process, WVDEP sought water quality information from various state and Federal agencies, colleges and universities, and private individuals, businesses and organizations. News releases and public notices were published in state newspapers and letters were sent to state and Federal agencies known by WVDEP to be generators of water quality data.

West Virginia's Section 303(d) List is based largely on the data collection and assessment that underlies the §305(b) report of the state's water quality. WVDEP generated the majority of available surface water quality data through the Watershed Assessment Program (WAP) performed within the Watershed Management Framework cycle. Biological data sources included WV Stream Condition Index (WVSCI) scores collected during WVDEP's WAP. Additional data was obtained from state and Federal agencies, local environmental agencies, colleges, and universities, citizen monitoring groups, and private firms. A complete list of data providers is shown on Table 4 of the Integrated Report. West Virginia considered all data and information regarding §130.7(b)(5) categories, which is the minimum required by Federal regulations.

Data evaluation by the agency began in the fall of 2007. In-house personnel possessing varying areas of expertise compared instream data to applicable water quality criteria and determined the impairment status of state waters. The basis for §303(d) Listing decisions relates to the West Virginia water quality standards. In general terms, if water quality standards are exceeded, a waterbody is considered impaired, placed on the §303(d) List, and scheduled for TMDL development. More specifically, a waterbody is considered impaired when it does not attain the designated use assigned to it by applicable water quality standards. Use attainment is determined by comparison of the instream values of various water quality parameters to the numeric or narrative criteria contained in the standards. The West Virginia water quality standards are codified at 46 CSR 1 – Legislative Rule of the Environmental Quality Board - Requirements Governing Water Quality Standards, and at 60 CSR 5 - Legislative Rule of the Department of Environmental Protection – Antidegradation Implementation Procedures. The 46 CSR 1 version used to develop the 2008 Section 303(d) List went into effect July 1, 2008. All water quality standards contained in this version have received the EPA's approval and are currently considered effective for CWA purposes.

In addition, West Virginia provided its rationale for not relying on particular existing and readily available water quality-related data and information as a basis for listing waters. West Virginia DWWM staff evaluated data from internal and external sources to ensure that collection

and analytical methods, quality assurance/quality control and method detection levels were consistent with approved procedures. All qualified data from available sources were used in the decision making process. For the stream quality assessment, West Virginia generally used water quality data generated between July 2002 and June 2007. EPA finds West Virginia's screening protocol and criteria described in its 2008 Section 303(d) listing rationale narrative to be a reasonable rationale in determining the usage of outside data, as waters listed as "impaired" should be based on scientifically valid data.

West Virginia released the Draft 2008 Section 303(d) List for public comment on March 24, 2008 through June 6, 2008. Notices of the availability of the Draft 2008 Section 303(d) List were placed in newspapers statewide and promoted via e-mail and the internet. These notices included information on where to obtain the documents and where to send comments. On March 24, 2008, the WVDEP provided EPA with the §303(d) Decision Database which records listing decisions for all waterbodies. After review of the §303(d) Decision Database, EPA provided comments to WVDEP on August 1, 2008, requesting clarification of individual waterbody listings and if any data and/or waters were screened out not used to make listing impairment decisions based on single pollution events. West Virginia received written comments from nine entities including EPA. WVDEP evaluated all comments received and prepared a responsiveness summary detailing WVDEP's actions regarding these comments. EPA concludes that WVDEP properly considered and responded to relevant public comments.

EPA received WVDEP's final 2008 Integrated Water Quality Monitoring and Assessment Report package combining the Section 303(d) List and Section 305(b) report on October 21, 2008. This package included: (1) a listing rationale narrative describing: (a) an overview of the process for development of the 2008 Integrated Report; (b) the assessment methodologies for the following kinds of data: numerical water quality criteria data including fecal coliform and pH, biological impairment, and fish consumption advisories; and (c) an explanation of the data evaluated in the preparation of the list; (2) a summary of comments and responses that could affect the listing of waters; (3) the Section 303(d) List with six supplemental tables tracking previously listed waters; (4) spreadsheets containing information on stream segments in each of the five assessment categories; (5) WVDEP's 303(d) Decision Database which records final listing decisions; and (6) all comment letters received by WVDEP during the public comment period.

