2010 West Virginia Integrated Water Quality Monitoring and Assessment Report

west virginia department of environmental protection
Division of Water and Waste Management

WEST VIRGINIA INTEGRATED WATER QUALITY MONITORING AND ASSESSMENT REPORT 2010

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 2007 through June 2009.

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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 2010 list. The EPA has recommended these 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.

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	

This Integrated Report is a combination of the 2010 Section 303(d) List and the 2010 Section 305(b) report. In general, this report includes data collected and analyzed between July 1, 2004 and June 30, 2009, 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 2010 Section 303(d) List are placed in Category 5 of this report.

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. Impairment assessments conducted for the 2010 cycle are based upon water quality standards that have received the EPA's approval and are currently considered effective for Clean Water Act purposes. In that regard, the EPA has recently approved several changes to the West Virginia Water Quality Standards. Information regarding the approved changes can be found on the DEP's Web page at http://www.dep.wv.gov/WWE/Programs/wqs/Documents/EPA%20Letters/2009_09_16_07_57_00.pdf

A waterbody is considered impaired if it violates water quality standards and does not meet its designated uses. Use attainment is determined by the comparison of the instream values of various water

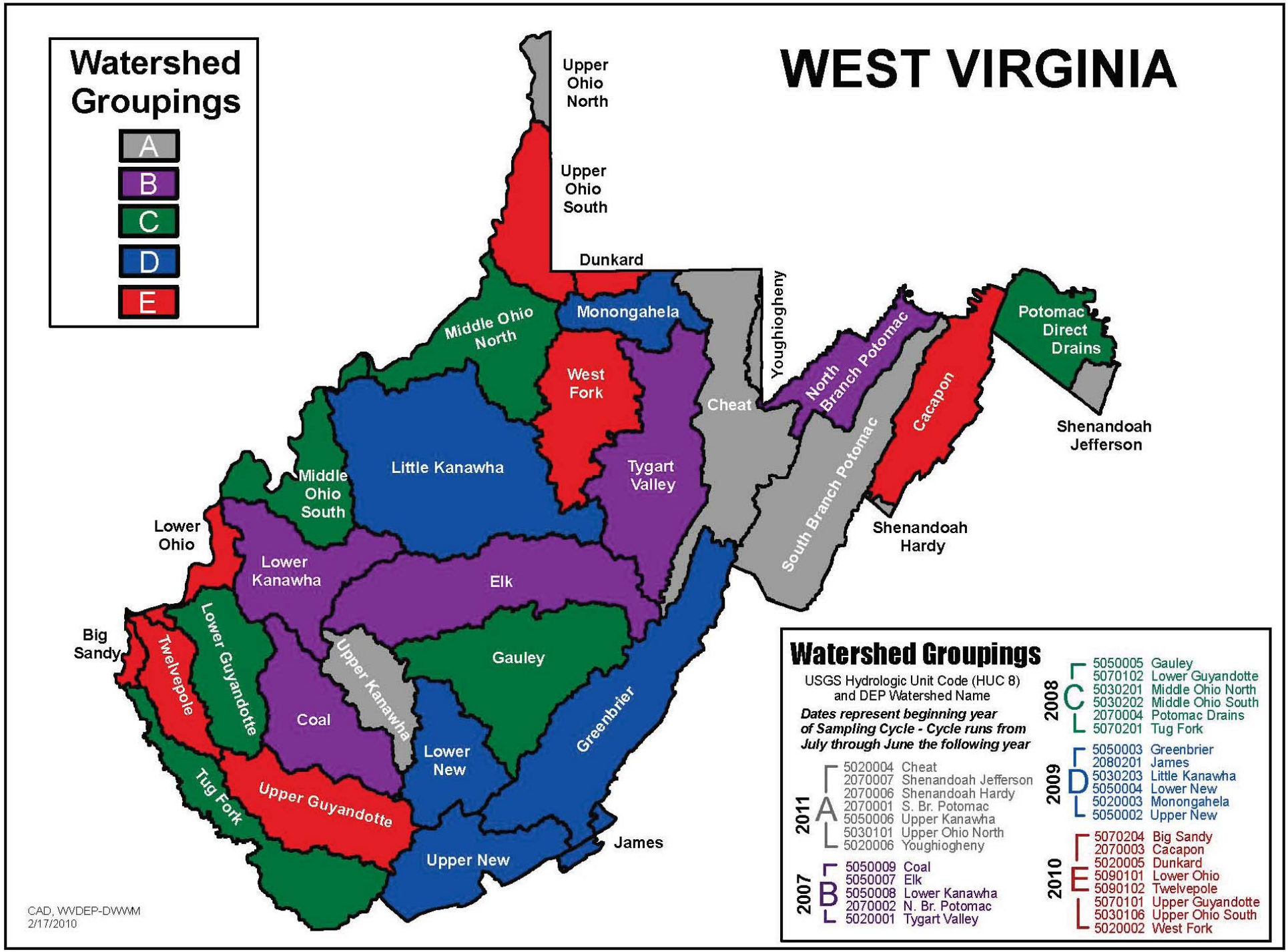
quality parameters to the numeric or narrative criteria specified for the designated use (see the Assessment Methodology section for more information on use attainment determination). Waterbodies that are impaired by a pollutant are placed on the 303(d) List and scheduled for TMDL development.

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 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.

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


Watershed Groupings
A
B
C
D
E
WEST VIRGINIA
Upper Ohio North
Upper Ohio South
Dunkard
Monongahela
Middle Ohio North
West Fork
Youghiogheny
Cheat
North Branch Potomac
Potomac Direct Drains
Cacapon
Shenandoah Jefferson
Shenandoah Hardy
South Branch Potomac
Tygart Valley
Little Kanawha
Middle Ohio South
Lower Ohio
Lower Kanawha
Elk
Big Sandy
Twelvepole
Lower Guyandotte
Upper Kanawha
Gauley
Coal
Greenbrier
Lower New
Tug Fork
Upper Guyandotte
James
Upper New
CAD, WVDEP-DWWM
2/17/2010
Watershed Groupings
USGS Hydrologic Unit Code (HUC 8)
and DEP Watershed Name
Dates represent beginning year of Sampling Cycle - Cycle runs from July through June the following year
2011 A
5020004 Cheat
2070007 Shenandoah Jefferson
2070006 Shenandoah Hardy
2070001 S. Br. Potomac
5050006 Upper Kanawha
5030101 Upper Ohio North
5020006 Youghiogheny
2007 B
5050009 Coal
5050007 Elk
5050008 Lower Kanawha
2070002 N. Br. Potomac
5020001 Tygart Valley
2008 C
5050005 Gauley
5070102 Lower Guyandotte
5030201 Middle Ohio North
5030202 Middle Ohio South
2070004 Potomac Drains
5070201 Tug Fork
2009 D
5050003 Greenbrier
2080201 James
5030203 Little Kanawha
5050004 Lower New
5020003 Monongahela
5050002 Upper New
2010 E
5070204 Big Sandy
2070003 Cacapon
5020005 Dunkard
5090101 Lower Ohio
5090102 Twelvepole
5070101 Upper Guyandotte
5030106 Upper Ohio South
5020002 West Fork

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 the Use Assessment Procedures section.

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. ORSANCO standards may be reviewed at http://www.orsanco.org/index.php/standards.

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 (DWWM) 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 the 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. The data analyzed for this report covers sampling years 2005 through 2009 and provides an overview of major pollutants impacting state waters.

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 including collection of benthic macroinvertebrate for biological community analysis. However, probabilistic sampling includes more rigorous water quality and habitat analysis.

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 communities.

Sites are selected to meet a variety of informational needs in the following areas:

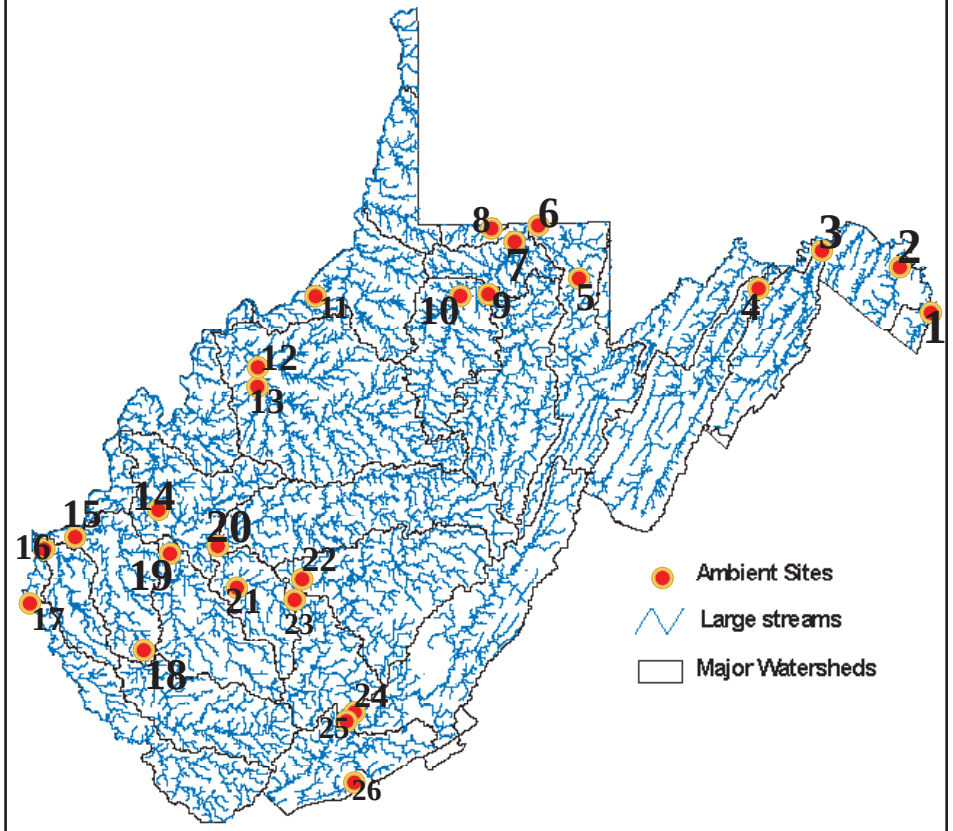
- Impaired streams
- Reference (minimally impacted) streams
- Spatial trends (multiple sites on streams exceeding 15 miles in length)
- Areas of concern as identified by the public and stakeholders
- Previously unassessed streams

Pre-TMDL development sampling

The major objective of this effort is to collect sufficient data for Total Maximum Daily Load modelers to develop stream restoration plans. Pre-TMDL sampling follows the framework cycle, i.e., impaired streams from watersheds in 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

Figure 1 – West Virginia's ambient monitoring sites



1. Shenandoah River at Harpers Ferry	14. Kanawha River at Winfield
2. Opequon Creek east of Bedington	15. Guyandotte River at Huntington
3. Cacapon River near Great Cacapon	16. Twelvepole Creek south of Ceredo
4. South Branch of the Potomac River	17. Tug Fork at Fort Gay
5. Cheat River at Albright, W.Va.	18. Guyandotte River at Pecks Mill
6. Cheat River below Cheat Lake	19. Coal River at Tornado
7. Monongahela River in Star City	20. Elk River at Coonskin Park
8. Dundard Creek east of Pentress	21. Kanawha River at Chelyan
9. Tygart Valley River at Colfax	22. Gauley River at Beech Glen
10. West Fork River at Enterprise	23. New River above Gauley Bridge
11. Middle Island Creek at Arvilla	24. Greenbrier River at Hinton
12. Hughes River west of Freeport	25. New River at Hinton
13. Little Kanawha River at Elizabeth	26. New River at Virginia state line

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 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 identifying non-point source land use stressors as well as any permitted facilities that may not be meeting their permit requirements. For more information, see the TMDL Development Process section.