West Virginia received comments questioning listing decisions for particular waterbodies. Where commentors advocated for or against particular impairment listings, West Virginia responded to the comments by providing relevant waterbody-specific analyses used in the listing decision; and, where appropriate, making changes to the Section 303(d) List.

EPA recognizes that WVDEP received comments questioning its reliance on biological assessments and the West Virginia Stream Condition Index to identify waters for inclusion on the Section 303(d) List. In identifying water quality limited segments for inclusion on the Section 303(d) List, states must evaluate attainment with water quality standards established under Section 303(c) of the Act, including numeric criteria, narrative criteria, waterbody uses, and antidegradation requirements, based on consideration of all existing and readily available information, including but not limited to assessment information such as chemistry, toxicity, or ecological assessment. Assessment information is particularly important for determining whether a waterbody is achieving its designated use, such as supporting aquatic life, or narrative criteria.

With respect to the various types of assessment information, EPA recommends that the states apply a policy of independent application to determine whether a waterbody is achieving applicable water quality standards. This policy addresses three types of assessment information:

chemistry, toxicity testing results, and ecological assessment. Each of these three methods can provide a valid assessment of non-attainment of a designated use and each independently can provide conclusive evidence of non-attainment without confirmation with a second method. EPA, Final Policy on Biological Assessments and Criteria (June 19, 1991); see also 48 Fed. Reg. 51,400, 51,402 (Nov. 8, 1983) (noting that biological monitoring is one method of testing compliance with narrative criteria); cf. 33 U.S.C. 1313(c)(2)(B) (nothing in Section 303(d) should be construed to limit or delay the use of effluent limitations or other permit conditions based on or involving biological monitoring or assessment methods). Biological assessments can provide compelling evidence of water quality impairment because they directly measure the aquatic community's response to pollutants or stressors, and they can help provide an ecologically based assessment of the compliance status of a waterbody. Memorandum from Geoffrey H. Grubbs, Director, Assessment and Watershed Protection Division, EPA, to Water Management Division Directors, Regional TMDL Coordinators, Regions I-X re Guidance for 1994 Section 303(d) Lists (Nov. 26, 1993).

Following EPA's review of WVDEP's final 2008 Section 303(d) List, EPA identified some additional concerns for which clarification and/or additional listings were provided by WVDEP in subsequent correspondence. West Virginia provided additional information to address EPA's comments and certain discrepancies identified by WVDEP. An electronic copy of West Virginia's revised 2008 Integrated Report combining the Section 303(d) list and Section 305(b) report with associated databases were received by mail on December 17, 2008.

EPA has reviewed West Virginia's description of the data and information it considered, its methodology for identifying waters, and additional information provided in response to comments raised by EPA. EPA concludes that the state properly assembled and evaluated all existing and readily available data and information, including data and information relating to the categories of waters specified in 40 CFR §130.7(b)(5).

B. Description of the data and information used to identify waters, including a description of the data and information used by West Virginia as required by Section 130.7(b)(5).

1. Section 130.7(b)(5)(i), Waters identified by West Virginia in its most recent Section 305(b) report as “partially meeting or not meeting designated uses, or as threatened.”

West Virginia's 2008 Section 303(d) List was combined with the §305(b) report to form what is now referred to as the Integrated Report. Therefore, the §305(b) report is no longer a stand alone document, and the data that would have gone into development of such a “stand alone” report was used in the production of the Integrated Report. In West Virginia, the biennial water quality assessment is conducted by the WVDEP DWWM. The Integrated Report incorporates the data and evaluations obtained from state and Federal agencies, local environmental agencies, colleges and universities, citizen monitoring groups, and private firms. A complete list of data providers is shown in Table 4 of the Integrated Report. West Virginia relied heavily on ORSANCO's 2006 §305(b) report and used support information when making listing decisions for the Ohio River and the tributaries for which data was available. West Virginia's Integrated Report compartmentalized the waters of West Virginia into five distinct categories which were described above. Waters are defined as being either supporting of all uses, supporting of all uses for which assessment occurred, lacking data for a determination, impaired but not requiring a TMDL, or impaired and requiring a TMDL.

Waters in Category 5, impaired and requiring a TMDL, are those placed on West Virginia's 2008 Section 303(d) List. These waters are found as not attaining their designated uses based on monitoring data. The methodology used to determine non-attainment of designated uses is described

in West Virginia's 2008 Integrated Water Quality and Assessment Report. West Virginia also provided the Section 303(d) List with five supplemental tables that track previously listed waters.

2. Section 130.7(b)(5)(ii), Waters for which dilution calculations or predictive models indicate non-attainment of applicable water quality standards.

West Virginia relied primarily on water quality monitoring data described above in identifying impaired segments. However, certain waters are included on the 2008 Section 303(d) List based upon modeling results associated with TMDL development. TMDL modeling of the baseline condition for all such waters indicates that pollutant reductions from existing sources are needed to ensure compliance with water quality criteria. In the majority of cases, water quality monitoring and predictive modeling reach consistent conclusions regarding the impairment status of waterbodies. In other cases, monitoring data may not be available, may not have been obtained at critical conditions or locations, or may not reflect the conditions that would exist if point sources were discharging at their permit limits. Where predictive modeling indicated that discharges in accordance with existing permit limits would cause violation of water quality criteria, the designated use of the water quality may be classified as "threatened," thereby subjecting it to Section 303(d) listing and TMDL development pursuant to Section 130.7(b)(5).

3. Section 130.7(b)(5)(iii), Waters for which water quality problems have been reported by local, state, or Federal agencies; members of the public; or academic institutions.

West Virginia solicited data from entities outside of the WVDEP. Several waters were placed on West Virginia's 2008 Section 303(d) List as a result of data collected by agencies other than WVDEP as identified in Table 4 of the Integrated Report.

- Federal agencies (i.e., U.S. Geological Survey, National Park Service, and EPA)
- State agencies (i.e., WV Department of Natural Resources, WV Department of Agriculture, and ORSANCO)
- Members of the public (i.e., Friends of Decker Creek, Friends of Cheat)
- Private companies (i.e., Alliance Coal, LLC, Orchard Coal)
- Academic institutions (i.e., WVU Water Research Institute)

West Virginia encouraged comment on its draft lists, and the submission of water quality data, each time the list was public noticed. West Virginia received additional data and information as comments to their Public Notice Draft 2008 Section 303(d) List. In their listing rationale, West Virginia summarized the comments and any changes that were made to the proposed list based on additional data and information.

4. Section 130.7(b)(5)(iv), Waters identified by West Virginia as impaired or threatened in a nonpoint assessment submitted to EPA under Section 319 of the CWA or in any updates of the assessment.

West Virginia properly listed waters with nonpoint sources causing or expected to cause impairment, consistent with Section 303(d) and EPA guidance. Section 303(d) Lists are to include all WQLSs still needing TMDLs, regardless of whether the source of impairment is a point and/

or nonpoint source. EPA's long-standing interpretation is that Section 303(d) applies to waters impacted by point and/or nonpoint sources. In *Pronsolino v. Marcus*, the District Court for the Northern District of California held that Section 303(d) of the CWA authorizes EPA to identify and establish TMDLs for waters impaired by nonpoint sources. *Pronsolino et al. V. Marcus et al.*, 91 F.Supp.2d 1337, 1347 (N.D.Ca. 2000), *aff'd*, 291 F.3d 1123 (9th Cir. 2002), petition for cert. filed, 71 U.S.L.W. 3531 (Feb. 6, 2003) (No. 02-1186). Also, see EPA's 1991 Guidance and National Clarifying Guidance for 1998 Section 303(d) Lists, Aug. 27, 1997.

5. Other data and information used to identify waters (besides items 1-4 discussed above).

EPA has reviewed West Virginia's description of the data, information, and methodology used by West Virginia in the development of their 2008 Section 303(d) List. This includes supplemental data and information that was submitted in response to EPA's comments. Table 4 of the Integrated Report lists 30 sources of data utilized during the listing process. After this review, EPA has concluded that West Virginia has properly assembled and evaluated all existing and readily available data and information, including data and information relating to the categories of waters specified in 40 CFR §130.7(b)(5).