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 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.

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.

Wetlands

The State of West Virginia takes great interest in the management of its wetlands both large and small. The current total wetland area within the state is 102,000 acres which comprises less than 1 percent of the State's total acreage {wetland acreage determined by National Wetlands Inventory: WV 1980-86}. As of this report, instituted management efforts are currently geared toward protection of wetlands by regulatory proceedings or acquisition. Permitting authority for activities impacting wetlands (Section 404) lies with the U. S. Army Corps of Engineers. West Virginia insures protection through an active Section 401 certification program.

Since the submission of the last 305(b) report; changes in the status of West Virginia's wetlands monitoring are being pursued. These changes are intended to be the start of a larger statewide monitoring and assessment program. Watershed Assessment personnel have been researching/developing assessment and monitoring strategies in conjunction with the EPA and other states. The Wildlife Resources Section of the Division of Natural Resources, in cooperation with West Virginia University, is also currently evaluating aerial photography from 2003 at a 1:4800 scale to supplement the data from the National Wetlands Inventory. Information from this project will provide improved detail and information, because the original 1986 NWI's imagery was at a 1:48,000 scale. The updated wetland polygons will show any creations, natural changes, human modifications, or loss since the 1986 NWI as well as proper Cowardin classification. A set completion date is not available, but currently six counties have been QA/QC'd by the DNR personnel and the DNR plans to finish most of the state during 2010.

The West Virginia Division of Natural Resources and the DEP plan to begin a wetlands monitoring and assessment program prior to the 2011 National Assessment. Due to the specialized skills of the the DNR, the responsibilities of a majority of field work will fall with the DNR. The DEP will combine efforts and personnel where applicable in the field as well as remain the primary reporting entity for the state. The DNR has recently completed a rapid assessment method for wetlands which can be used statewide. Calibration with intensive assessments and GIS remote assessments on the same wetlands/sites gives us high confidence in data to be generated in future rapid assessments. The DNR plans to start collecting data for database use/storage in the field season of 2010.

A National Wetlands Condition Assessment (EPA) is planned for 2011 which will encompass the entire United States. The DEP continues to maintain contact with the EPA in preparation for this NWCA; and the DEP and DNR plan to combine efforts to assess the sites in West Virginia. The EPA intends to inform states of site selections by March 2010 and follow with standardized assessment methods by April 2010.

Table 3 - Current and future monitoring activities

26 Ambient sites will be monitored monthly (Monongahela River Basin sites) or bi-monthly from July 2009 through June 2011
A third round of probabilistic monitoring that began in the spring of 2007 will continue through 2011. Seventy-eight site are assessed each year. Fish Community assessements are being conducted at approximately one-third of the sites.
Pre-TMDL development monitoring for Group D - 181 sites from 118 streams in the Monongahela River Watershed were sampled from July 2009 through June 2010.
Pre-TMDL development monitoring for Group E - 301 sites from 224 streams in the West Fork River Watershed will be sampled from July 2010 through June 2011.
Group D Targeted Sampling – 53 targeted sites were sampled in 2009. Targeted assessments include water quality, biology, and habitat measures.
Group E Targeted Sampling – Approximately 50 sites will be sampled during the 2010 summer sampling season.
Lakes – Eight lakes within Group E will be sampled four times during the 2010 growing season (May through October) and approximately 10 Group A Lakes will be sampled in 2011.
Water quality meters were deployed at 48 locations on 36 streams. Parameters measured include pH, temperature, conductivity, and dissolved oxygen.
Long Term Monitoring Sites (LTMS or LitMuS). Approximate 50 sites were sampled in 2009. A similar or greater number will be assessed in 2010.

Current wetland information can be found in the booklet West Virginia's Wetlands… Uncommon, Valuable Wildlands (Tiner, 1996). Future valuable information on the number and condition of West Virginia's wetlands will be available from the 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 major 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.dep.wv.gov/WWE/getinvolved/SOS/Pages/WAD.aspx. 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.

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. 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 the DEP's Web site using the following link: http://www.dep.wv.gov/WWE/watershed/IR/Documents/WV_WQ_Data_Submission_Guidelines_2010.pdf

Assessment decisions are made using the most accurate and recent data available to the agency. For stream water quality assessments, the DEP generally used water quality data generated between July 2004 and June 2009. 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.

External data providers

Data submitted from sources outside of the Watershed Assessment Branch were considered in the development of this report. This also includes data from other the DEP programs. Entities that provided information in response to the agency's request for data for the 2010 Section 303(d) list are shown in Table 4. External data received and qualified in the preparation of previous Section 303(d) lists were reconsidered in the 2010 review. Once data was submitted, the DEP performed the following:

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

Table 4 - Data providers for the 2010 303(d) List and Integrated Report

ARGUS Energy	Chesapeake Bay Program Office	West Virginia Department of Agriculture
Don Gasper	Friends of Deckers Creek	West Virginia Department of Environmental Protection
ORSANCO	State of Kentucky	The Conservation Fund Freshwater Institute
U.S. Army Corps of Engineers	USDA Forest Service	U.S. Geological Survey
West Virginia Water Research Institute	Mud River Watershed Decentralized Wastewater Demonstration Project	

USE ASSESSMENT PROCEDURES

The primary focus of this report is to assess water quality information and determine if the designated uses of state waters are impaired. This section describes the various protocols used to determine use impairment.

303(d) Listing Methodology

Numeric water quality criteria

The decision methodology for numeric water quality criteria used in preparation of the draft 2010 Section 303(d) list are consistent with those used in 2008 listing cycle.

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 the 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.

Additionally, the DEP does not interpret the impacts of a single pollution event as representative of current conditions if it is believed that the problem has been addressed. Similarly, the DEP does not intend to interpret the results of clustered monitoring of a single event as being representative of water quality conditions for longer time periods. Datasets are screened for excessive clustering of monitoring, in space or time, to avoid misinterpretation.

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

Segmentation of streams

The majority of newly listed streams were identified as impaired for their entire length. Segmentation occurred only in limited situations involving streams with impoundments or alternative designated uses, or when knowledge of a specifc pollutant source allowed clear distinction of impaired and unimpaired segments.

Segmentation based upon the limited amount of water quality monitoring data that is usually available may not accurately portray the extent of

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

Water Quality Criteria	Impairment Thresholds	Additional Considerations
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 may not considered "impaired."
Chronic Aquatic Life Protection (Use Category B) Human Health Protection (Use Categories A and C)	The water is impaired if a greater than 10% frequency of exceedance is demonstrated in an ample dataset (20 or more available observations). The water is impaired if three exceedances of criteria occur with less than 20 available monitoring results. 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)	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.

impairment and may contradict the ultimate findings of the TMDL that the listing mandates. The DEP believes the TMDL development process, which links extensive 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, incorporates the specific exposure duration and exceedance frequency terms of water quality criteria and prescribes pollutants allocations that will result in attainment of criteria in all stream segments.

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 basing assessments on two monts out of 12 in noncompliance (2/12 – 16.7 percent rate of 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 (4/12 – 33.3 percent rate of 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. The 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.

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 m^2 area of substrate. Identifications are completed for a 200-organism subsample. The WVSCI was developed

West Virginia Stream Condition Index or WVSCI

The WVSCI consists of six benthic community metrics combined into a single multimetric index. The WVSCI was developed by Tetra Tech Inc. (2000) using DEP and EPA data collected from riffle habitats in wadeable streams.

In general terms, all metric values were converted to a standard 0 (worst) to 100 (best) point scale. The six standardized metric scores were then averaged for each benthic sample site to come up with a final index score ranging from 0.0 to 100.0. Using the distribution of scores from all sites that are considered reference sites, an impairment threshold of 68.0 was established. If a stream site received a WVSCI score greater than 68.0, it was considered to be unimpaired.

WVSCI Scoring Criteria
› 68.0 Unimpaired
≥ 60.6 to 68 "Gray Zone"
‹ 60.6 Impaired

To address the potential variability associated with a number of factors (collector, micro-habitat, subsampling, etc.) a precision estimate was determined by analysis of duplicate biomonitoring data. The precision estimate (7.4 WVSCI points) was subtracted from the impairment threshold to define a "gray zone" of WVSCI scores between 60.6 and 68.0 for which adverse impact to biological integrity is less than certain.

The effective use of limited TMDL development and implementation resources requires the avoidance of impairment misclassifications. Although the true WVSCI impairment threshold is 68.0, DEP identified biological impairment in the 303(d) listing process only in response to WVSCI scores less than 60.6, so as to allow the highest degree of confidence in the validity of the listed biological impairments.

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.

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, the Division of Natural Resources, 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 exist for 16 state streams and six 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 fish advisories Web site is www.wvdhhr.org/fish/current.asp.

The listing of waters based on fish consumption advisories is strongly supported by the 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 applicable body-burden criteria.

Narrative Water Quality criteria - Greenbrier River algae

In recent years, the DEP has received a number of reports of excessive algal growth along certain sections of the Greenbrier River which has made fishing and swimming in the areas nearly impossible during portions of the summer season. In order to address this loss of recreational use, the DEP began evaluating algal growth on the Greenbrier River in 2007 to determine both the extent of impact and the sources of pollution which were contributing to these conditions.