C. A rationale for any decision to not use any existing and readily available data and information for any one of the categories of waters as described in Sections 130.7(b)(5) and 130.7(b)(6)(iii).

West Virginia provided its rationale for not relying on particular existing and readily available water quality related data and information as a basis for listing waters. West Virginia DWWM staff evaluated data from internal and external sources to ensure that collection and analytical methods, quality assurance/quality control and method detection levels were consistent with approved procedures. All qualified data from available sources were used in the decision making process. EPA finds West Virginia's screening protocol and criteria described in its 2008 Integrated Report rationale narrative to be a reasonable rationale in determining the usage of outside data, as waters listed as "impaired" should be based on scientifically valid data.

D. Rationale for delisting of waterbodies from the previous Section 303(d) List.

West Virginia has indicated, through "Supplemental Table A", those waterbodies that were included in previous §303(d) Lists but are now delisted from the 2008 Section 303(d) List. West Virginia has demonstrated to EPA's satisfaction its rationale for these delistings. According to the regulations at 40 CFR §130.7(b), a water may be delisted for the following reasons: more recent or accurate data; more sophisticated water quality modeling; flaws in the original analysis that led to the water being listed in the categories in Section 130.7(b)(5); or changes in conditions (i.e., new control equipment, elimination of discharges).

WVDEP delisted waterbodies due to new water quality analyses demonstrating compliance with water quality standards, revisions to water quality criteria associated with the previous listing, or a modification of the listing methodology. One of the conditions outlined includes more recent or accurate data showing compliance with applicable water quality standards. For the 2008 Section 303(d) List, West Virginia submitted various sets of data demonstrating that certain waters either recovered to the point that the applicable water quality standards have been attained, or were listed in error and are currently not impaired. For other delistings, reassessments revealed that some waters were still impaired, but that the pollutants

or impairment lengths had changed. These delisted water pollutant combinations were reassessed using methodologies at least as stringent as the methodology that originally placed the water on the list.

For each segment proposed for removal from the 2008 Section 303(d) List, West Virginia provided EPA with sufficient documentation as justification. Such data included benthic macroinvertebrate data, chemical data, compliance data, and other forms of documentation. EPA reviewed this data and approves the delisting determinations listed in “Supplemental Table A.” Decisions regarding the need for TMDL development were made in accordance with the requirements of 40 CFR §130.7(b)(1) and the state’s listing criteria.

WVDEP has also identified on “Supplemental Table B” those waterbodies where a TMDL has been completed. Consequently, these waterbodies are not included on the Section 303(d) List.

E. Any other reasonable information requested by the Regional Administrator described in Section 130.7(b)(6)(iv).

During the review of West Virginia’s 2008 Section 303(d) List, EPA, Region III, staff requested additional information from West Virginia.

- Justification for differences between EPA recommendations and WVDEP’s final 2008 Section 303(d) List. In comment letters dated August 1, 2008, and various electronic comments sent from November 2008 to December 1, 2008, EPA requested clarification and amendments to West Virginia’s 2008 Section 303(d) List. West Virginia evaluated EPA’s comments and provided explanations. Where appropriate, the list was revised to resolve the discrepancy.
- Justification for delisting segments. West Virginia delisted a number of segments listed on the 2008 list which were provided on “Supplemental Table A – Previously Listed Waters – No TMDL Developed.” Where waters were delisted, the delisting was consistent with the CWA and implementing regulations.
- Clarification of changes to previously listed waters. EPA requested that West Virginia clarify changes in segment length and stream codes to previously listed waters. This information was provided to EPA to justify changes made from previous listing cycles.

EPA concludes that West Virginia has addressed all additional information EPA requested of the state during the review of the 2008 Section 303(d) List.

F. Identification of the pollutants causing or expected to cause a violation of the applicable water quality standards described in Section 130.7(b)(4).