The initial investigation documented conditions in the mainstem of

the Greenbrier River. Thick algal mats and/or large areas of attached filamentous algae growth occurred over approximately 50 miles of the river, at times stretching from bank to bank. Similar conditions occurred in 2008. During both 2007 and 2008, public water suppliers drawing river water from affected areas received complaints of odor in their drinking water requiring initiation of additional treatment measures.

In 2009, DEP personnel performed intensive water quality sampling along the Greenbrier River as the algae began to bloom. Instream grab samples were analyzed for total and dissolved phosphorus, total nitrogen, alkalinity, hardness, and other parameters. Both the chemical and physical conditions in the Greenbrier River – including hardness, alkalinity, temperature, clarity, and substrate – proved to be ideal for growth of filamentous algae. The water chemistry results also revealed elevated levels of nitrogen and dissolved phosphorus in areas of excessive algae growth, with phosphorus being the limiting nutrient. The written report *Assessment of Filamentous Algae in the Greenbrier River and Other West Virginia Streams* summarizing the investigation is available on the DEP's Web site, www.dep.wv.gov/WWE/watershed/wqmonitoring/documents/Greenbrier/Algae_Summary_WQS_meeting_May_09.pdf.

Currently West Virginia does not have numeric water quality criteria for phosphorus in flowing rivers. However, seasonal non-attainment of designated uses (public water supply and contact recreation) has been documented due to excessive algal growth and the excessive algae growth has been attributed to anthropogenic phosphorous inputs. Non-attainment of uses is based on multiple provisions of Title 47-2-3.2 of the West Virginia Legislative Rules ("Conditions Not Allowable in State Waters"). Section 3.2.a prohibits distinctly visible floating and suspended solids (filamentous algae mats) which pervade large reaches of the Greenbrier River. Section 3.2.h prohibits conditions that require treatment beyond conventional treatment to produce finished drinking water and Section 3.2.i prohibits conditions caused by wastes that adversely alter the integrity of a stream, including impacts to the physical, chemical and biological components of an aquatic ecosystem. In the case of the Greenbrier River, the DEP has determined the existence of the prohibited conditions and causation by a pollutant. The DEP is assessing the Greenbrier River as impaired from its mouth upstream to mile point 102.7.

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 4). The results reveal that 23 percent of West Virginia's stream miles are in either Category 1 or 2 (fully supporting all or some assessed uses). Category 3, streams with insufficient data, makes up 39% 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. Approximately 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 Web site, www.dep.wv.gov. 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.

Category 5 includes 1091 impaired stream segments, covering approximately 6,685 stream miles that are impaired and need TMDLs developed. This number has increased from 6,157 miles of impaired streams identified on the 2008 list. The increase is due, in part, to the TMDL development timeline. TMDLs always are in various stages of development, and with the additional sampling data generated, streams and stream segments may move from Catergories 1, 2 or 3 to Category 5.

Table 6 - 2010 Category Summary Report for West Virginia					
LAKES					
Type	**CATEGORY**	**# of lakes**	**% lakes**	**acres**	**% acres**
Lake	1	27	20	522	2
Lake	2	47	36	5990	26
Lake	3	43	32	10029	43
Lake	4a	9	7	189	1
Lake	5	6	4	6498	28
	TOTAL	132	100	23228	100
STREAMS					
Type	**CATEGORY**	**# of stream segments**	**% stream segments**	**miles of streams**	**% miles**
Stream	1	1269	11	4378	14
Stream	2	824	7	2834	9
Stream	3	6776	61	11711	39
Stream	4a	1180	11	4883	16
Stream	4b	2	0	2	0
Stream	4c	36	0	35	0
Stream	5	1091	10	6685	22
	TOTAL	11178	100	30528	100

Additionally, TMDLs that have not yet been approved by the EPA remain listed in Category 5. Once these TMDLs are approved, those streams and stream segments will move to Category 4a.

Table 7 contains a breakdown of use support specific to the use categories for state 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)
- 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

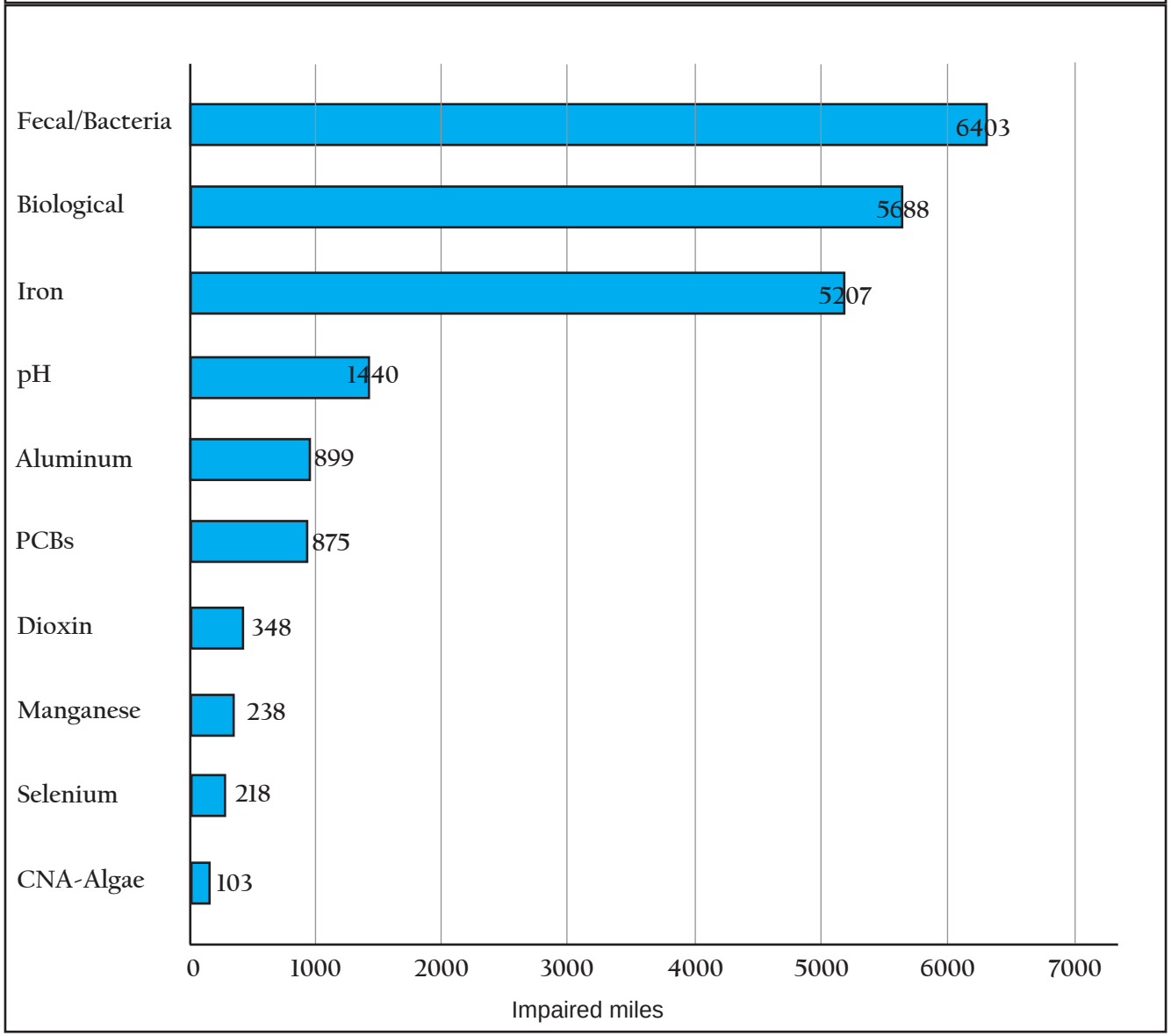
LAKES																		
Designated Use	Number of Lakes	Size (acres)	Fully Supporting				Insufficient Data				Not Assessed				Not Supporting			
			#	%	Acres	%	#	%	Acres	%	#	%	Acres	%	#	%	Acres	%
A - Public Water	132	23228	33	25	852	4	55	42	20772	89	35	26	1415	6	9	7	189	1
B1 - Warm Water Fishery	113	17891	25	22	550	3	44	39	15737	88	35	31	1415	8	9	8	189	1
B2 - Troutwater	19	5337	12	63	999	19	7	37	4338	81	0	29	0	0	0	0	0	0
C - Contact Recreation	132	23228	62	47	3395	15	25	19	11863	51	38	29	1468	6	7	5	6502	28
D - Agriculture and Wildlife	132	23228	70	53	6243	27	23	17	15513	67	38	29	1468	6	1	1	4	0
E -Industrial	132	23228	70	53	6243	27	23	17	15513	67	38	29	1468	6	1	1	4	0
Total	132	23228																

STREAMS																		
Designated Use	Number of Stream Segments	Size (miles)	Fully Supporting				Insufficient Data				Not Assessed				Not Supporting			
			#	%	Miles	%	#	%	Miles	%	#	%	Miles	%	#	%	Miles	%
A - Public Water	11175	30525	2319	21	9120	30	437	4	1060	3	6603	59	11269	37	1816	16	9076	30
B1 - Warm Water Fishery	10146	25473	1166	12	3935	15	992	10	3207	13	6323	62	10637	42	1665	16	7694	30
B2 - Troutwater	1032	5051	347	34	1979	39	228	22	1292	26	278	27	628	12	179	17	1152	23
C - Contact Recreation	11178	30528	2368	21	8616	28	720	7	2641	9	6622	59	11303	37	1468	13	7968	26
D - Agriculture and Wildlife	11177	30527	3694	33	15896	52	343	3	1471	5	6622	59	11303	37	518	5	1858	6
E -Industrial	11178	30528	3694	33	15896	52	343	3	1471	5	6622	59	11303	37	519	5	1858	6
Total	11178	30528																

Table 8 - Summary of the causes for impaired streams

TYPE	CAUSE	SIZE (acres)
Lake	Sedimentation/ Siltation	193
Lake	Trophic State Index	100
Lake	Iron	54
Lake	DO	8
Lake	PCBs	6498
TYPE	**CAUSE**	**SIZE (miles)**
Stream	Temperature, water	2.3
Stream	Ammonia	5.4
Stream	Chloride	21.6
Stream	Lead	23.3
Stream	DO	25.2
Stream	Nitrite	30.7
Stream	Low Flow Alterations	44.3
Stream	Manganese	238
Stream	Zinc	17.7
Stream	Selenium	218
Stream	Dioxin	348
Stream	Aluminum	899
Stream	PCBs	875
Stream	pH	1440
Stream	Iron	5207
Stream	Fecal/Bacteria	6403
Stream	Bio-Impairment	5688
Stream	CNA - Algae	103

Table 9 - Number of miles for the leading causes of West Virginia impaired streams
(shows causes with >100 miles impaired)

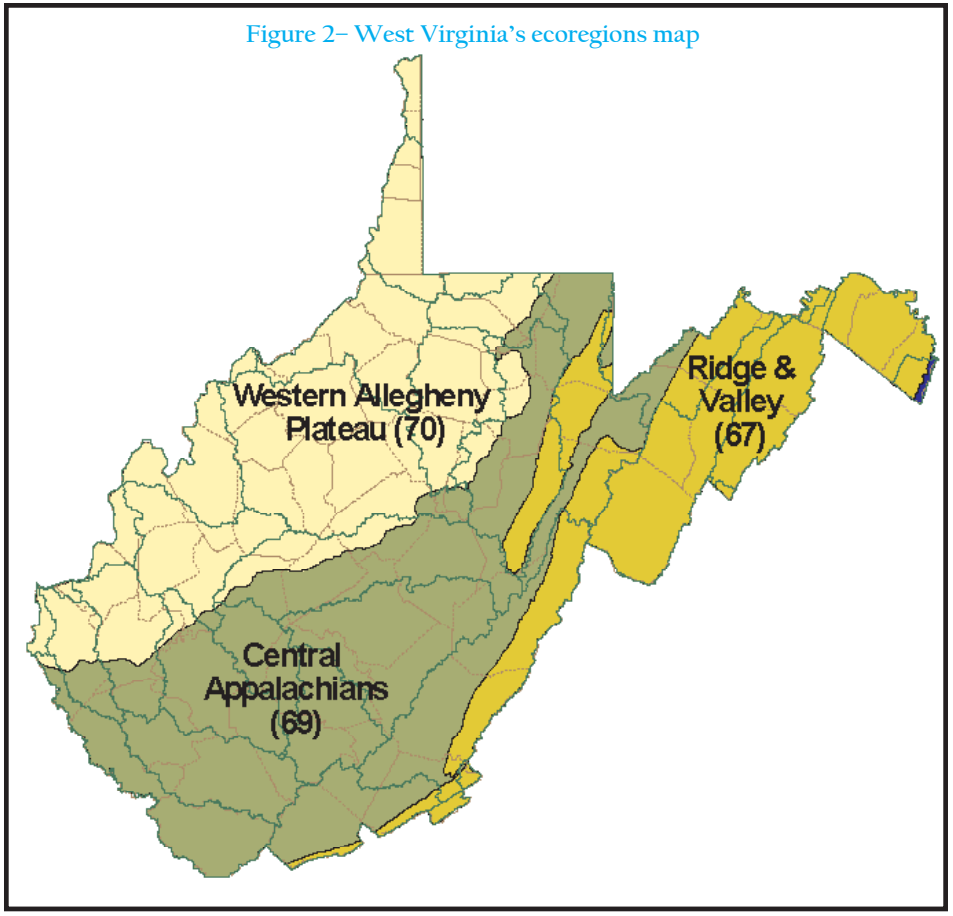


Probabilistic Data Summary

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 the characterization of 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 (1st-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. The DEP is currently in its third cycle of monitoring ambient conditions using the Probabilistic Method. This report summarizes the data from the last two years from the previous cycle (2002 – 2006) and the first three years from the third cycle (2007 – 2009) and are described in terms of ecoregions.

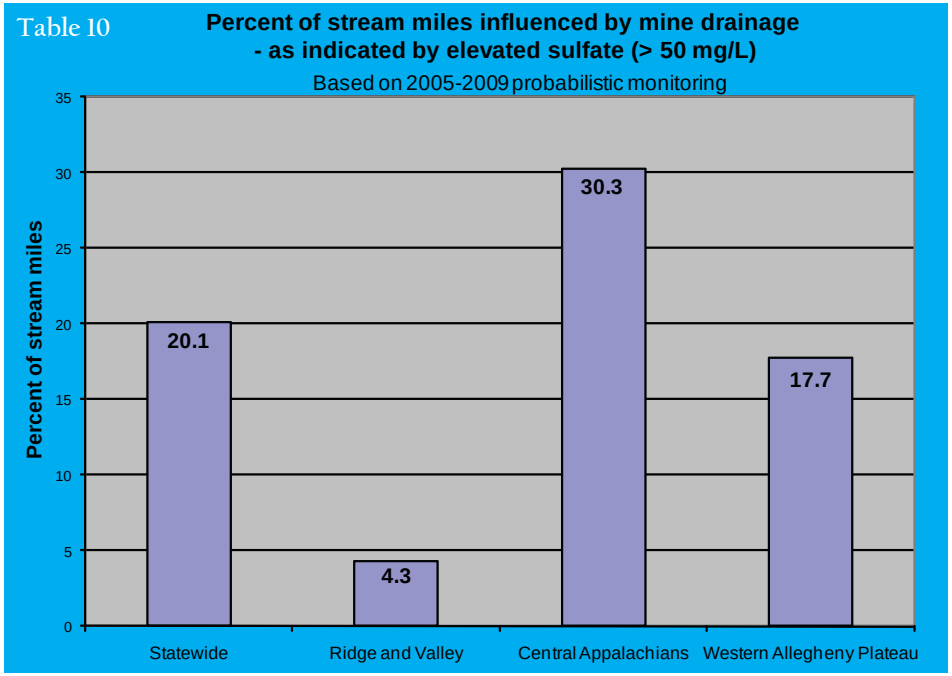
Figure 2– West Virginia's ecoregions map



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 20.1% of the stream miles statewide are influenced by mine drainage (Table 10). 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 30.3% of the stream miles in the Central Appalachians are influenced by mine drainage. Contrastingly, about

Table 10

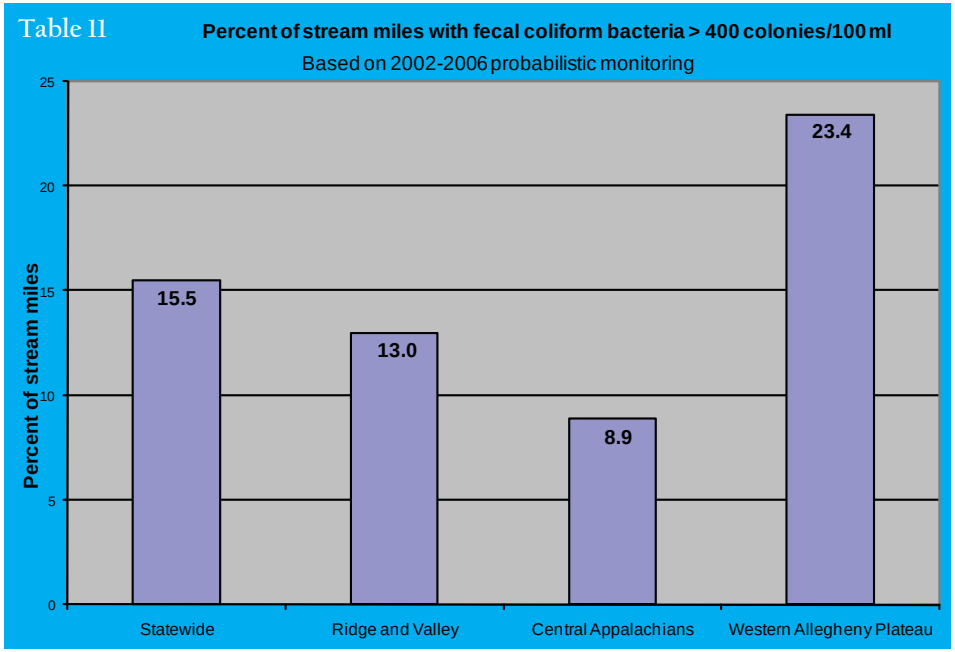


4.3% and 17.7% of stream miles are influenced by mine drainage in the Ridge and Valley and Western Allegheny Plateau, respectively.

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 15.5% of stream miles in the state have fecal coliform bacteria levels that exceed the criterion of 400 colonies/100mL (Table 11). 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 (23.4% of stream miles) and somewhat lower in the Central Appalachians (8.9% of stream miles) and the Ridge and Valley Ecoregions (13.0% of stream miles). It should be noted that the probabilistic monitoring is performed at baseflow conditions. Because samples are not collected during storm runoff

Table 11

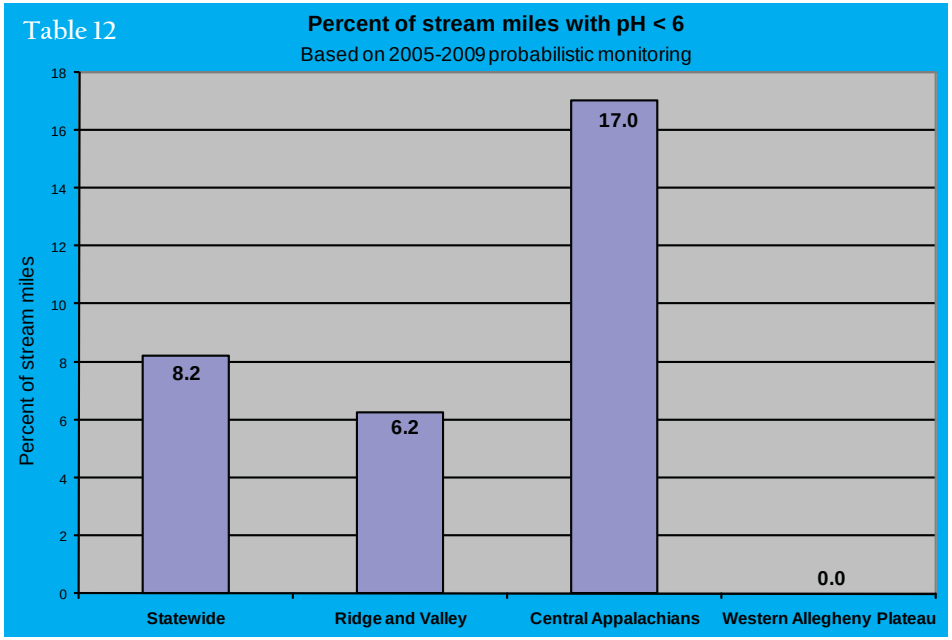


events, bacteria levels that would likely increase under these higher flow conditions are not accounted for in this assessment.