West Virginia identified the pollutants that were causing or expected to cause a violation of the applicable water quality standards for every listed segment where the identity of the pollutant was known. West Virginia included those pollutants for which a numeric water quality criterion was violated, such as fecal coliform. For violations of a narrative criterion, pollutants were rarely identified. Therefore, many waters were listed

for violations of the narrative biological standard without identifying a cause since no cause was determined at the time of listing. West Virginia anticipates that the cause of biological impairments will be determined during TMDL development.

G. Priority Ranking and Targeting.

Within the 2008 Section 303(d) List, West Virginia has provided TMDL development dates and a detailed discussion of both the priority ranking and schedule development in its 2008 Section 303(d) List rationale. This discussion includes a description of West Virginia's five-year Watershed Management Framework cycle for its five hydrologic groups (A-E). EPA reviewed West Virginia's priority ranking of listed waters for TMDL development, and concludes that West Virginia properly took into account the severity of pollution and the uses to be made of such waters. Scheduling, however, takes into account additional relevant factors, such as programmatic considerations (i.e., efficient allocation of resources, Watershed Management Framework cycles, and coordination with other programs or states) and technical considerations (i.e., data availability, problem complexity, availability of technical tools). Another factor West Virginia considered in prioritizing its listed waters is the schedule in the Consent Decree resolving *Ohio Valley Environmental Coalition, Inc., et al. v. Carol Browner, et al.*, No. 2:95-0529 (S.D.W.VA.) entered on July 9, 1997, which establishes dates for EPA to ensure TMDL development for all waters and pollutants listed on West Virginia's 1996 Section 303(d) List.

In addition, EPA reviewed West Virginia's identification of WQLSs targeted for TMDL development in the next three years, and concludes that the targeted waters are appropriate for TMDL development in this timeframe. High priority has been placed on these stream segments. For other impairments where the timing of TMDL development is less certain, multiple year entries were indicated that represent the opportunity for TMDL development per the Watershed Management Framework cycle.

Although West Virginia's projected TMDL development dates do not strictly follow EPA's pace guidance of completion within eight to thirteen years since initial listing, West Virginia's TMDL development plans appear consistent with the guidance in that West Virginia plans to develop TMDLs for approximately 100 impaired waters per year and attempts to simultaneously develop TMDLs for all known impairments. The 2008 Section 303(d) List identifies 20 lakes and 913 stream segments. Given West Virginia's TMDL development rate of approximately 100 waters per year, it is likely that West Virginia will comply with EPA's pace guidance.

H. Coordination with the U.S. Fish and Wildlife Service

During West Virginia's public comment period, EPA sent a copy of West Virginia's Draft 2008 Section 303(d) List in electronic correspondence on March 25, 2008, to the U.S. Fish and Wildlife Service (USFWS). EPA requested comments from USFWS regarding the draft list; no comments were received.

December 5, 2008

Larry Merrill
Office of Watersheds
US EPA Region 3 (3WP30)
1650 Arch Street
Philadelphia, PA 19103-2029

Re: West Virginia 2008 Integrated Report

Dear Mr. Merrill:

Following review of comments provided by your staff, WVDEP made various revisions to the 2008 Integrated Report originally submitted to EPA on October 17, 2008, in anticipation of EPA approval Section 303(d) components.

WVDEP made the following final revisions:

- Supplemental Table B was revised to reflect that approved Fe, Al and pH TMDLs are in place for Dow Fork (WVKC-47-G-1).
- Dissolved aluminum and pH TMDLs were deleted from Supplemental Table B for Long Branch (WVKC-47-G).
- On the 303(d) list, the impaired length of Maynard Branch (WVO-2-Q-23) was revised from “mouth to RM 0.4” to “mouth to RM 0.2”, and the impaired length of Right Fork Cub Branch (WVO-2-Q-31-A) was revised from “entire length” to “mouth to RM 0.6”. The revisions are based upon documentation of the existence of instream impoundments and culverts that we present at the time of biological assessment that limit the representative reach associated with the biological samples collected at or near the mouth of those streams.