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 8.2% of the stream miles in the state have pH values below 6.0 (Table 12). Most of the stream miles identified as impacted by acidic waters are in the Central Appalachians Ecoregion, representing 17.0% 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 6.2% of the stream miles

Table 12



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.

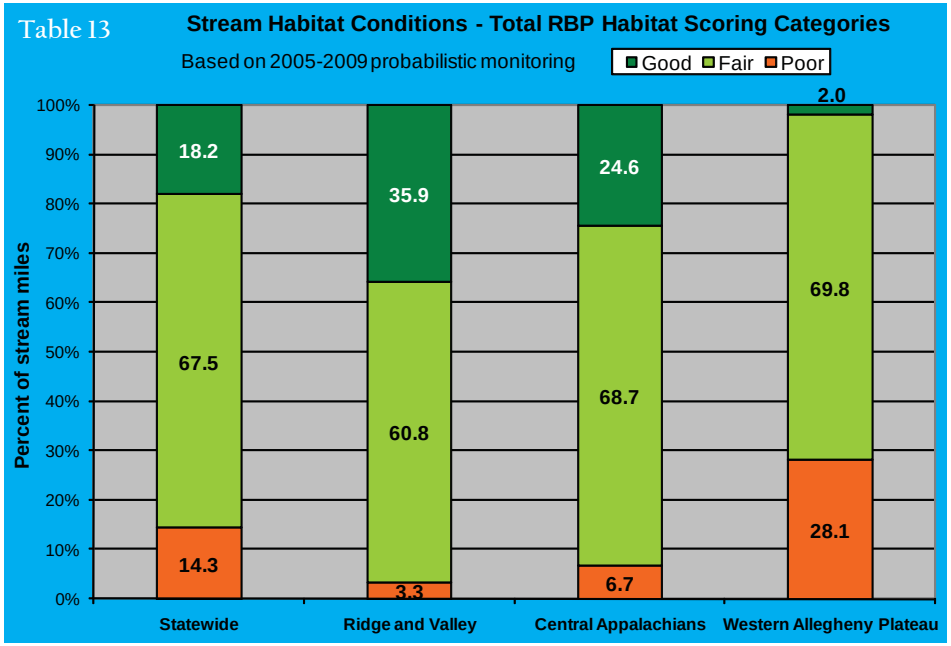
Habitat quality

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 the 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 (Table 13). Based on probabilistic data, about 18.2% of stream miles have good habitat quality (total RBP score of 160 or greater), 67.5% of stream miles have fair habitat quality (110–159), and 14.3% 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 24% of stream miles in each of these ecoregions are of good quality and less than 7% 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 2% of its stream miles being rated as good in overall habitat quality. Additionally, the proportion of stream miles with poor habitat quality (28.1%) is substantially higher in this ecoregion. It is important to consider that the greatest proportion (over 97%) 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 the DEP may gain insight into overall habitat conditions by combining the individual measures, it is useful to examine specific

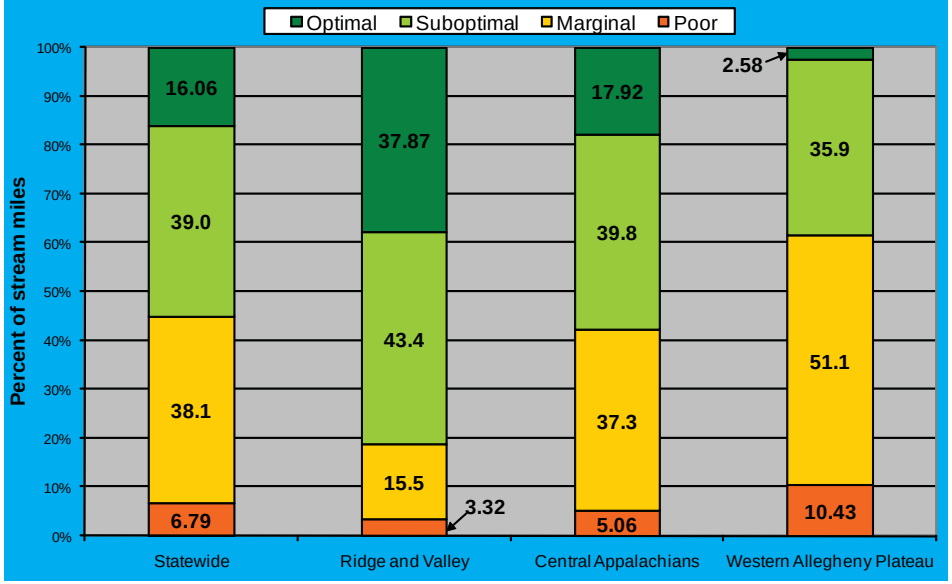
Table 13



habitat characteristics. Sedimentation is one of the most significant problems facing West Virginia streams. Significant sources of increased sedimentation include agricultural activities, mining, logging, oil and 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 and organism eggs. 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 6.79% of stream miles are in poor condition, 38.1% stream miles are marginal, 39% of stream miles are suboptimal, and 16.06% of stream miles are in optimal condition (Table 14). As with the overall habitat scores, the widespread impacts of sedimentation in West Virginia are apparent in that over 83% of the wadeable streams miles in the state score less than optimal.

Table 14 **RBP Habitat Parameter 'Sedimentation' Scoring Categories**

Based on 2005-2009 probabilistic monitoring



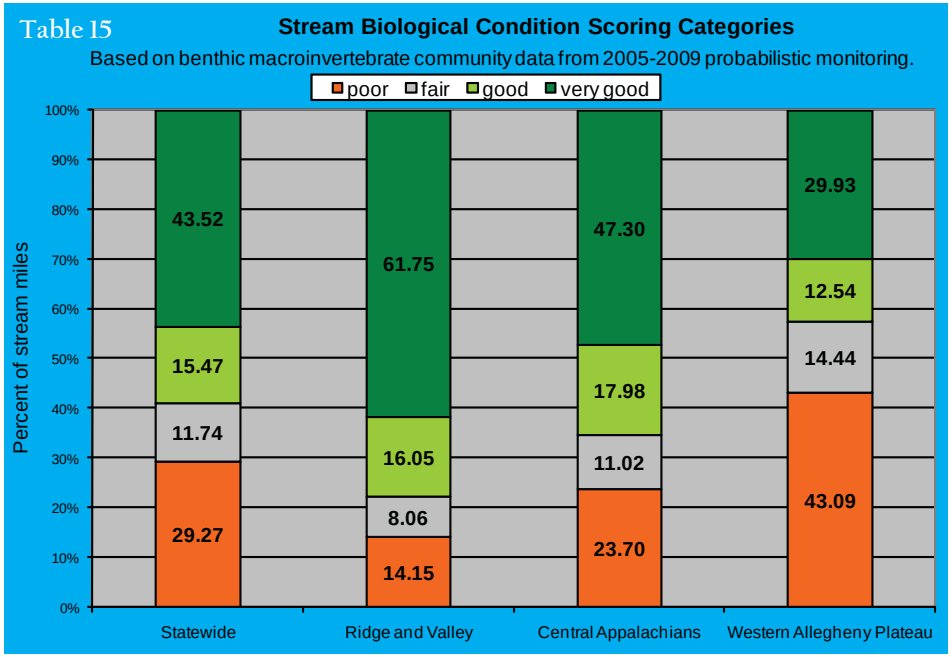
The Ridge and Valley Ecoregion is better than both the Central Appalachian or the Western Allegheny Plateau Ecoregions regarding sedimentation. In the Ridge and Valley ecoregion, 37.87% of stream miles are in optimal condition and 3.32% are in poor condition. Results for the Central Appalachians are poorer than the Ridge and Valley ecoregion but better than the Western Allegheny Plateau Ecoregion, with 17.92% of stream miles in optimal condition and 5.06% 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 3% of stream miles in this ecoregion are in optimal condition and just under 61.53% 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. The 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

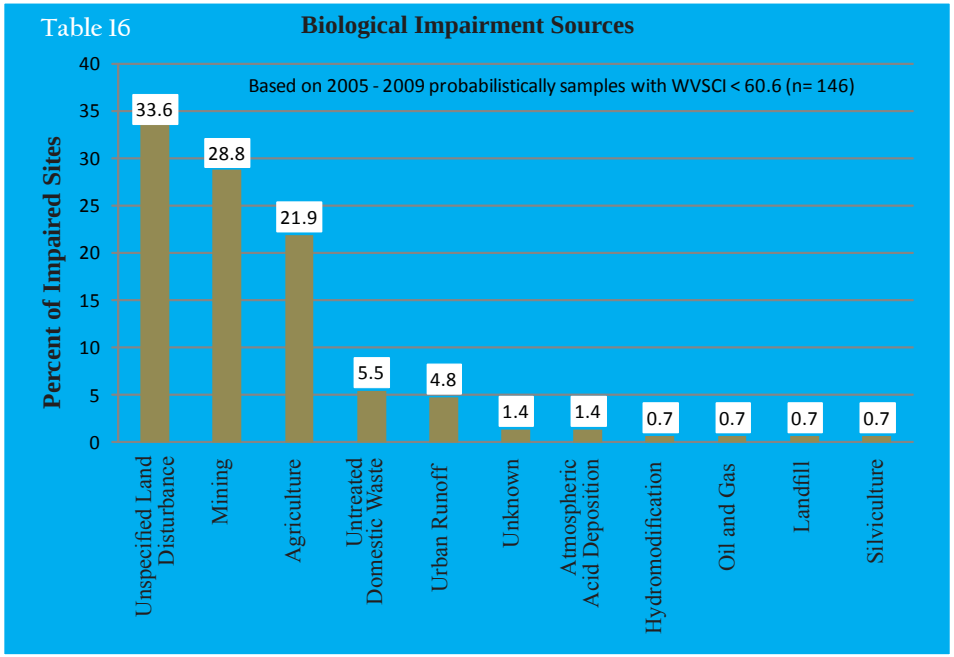
Table 15 **Stream Biological Condition Scoring Categories**

Based on benthic macroinvertebrate community data from 2005-2009 probabilistic monitoring.



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 29.27% of wadeable stream miles in the state are in poor condition (i.e. impaired), while 58.99% of stream miles are not impaired and 11.74% are inconclusive (Table 15). More than 43% (43.09%) 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 (14.15% and 23.70%, 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.

Table 16



Sources of bio-impairment

The results of the 2005 - 2009 probabilistic sampling revealed that 146 out of 530 samples received a WVSCI score of 60.6 or less. Benthic macroinvertebrate communities that score below this value are considered impaired, and the DEP would describe them as not supporting their aquatic life use designation.

Eleven 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 land use activities. Each of the 146 sites was assigned a primary source of impairment from one of the 11 categories. For sites with possibly more than one source of impairment, the most obvious source was listed. Of the 146 bio-impaired sites, "unspecified land disturbance" affected almost 33 percent. Unspecified land disturbances are characterized by heavy sand and sedimentation associated with dirt roads, poor riparian zones, and highly eroded areas. The next highest sources of impairments are mining and agriculture.

Major Basin Summaries

Dunkard Creek

The DEP recently completed, and the EPA approved, Total Maximum Daily Loads for iron, fecal coliform, chloride and biological impairment related to sediment. The fish kills that occurred in in the fall of 2009 were a new development caused by golden algae (Prymnesium parvum) and its associated toxins.

The West Virginia Department of Environmental Protection and the West Virginia Division of Natural Resources, along with a number of other agencies, have investigated the cause of a substantial fish kill in Dunkard Creek, in Monongalia County.

Members of the public first reported seeing dead fish in Dunkard Creek and notified the DNR on September 1, 2009. At that time, staff from a variety of divisions from the DEP and the DNR visited the scene, began taking samples and started looking for a cause.

Because of mining activity in the area, the industry was an early suspect. In fact, after conferring with the DEP, Consol, which operates an active mine in Blacksville, W.Va., agreed to shut off its discharge into Dunkard Creek at its Blacksville No. 2 site. However, at the same time Consol was shutting off its pumps, dead fish were found upstream from its outlet, indicating that the outlet at that site is not the sole cause for the dead fish.

The agencies also received reports from area residents suspecting tanker trucks of dumping wastewater from oil and gas drilling activities into Dunkard Creek. Further investigation revealed those trucks that had been reported were withdrawing water from the stream, rather than dumping wastewater.

On Friday, September 18, 2009 staff members from the DEP flew over the area in a helicopter to see if there was anything they could see from the air that they missed on the ground. The staff noted the stream was clouded with a rust color from the Pennsylvania border upstream to a beaver dam in the South Fork of the West Virginia Fork of Dunkard.

In addition, investigators solicited the assistance of micro-biologists to help determine whether some form of algae or similar growth was a contributing factor. Toxins are sometimes produced by algae; and saline environments are sometimes involved with harmful algae blooms.

Additional water samples for golden algae taken on September 24, 2009 reconfirmed the presence of golden algae in amounts known to have caused fish kills in other states and countries. The DEP and other investigators have been assembling available scientific information on golden algae and the toxins it produces. As reported in available scientific literature, both the golden algae and the toxins it produces are influenced by environmental factors including the water's pH, temperature, salinity and nutrients. Toxin production mainly kills fish and appears to have little effect on cattle or humans.

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 102.5), 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.

Currently, all tributaries of the Lower Kanawha and Lower Elk, from Summersville Dam to the mouth, are being evaluated by the DEP for TMDL development. Once sampling and stressor identification are complete, all tributaries with impairments, other than ionic stress, will have TMDLs completed by December 2010 under the current schedule.

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

Between March 2001 and September 2002, the 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 and a consumption advisory related to elevated fish tissue concentrations of Polychlorinated Biphenyls (PCBs). Cheat and Tygart Lakes are listed for PCBs. The PCB listing of these lakes are based on elevated fish tissue concentrations and fish comsumption advisories. Recent fish tissue sampling has resulted in delisting of the Monongahela River for PCBs.

In Spring 2009, the DEP announced plans to develop TMDLs on all impaired tributaries of the Monongahela River from its beginning at the confluence of the West Fork River and Tygart River to the West Virginia/ Pennsylvania border. Currently, water quality sampling and biological assessments are being conducted on all tributaries with known or suspected impairments. Once sampling is completed and all streams are assessed, the DEP will begin TMDL development for impaired waters. The DEP expects to submit the TMDLs to the EPA for approval by November 2012.

In March 2010, the DEP proposed a list of streams for TMDL development in the West Fork River Watershed. The streams were advertized in papers statewide seeking public input. A public meeting in the Summer of 2010 to present sampling plans and to address any questions or comments from the public. Pre-TMDL sampling began in July 2010 with draft TMDLs due to EPA by fall of 2013.

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 September 2010. 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 dramatic 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 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 has a fish consumption advisory for PCBs.

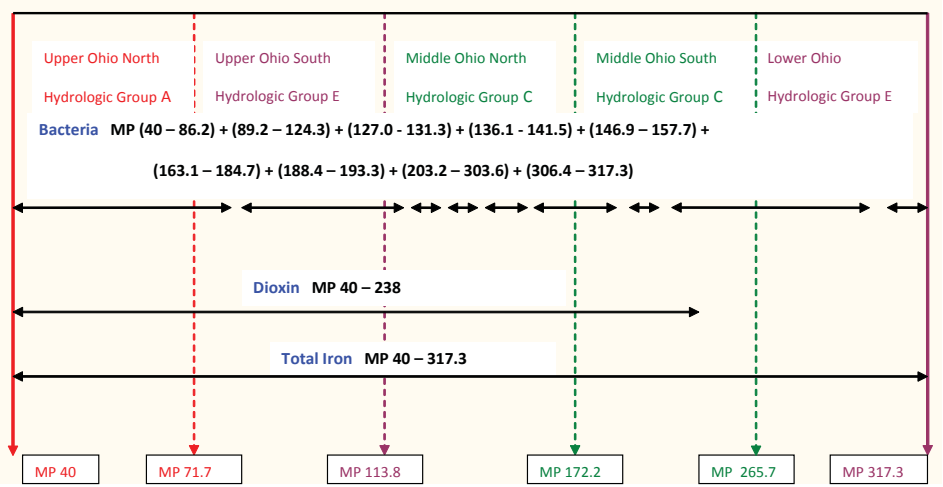
Previously, the EPA developed iron and aluminum TMDLs for the mainstem and several tributaries. The previously developed total aluminum TMDLs are now obsolete due to the criteria revisions that occurred in 2006. In addition, the DEP has received approval from the EPA for TMDLs on four additional tributaries (Copen Run, Duck Creek, Duskcamp Run and Lynch Run) for various impairments including: total iron, total manganese, 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 bimonthly. 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, the DEP has reviewed the data and incorporated these assessments into the West Virginia Section 303(d) List.

Figure 3 - Impairments of the West Virginia section of the Ohio River



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 continues to be identified as iron-impaired based upon the application of West Virginia's warmwater aquatic life criterion of 1.5 mg/l. Figure 3 depicts the impairments and segment lengths for the Ohio River bordering West Virginia.

Tug Fork River

In 2002, the 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 2010 West Virginia Section 303(d) List for violations of the fecal coliform criteria and biological impairment. The fecal coliform impairment extends the entire length of the river 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. The product of this cooperative effort 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. In addition, the DEP, Va. DEQ and EPA Region III have been cooperating in an effort to locate and reduce sources of PCBs to the Bluestone River. As part of this effort, remediation of the now defunct Lyn Electric Site in Bluefield, W.Va. has been completed. Efforts included leveling and removal of the electric motor remanufacturing buildings on the site. Also, contaminated water and debris were removed from the site and clean material used to backfill the open basement areas of the property. Within the watershed additional monitoring and source evaluation is on going to determine what steps need to be taken in the near future.

Ohio River Valley Water Sanitation Commission – ORSANCO

As with previous reports, the DEP's 2010 Integrated Report includes assessments based on data provided by ORSANCO. Throughout the development of ORSANCO's 2010 Biennial Assessment, the DEP has been involved with ORSANCO's efforts to standardize assessments among the "compact" states. The DEP's 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 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 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, committing 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 state point and nonpoint sources. All other Bay jurisdictions have developed and are implementing similar plans. Many DEP programs are actively participating in the development of a Chesapeake Bay TMDL, which is scheduled to be completed in December 2010.

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 the 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 Water Resources Association

The association, in some form or another, was founded in 1981. The association works 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 association 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. Recently the organization has changed it name to the Ohio River Basin Water Resources Association and has signed a Memorandum of Understanding with ORSANCO to seek ways for the organizations to work together more efficiently.

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's 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. Since its inception, the DEP's TMDL section pursued timely development of TMDLs for the waters and impairments identified in the consent decree between the EPA and the Ohio Valley Environmental Coalition, et. al. The TMDLs developed and approved in the Dunkard Creek, Upper Ohio River South, Youghiogheny, and Camp Creek portion of the Twelvepole Creek watersheds in 2009 fully accomplished the EPA's commitments under the consent decree.

The 303(d) list identifies and prioritizes the waters and impairments for which future TMDLs will be developed by specifying the year in the "Projected TMDL Year" column. The impaired waters intended for TMDL development in 2010, 2011 and 2012 are known and identified. For other waters and impairments, where the timing of TMDL development is less certain, the "Projected TMDL Year" is identified as the latest year where an opportunity exists per the DEP's plans to develop

TMDLs in concert with the Watershed Management Framework.

At any point in time, the DEP personnel 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 17 shows the state's TMDL development progress.

The DEP's Web site contains all approved TMDL documents and the draft TMDL documents currently out for public comment. These documents can be found at http://www.dep.wv.gov/WWE/watershed/TMDL/Pages/default.aspx.

Table 17 - West Virginia TMDL development progress

Hydrologic Group	Watersheds	Progress
E1	Dunkard Twelvepole Upper Ohio South	U.S. EPA approved in 2009
A1	Youghiogheny	U.S. EPA approved in 2009
A2	Cheat	Allocation development process underway Draft TMDLs expected summer 2010
B2	Elk Lower Kanawha North Branch of the Potomac	In model development process draft TMDLs expected fall 2010
C2	Middle Ohio North Middle Ohio South	In model development process Draft TMDLs anticipated in 2011
D2	Monongahela	Pre-TMDL monitoring and source characterization ongoing (July 2009 - June 2010)
E2	West Fork (tentative)	Stream selection was advertised in March 2010

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. The DMR is responsible for the computer databases that track the 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. The 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. The 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.

The 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.