Enclosed with this correspondence is a CD containing the revised West Virginia 2008 Integrated Water Quality Monitoring and Assessment Report and supporting documentation. This CD is a complete replacement for the one included with our original submission.

WVDEP remains willing to cooperate in any manner necessary to support EPA’s approval of the Section 303(d) List. If you or your staff have any questions or would like to discuss any issue in greater detail, please contact Dave Montali or me at (304) 926-0499.

Sincerely,

Patrick V. Campbell
Assistant Director

Attachments

cc: Scott Mandirola, Acting Director, DEP-DWWM
William Richardson, US EPA
James Laine, DEP-DWWM

October 17, 2008

Larry Merrill
Office of Watersheds
US EPA Region 3 (3WP30)
1650 Arch Street
Philadelphia, PA 19103-2029

Re: West Virginia 2008 Integrated Report

Dear Mr. Merrill:

Pursuant to requirements contained in the federal Clean Water Act, 40CFR130 and in current federal guidelines, I am hereby transmitting West Virginia's 2008 Integrated Water Quality Monitoring and Assessment Report. The report represents a lengthy review of all existing and readily available water quality information on West Virginia's waters, contains information on our assessment methodologies and includes the West Virginia 2008 Section 303(d) List. The Section 303(d) List component is being officially submitted for your approval.

In support of the submission, the following information is provided on the included CD:

- An electronic copy of the document
- Spreadsheets containing information on stream segments in each of the five assessment categories
- West Virginia's 303(d) decision database with supporting electronic data files
- A spreadsheet identifying and rationalizing all of the changes made to the Section 303(d) List and supplements in the time since the documents were released for public comment. This spreadsheet includes revisions initiated by DEP as well as those resulting from EPA comments and public comments.
- A spreadsheet addressing EPA's questions relative to specific stream listings on the Section 303(d) List and Supplements.

Also enclosed are CDs that contain all files needed to port required information into ADB. Two copies are provided to facilitate transfer of the information to RTI.

The Integrated Report contains a Responsiveness Summary addressing public comments received in response to the Draft Section 303(d) List. Hard copies of all public comments are being sent separately.

Consideration was given to the comments provided by EPA Region III. DEP reactions to those comments are provided below.

EPA requested clarification of the statement: "Further, waters are not deemed impaired based upon "not-detected" analytical results from methodologies that have detection limits that are not sensitive enough to confirm criteria compliance."

For certain water quality criteria, the criterion value is lower than the detection level of approved analytical procedures. The statement remains a component of our listing methodology to indicate that the agency would not use the detection limit of the method as an observed, non-attaining, result if the reported value from an appropriate method is “not detected”.

EPA asked if any data submitted by external sources was screened out and not used to make listing/impairment decisions.

Certain biological information was submitted during the public comment period that could not be effectively validated and was not directly used in the development of the 303(d) list. That notwithstanding, the submitted information did not absolutely contradict DEP biological data and the agency has committed to work with the provider to improve future data quality and documentation, and to conduct joint biological evaluations. Additional details are provided in the Responsiveness Summary.

EPA requested explanation of any instances where streams were not listed based upon clustered monitoring around a single pollution event or where single pollution events were found not to be representative of current conditions.

The statement “WVDEP does not interpret impacts of single pollution events as representative of current conditions if it is known the problems have abated and does not interpret clustered monitoring of a single event as representative of water quality conditions for longer time periods” is a component of our listing methodology to advise stakeholders of agency philosophy. No specific applications of this provision were made in the 2008 process.

EPA requested correction of the consent decree deadline for TMDLs for mine drainage impaired waters.

The TMDL Development section of the Integrated Report contains the correct consent decree deadline of September 30, 2009.

EPA’s questions relative to specific stream listings are addressed in the spreadsheet “WV_2008_IR_Responses_to_EPA_listing_comments_20081007.xls”. Column H of the spreadsheet identifies the changes made to the draft 303(d) list or supplement, and/or provides the requested explanation.