Environmental Enforcement (EE) is a branch of the Division of Water and Waste Management charged with assuring compliance with many of the state pollution control regulations. EE 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. The DEP is also working with several state and federal agricultural agencies to develop a Concentrated Animal Feeding Operation (CAFO) permitting program. 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. Below is a list of permit actions for the time period beginning in July 2007 and ending in June 2009.

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER AND WASTE MANAGEMENT
Report Date 02/12/2010

NPDES PERMITTING	- PERMIT ACTION REPORT (7/1/2007 - 6/30/2009)											
	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 2010	Withdrawn and Voided This Period	Applications Pending as of 6/30/2009					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	Less Than, Equal to 90 dep days	Total (dep days)	Greater Than 180 total days		
INDIVIDUAL PERMITS	214	0	216	65	2	13	14	26	53	21	164	180
GENERAL PERMITS												
Home Aeration Units	590	2	558	1081	14	0	0	88	88	53	18	44
Sewage General	27	0	27	12	1	0	0	12	12	9	98	146
Storm Water Construction	1315	0	1285	317	30	0	1	68	69	12	27	33
All Others	937	1	517	670	20	1	6	441	448	59	81	141
MODIFICATION PERMITS	410	2	367	93	36	14	8	54	76	31	73	84
TRANSFER PERMITS	342	0	330	31	10	1	1	27	29	9	17	36
TOTAL - PERMITS	3835	5	3300	2269	113	29	30	716	775	194		

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.

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.

Nonpoint Source Control Program

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. 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 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.

Groundwater Program

Under the Groundwater Protection Act, West Virginia Code Chapter 22, Article 12, Section 6.a.3, the DEP is required to provide a biennial report to the 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, 2007 through June 30, 2009. Copies of the report "Groundwater Programs and Activities: Biennial Report to the West Virginia 2010 Legislature" may be obtained by contacting the Groundwater Program at the Division of Water and Waste Management, 601 57th St., Charleston, WV 25304 or by calling (304) 926-0495. The report also may be reviewed at http://www.dep.wv.gov.

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.

Cost Benefit Analysis

A true cost/benefit analysis on the economic and social costs and benefits of water pollution control is a difficult and time consuming task. Particularly, the evaluation of industrial facilities would be a monumental task considering the various types of industry (mining, chemical, power generation, etc), each having a very different process of pollution control. However, the information contained in the following paragraphs provides an idea of the amount of money currently expended to construct and upgrade both the municipal facilities within the state as well as programs available to homeowners wanting to correct failing onsite sewage systems.

Funding for Water Quality Improvements
The DEP is responsible for administering a combination of state and federal funds expended for projects to improve water quality in state streams. The following narrative provides an overview of the programs within the DEP's Office of Water and Waste Management that provide funding for water quality improvements and a summary of the funds dispersed between July 2007 and June 2009 to improve water quality.

Clean Water 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 CWSRF program funding for financial assistance, the community is 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 2007 through June 2009, 35 wastewater treatment facility loans totaling $85,807,285 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 2007 through June 2009, 31 nonpoint source agriculture BMP loans totaling $1,615,118 were funded.

Onsite Systems Loan Program

In cooperation with the West Virginia Housing Development Fund, a 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. Centralized treatment for these homes will not be available in the next five years. For the current reporting period of June 2007 through June 2009, a total of 62 systems were funded at a cost of $407,409.

In conclusion, although funding for maintenance and improvement of water quality is often a controversial issue, the DEP recognizes that millions of dollars are expended annually by businesses, municipalities, private and public entities (including state and federal agencies) to improve and maintain water quality in West Virginia. These expenditures address pollutants from various media including solid and hazardous waste, air and water.

Public Participation and Responsiveness Summary

The draft Section 303(d) List was advertised for public comment from March 15, 2010 through May 19, 2010. 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. Legal 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, the DEP considered all comments and made adjustments to the list where appropriate.

Table 18 identifies all entities that provided comments. All relavant 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 18 - 2010 Section 303(d) List Commenters

Argus Energy WV, LLC	Patriot Coal	Linda Lee Elliston Emrich
ICG Beckley, LLC	PPG Industries	City of White Sulphur Springs
Town of Ronceverte	Arcelor Mittal	West Virginia Manufactors Association
Tunnel Ridge, LLC	Arch Coal, Inc.	West Virginia Chamber of Commerce
Arthur W. Dodds	Pamela C. Dodds	West Virginia Coal Association
Duane Nichols	Hunter Ridge	American Electric Power
Kim Shiemke	Tom Danek	

The following issues were raised by commenters relating to the listing of numerous state waters for mercury:

- ***The use of total mercury fish tissue results to assess a methyl mercury criterion.***
- ***The use of fish tissue fillet results to assess to assess a total organism body burden criterion.***
- ***The lack of a demonstrated > 10% rate of exceedance for methyl mercury in the most recent sampling of fish from the Kanawha River.***
- ***The use of individual composite sample results rather than a trophic level weighted geometric mean for assessing impairment.***
- ***The use of ORSANCO's total mercury data and more restrictive 0.3 ug/g standard to assess methyl mercury impairment on the Ohio River.***

The existing mercury listings for West Virginia waters were based on total mercury sample results from composites of fish fillets. Previous listings were based on the EPA guidance recommending states could equate total mercury levels in fish tissue to methyl mercury levels. In the guidance, the EPA suggested that total mercury concentrations in fish tissue could be assumed to represent methyl mercury concentrations for the purpose of listing. Language from the EPA document Water Quality Criterion for the Protection of Human Health: Methylmercury (2001) states in part "the MSRC concluded, based on research conducted by Bloom (1992) and Morgan et al. (1994), that over 90% of the mercury present in fish and seafood is methyl mercury. Thus, total mercury concentrations are considered appropriate for evaluation of methyl mercury exposure in human populations."

However, the DEP recognizes that proper assessments must be made in accordance with approved water quality standards. In the case of mercury, comments correctly point out that the criterion calls for whole fish samples, analyzed for methyl mercury. Studies were provided indicating mercury concentrations in fillets may be higher than those in whole body samples and that the methyl mercury to total mercury ratio in fish tissue may not be as high as the EPA's general statements indicate. As such, the DEP cannot conclude that the standards have been properly applied, and will remove existing listings for mercury.

The DEP is in the second year of a two-year study to evaluate statewide advisories for mercury and will analyze a percentage of fish collected for both methyl and total mercury to determine an appropriate ratio for future assessment purposes. However, all current fish consumption advisories will remain in place.

As the agency is proposing delisting of mercury impairments based upon the total/methyl and fillet/whole body issues, the requests for delisting based upon exceedence frequency and averaging are moot at this time. However, the DEP does not agree that the listing methodologies for water column numeric criteria would be appropriate for consideration of fish tissue results. The EPA mercury implementation guidance relative to trophic level weighting will be considered in future assessments.

The Ohio River listings were included to honor the initial draft assessments made by ORSANCO for portions of the Ohio River. The DEP has since been informed by ORSANCO of its plan to change the original assessments for mercury and proceed with additional sampling to better understand the relationship of total to methyl mercury for Ohio River fish. As such, the DEP has also removed the Ohio River mercury listings from the draft list.

Two commenters requested the removal of the CNA-Algae listing for the Greenbrier River (WVKNG). One commenter stated that the condition "does not constitute a danger at this time." The second commenter stated that they believe "the river is not failing to meet its designated uses."

The DEP does not agree with these comments. As described in the Narrative Water Quality Criteria - Greenbrier River Algae section of this document, the DEP believes that the excessive growth of algae does constitute a loss of designated uses for the listed segment of the Greenbrier River. The DEP has determined the existence of conditions prohibited by 47 CSR 2 Section 3.2 and causation by a pollutant. The state's Environmental Quality Board in a recent ruling (Appeal Nos. 09-05-EQB and 09-08-EQB) called the problems in the Greenbrier River undeniable and stated that designated uses have been jeopardized. As such, the DEP is retaining the Greenbrier River listing.

The classification of Big Sandy Creek (WVMC-12) as a trout stream was disputed because it is not listed in Appendix A of 47 CSR 2 and is not believed to be a cold water fishery. The delisting of iron, dissolved aluminum and pH impairments was requested.

The commenter correctly stated that available water quality monitoring data for Big Sandy Creek does not indicate impairment pursuant to dissolved aluminum criteria for warmwater fisheries and that Big Sandy Creek is not included in Appendix A of 47 CSR 2. Appendix A is not a comprehensive lists of trout waters and the DEP applies the trout water designated use and associated criteria to any stream believed to meet the definition 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, the DEP relies heavily on the guidance of the Division of Natural Resources. After receipt of the comment, the DEP reviewed available documentation and consulted with the Division of Natural Resources. Both agencies agree that Big Sandy Creek is more appropriately classified as a warmwater fishery. As such, the dissolved aluminum (trout) impairment was removed from the list. Iron and pH impairments remain indicated as "TMDL Rev." because existing

TMDLs previously developed by the EPA are being reevaluated in the Cheat River Watershed TMDL development project. Within that project, reevaluation will be based upon the criterion for warmwater fisheries.

Two commenters requested delisting of the iron impairments of the Ohio River. The following issues were raised:

- **Available data for certain pools does not demonstrate a greater than 10% rate of exceedance**
- **Available data at certain locations indicates no violations in the past two years**
- **The great majority of the iron in the Ohio River (Upper North) is naturally occurring and due to runoff of surface soils into the River**
- **Iron concentrations in the Ohio River (Upper North) do not pose a threat to human health or aquatic life and do not demonstrate that an impairment exists.**

In the West Virginia 2008 Section 303(d) List, the entire length of the Ohio River is listed as impaired for iron. Delisting requires adequate documentation that the impairment no longer exists. The data available for assessment is generated by ORSANCO and includes multiple locations. The WVDEP's listing methodology is point-based rather than pool-based.

Over the five year assessment period for the 2010 Draft 303(d) List, a greater than 10% rate of exceedance of the West Virginia iron water quality criteria was observed at mile points 42.6, 84.2, 126.4, 203.9 and 341. A less than 10% rate of exceedance was observed at mile points 54.4, 161.8 and 279.2. The West Virginia listing methodology extends an impaired condition in both directions until a non-impaired condition is observed. Based on that methodology, the entire length of the Ohio River is impaired for iron.