The document represents the best efforts of our staff and I am confident that you will find the report to be both informative and compliant with applicable guidance. The report as submitted to your office will be posted on our website, although we do not intend to print and distribute the document until we obtain your approval of the Section 303(d) portion. As such, I look forward to your timely review and stand ready to explain our actions in any detail necessary for your approval. If you or your staff have any questions or would like to discuss any issue in greater detail please contact Dave Montali or me at (304) 926-0499 (exts.1063, 1046).

Sincerely,

Patrick V. Campbell
Assistant Director

Attachments

cc: Scott Mandirola, Acting Director, DEP-DWWM
Jennifer Sincock, US EPA
James Laine, DEP-DWWM

List Format Description

The format of the 2008 Section 303(d) list is organized around the Watershed Management Framework. The five hydrologic groups (A-E) of the framework provide the skeleton. Within each hydrologic group, watersheds are arranged alphabetically and impaired waters are sorted by stream code in their appropriate watershed. The information that follows each impaired stream includes the stream code, the affected water quality criterion, the affected designated use, the general cause of the impairment (where known), the impaired length (or, by default, the entire length), the planned or last possible timing of TMDL development and whether or not the impairment was on the 2006 list. The cause of impairment is often unknown or uncertain at the time of listing and is so indicated on the list. The scheduling of TMDL development is discussed in detail in Section 6. A West Virginia Watershed Management Framework map is provided to assist navigation within the list. A key is also provided to aid in the interpretation of presented information.

List Supplements Overview

Seven supplements are provided that contain additional information. The seven supplements are entitled: “Previously Listed Waters – No TMDL Developed,” “Previously Listed Waters – TMDL Developed,” “Impaired Waters under TMDL Development,” “Water Quality Improvements Being Implemented – Below Listing Criteria,” “Impaired Waters – No TMDL Needed,” “Total Aluminum TMDLs Developed” and “New Listings for 2008.”

Supplemental Table A - Previously Listed Waters – No TMDL Developed

Previously listed waters from the 2006 list that are not on the 2008 list are included in this supplement if a TMDL has not been developed, and these waters have been reevaluated and determined not to be impaired. Causes for revision of the impairment status include recent water quality data demonstrating an improved water quality condition, revision to the water quality criteria associated with the previous listing, documentation that the water was previously listed in error or a modification of the listing methodology.

Supplemental Table B - Previously Listed Waters - TMDL Developed
TMDLs have been developed for many previously listed waters. TMDL development allows the removal of an impaired water from the 303(d) list. In the suggested format of the Integrated Report, such waters are to be classified in Category 4A and clearly distinguished from Category 5 and the 303(d) list. Waters included in Category 4A have TMDLs developed, but water quality improvements are not yet complete and/or documented. The waters identified in Supplement B will match those of Category 4A of the Integrated Report.

Supplemental Table B-1 – Impaired Waters under TMDL Development

TMDLs for certain impaired waters in the New River watershed have been developed by the DEP and are awaiting EPA approval. It is assumed that the EPA will approve these TMDLs prior to their approval of the 2008 Section 303(d) list. Barring unforeseen complications, the waters/ impairments shown in Table B-1 will also be included in Category 4A of the Integrated Report.

Supplemental Table C - Water Quality Improvements

The goal of TMDLs and stream restoration projects is to bring the stream back to the point where it meets its designated uses and the associated water quality criteria. Supplement C includes a listing of streams with improved water quality due to TMDL implementation or pre-TMDL stream restoration work resulting in delisting. In the Integrated Report, the waters in Supplement C are to be included in Category 1 (meeting all uses), provided that impairments for other uses/pollutants are not evidenced.

Supplemental Table D - Impaired Waters - No TMDL Development Needed

This table lists impaired waters for which either other control mechanisms are in place to control pollutants or the water is not impaired by a pollutant (i.e., flow alterations caused by mining). These are the same waters contained in the Integrated Report’s Category 4b and 4c, respectively.

Supplemental Table E - Total Aluminum TMDLs Developed

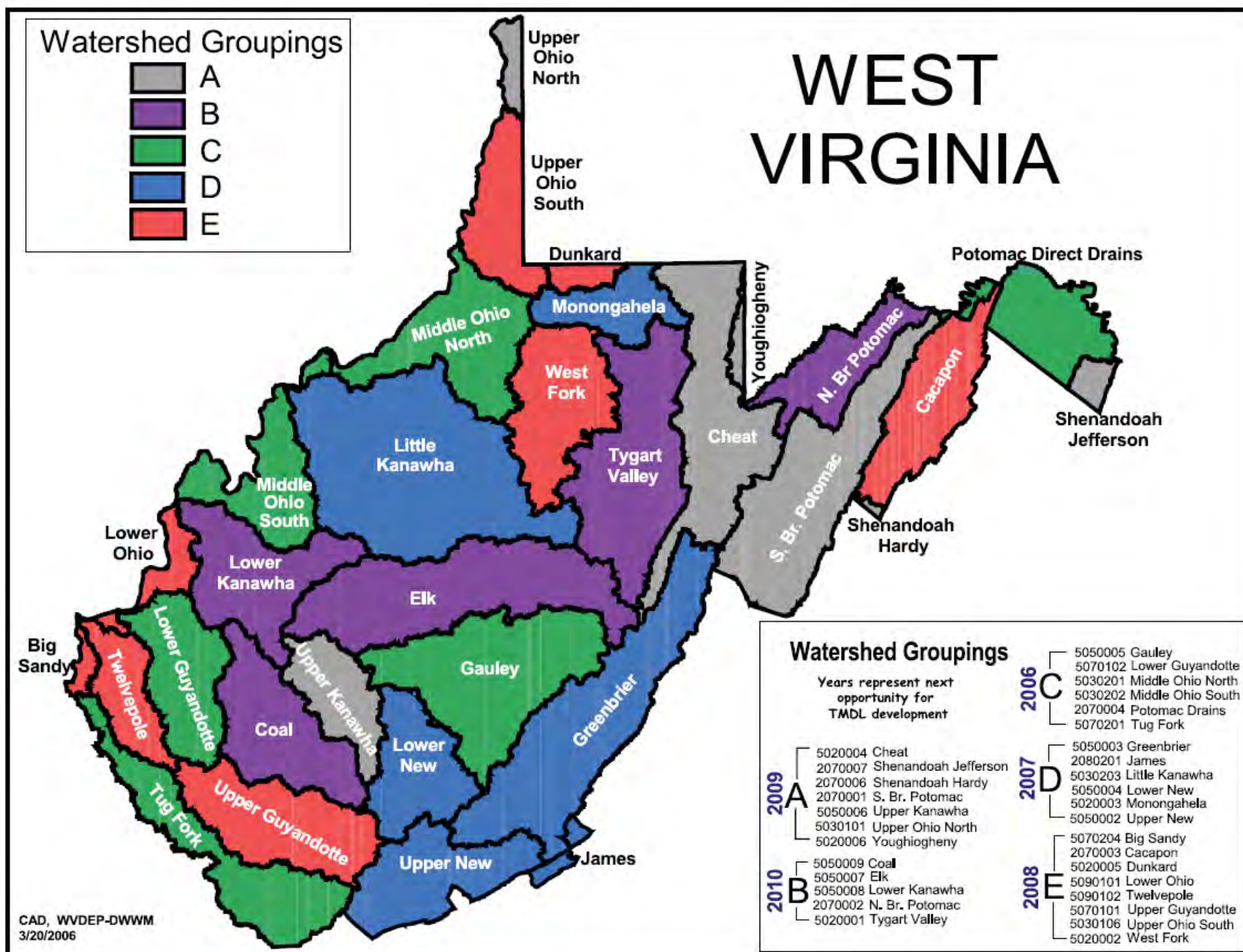
This table contains a list of previously listed waters for total aluminum TMDL that were developed and established by the EPA. Due to a criteria change from total aluminum to dissolved aluminum, West Virginia placed total aluminum TMDLs onto a separate table from Supplemental Table B.

Supplemental Table F – New Listings for 2008

This table is a list of impaired waters that were not previously included on the 2006 Section 303(d) list.



North River in Hampshire County
Photo by Jeff Bailey





west virginia department of environmental protection