The listing methodology provides flexibility to override a five year assessment if no violations are observed in the most recent two-year period and the agency is convinced the impairment no longer exists. One commenter correctly stated that no iron violations are observed at mile point 84.2 from July 2007 to June 2009. However, the agency is not convinced that monitoring during that period confirms a non-impaired condition. Monitoring at mile point 84.2 on March 17, 2010 revealed a total iron result of 3.296 mg/l. In addition, further examination of the Ohio River data obtained from ORSANCO indicates a positive relationship between total suspended solids (TSS) and total iron. The relationship shows that as TSS values rise there is a corresponding increase in total iron values. Samples obtained in the last two years have not captured TSS values reaching the levels noted in previous samples with iron violations. As such, the DEP cannot state with confidence that the current iron levels in the Ohio River no longer violate water quality criteria. In the evaluation performed in response to these comments, the DEP determined that it erred when proposing delisting of a portion of the lower segment of the Ohio River and is retaining the entire length impairment of the 2008 list.

The DEP is aware that iron is present in native soils and sediment from numerous sources can cause violations of the water quality standards. However, the current EPA approved water quality criteria for West Virginia is total iron and according to federal regulations must be used in assessing waters for Clean Water Act purposes. The DEP does not have conclusive information that observed iron concentrations in excess of criteria are naturally occurring. The 2010 Draft Section 303(d) List must be based on effective water quality standards, which currently do not include a site-specific criterion for iron in the Ohio River.

Several commenters requested that DEP implement a Total Dissolved Solids (TDS) standard to protect the environment.

West Virginia does not currently have a TDS standard applicable to its waters. Without a standard, the DEP cannot list a stream on the impaired streams list for TDS. A TDS criterion has been recommended in the state's triennial review of water quality standards.

A perceived lack of action by the DEP was expressed in regard to several streams in the Dunkard and Monongahela watersheds that the

commenter believes are impaired.

The DEP has previously listed many of the streams/impairments noted in the comment and the EPA and/or the DEP have developed TMDLs as identified in Supplemental Table B. The DEP is currently pursuing a new TMDL development project for impaired tributaries of the Monongahela River. This effort will reevaluate TMDLs developed by the EPA in 2002 and will also address newly identified impairments. A comprehensive "Pre-TMDL" monitoring program has just been accomplished but was not available for assessment in the 2010 cycle. This data is being assessed now and identified impairments will immediately proceed to TMDL development. The impairments will be identified on the 2012 303(d) list and TMDLs are planned to be finalized by December 31, 2012. In summary, all waters named by the commenter either have or are having TMDLs developed.

A commenter requested that "the DEP recognize and emphasize the role of sediment and turbidity as causes for stream impairment." The commented also requested NPDES permitting and enforcement program enhancements to restrict discharges of storm water associated with construction activities in sensitive areas.

The DEP recognizes the role that sediment plays in stream water quality. Elevated suspended solids can be associated with exceedances of total iron water quality criteria and sedimentation is often determined to be a significant stressor of biologically impaired streams when TMDLs are developed. However, stream-specific cause and effect relationships cannot be accurately determined with the limited information that is available at the time of listing. In the TMDL development process, streams listed for iron and/or biological impairment undergo evaluation of sediment contributions both from upland sources and streambank erosion. After extensive modeling, TMDLs establish allocations for existing point and nonpoint sources that are necessary to restore designated uses. The Construction Stormwater General Permit requires application of Best Management Practices (BMPs) that are designed to minimize water quality impacts. TMDLs also address new discharges and include requirements that limit the amount of disturbed area concurrently registered under the Construction Stormwater General Permit.

Multiple commenters stated that the WVSCI is an inappropriate mechanism for assessing narrative criteria because it has not been promulgated as a water quality standard by the West Virginia Legislature and has not been subject 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, the 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. The 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 the DEP for that purpose. It was developed for the EPA and the 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 2010 effort, the WVSCI has been applied in four 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. The DEP conscientiously considered and responded to all such comments. The EPA reviewed public comments and the DEP responses and, in their list approvals, concluded that the DEP properly assessed biological data and properly considered and responded to public comments.

A commenter contended that the DEP's sole reliance on the WVSCI methodology constitutes an improper evaluation of the overall biological integrity of an aquatic ecosystem which requires a more comprehensive assessment to include habitat and fish populations. The following excerpt from DEP Cabinet Secretary Randy Huffman's June 25, 2010 testimony to the Senate Committee on Environment and Public Works, Subcommittee on Water and Wildlife was also included to support the comment:

> ***These tools are just that, tools. They are not stand alone determinants of compliance with the narrative criterion. Any application of these assessment tools in determining compliance with the narrative criterion must faithfully apply the language of the standard itself, which prohibits significant adverse impacts on the biological component of the aquatic ecosystem.***

The commenter also included excerpts from a recent resolution of the West Virginia Legislature and suggested that the use of WVSCI "wholly disregards the Legislature's mandate as expressed in House Concurrent Resolution No. 111 and simultaneously betrays the very spirit and intent of the WVWPCA."

In reference to Secretary Huffman's Senate testimony, the commenter omitted text that is contextually important. The theme of the paragraph disputed conclusions that result from application of the draft GLIMPSS methodology. Preceding the excerpted text, the paragraph clearly indicates two points: GLIMPSS has not been put into regulatory use and the DEP uses the WVSCI to assess biological integrity under the narrative water quality criterion. The concluding sentence of the paragraph states:

> *In that regard, the WVDEP considers streams with less than 60.6 as biologically impaired.*

The DEP's use of WVSCI to assess 47CSR2-3.2.i is consistent with the Secretary's testimony.

House Concurrent Resolution No. 111 was directed to the United States Environmental Protection Agency in response to federal guidance suggesting conductivity measurement to gauge potential to violate narrative requirements. Nonetheless, the DEP's use of WVSCI to assess 47CSR2-3.2.i is consistent with the Resolution. WVSCI is an Index of Biological Integrity (IBI) for benthic macroinvertebrates. Benthic macroinvertebrates are aquatic life and afforded Clean Water Act protection. Failing WVSCI scores indicate nonsupport of the aquatic life designated use and nonattainment of the narrative criterion at 47CSR2-3.2.i. Under WVSCI, benthic macroinvertebrates are evaluated to determine the balance of the aquatic community. Multiple metrics measure species diversity, with favorable scores indicating the community "is diverse in species composition" and "the aquatic community is not composed of only pollution tolerant species." Favorable scores also demonstrate assemblages that are sufficient to perform biological functions necessary to support fish communities. The DEP has not developed or implemented a fish IBI for West Virginia waters. While a fish IBI might be useful in non-wadeable streams or other habitats that do not support the WVSCI protocol, fish community assessment is not a prerequisite or substitute for benthic macroinvertebrate assessment in habitats that support the WVSCI protocol. In fact, WVSCI assessment indicating impairment provides evidence of ecosystem imbalance and adverse impact to higher trophic level organisms.

The Legislature resolved that interpretation of narrative water quality standards is the responsibility of the DEP and that interpretation must

faithfully balance the protection of the environment and economic development. The DEP's historic and continued use of WVSCI to scientifically assess attainment of water quality standards does not violate the Legislature's statement of public policy as contained the West Virginia Water Pollution Control Act.

General and stream-specific comments were received suggesting the DEP should not use a single biological sampling event to list a stream as biologically impaired. The following streams were requested to be removed based on a single WVSCI sample: unnamed tributary (unt) of Birds Creek (WVMT-12-H-1), Hackers Creek (WVMT-26), Buffalo Creek (WVPSB-5), Parker Branch (WVO-2-Q-18-D) Maynard Branch (WVO-2-Q-23).

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 has used this methodology to make assessment decisions on hundreds of single samples events over the last ten years in previous 303(d) lists with each list receiving the EPA approval.

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.

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, the 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{mountaintop mining / valley fill} 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 2010 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. The 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.

A commenter expressed the concern that "in many cases, the specific data relied upon by DWWM is inadequate and/or deficient" stating that "during metric development for the WVSCI, consideration of individual metrics did not include an evaluation of metric variability." 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."

WVSCI variability has been measured and addressed in the listing methodology. Duplicate sampling (two samples collected at the same location and time) has been a routine component of the 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, the 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 re-sampling 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. The 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.

Certain comments proclaimed that the Division of Water and Waste Management is being disingenuous in its assessment of the biological integrity of state waters "in an apparent effort to inflate the list of impaired streams in West Virginia and needlessly target the mining industry."

The DEP does not agree with the above assertions. The current list reflects the DEP's responsibility under the Clean Water Act to objectively

assess use attainment in West Virginia waters. The biological assessment methodologies associated with the 2010 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.

A commenter urged the DEP to seek a statutory change that would allow review of 303(d) listing decisions by the Environmental Quality Board and to develop, through rulemaking, reasonable standards for adding or removing water bodies from 303(d) lists. The commenter cited footnote 19 of the West Virginia Supreme Court of Appeals decision Monongahela Power v. Chief, Office of Water Resources, 567 S.E.2d 629, 641 (W.Va. 2002).

In the cited decision, the Supreme Court ruled that a 303(d) list developed by the DEP did not constitute an "order" pursuant to W.Va. Code § 29A-1-2(e) and is not an action that is appealable to the Environmental Quality Board under W.Va. Code § 22-11-21 (1994). The Court found that the DEP-prepared list is essentially a recommendation and has no force and effect until approved by the Administrator of the EPA, which constitutes the final disposition of the matter. The Court also rejected an argument that persons affected by the list are denied due process, finding that they are provided with the requisite notice and right to be heard. The opinion referenced Federal Clean Water Act provisions mandating that States provide public notice and opportunity for public comment on 303(d) lists prior to final submission to the EPA and case law holding that the EPA's decisions concerning 303(d) lists and Total Maximum Daily Loads are reviewable in United States district courts.

In Footnote 19, the Court noted that there is nothing in federal law which prevents authorizing the Environmental Quality Board to review DEP-prepared 303(d) lists prior to their submission to the EPA for approval and respectfully invited the attention of the Legislature to the matter. While the commenter may seek the Legislature's attention, the DEP does not intend to independently do so. As evidenced by this responsiveness summary and those included in past 303(d) lists, the DEP professionally pursues list preparation and carefully considers and addresses public comments. In their approval, the EPA must determine that the DEP properly executed all of its responsibilities under Section 303(d) of the Act, including proper consideration and response to relevant public comments. State methodologies must be consistent with federal expectations for adding and removing water bodies from the list.

Because of the applicability of federal requirements, the draft nature of list preparation by the DEP and the availability of a federal forum for review of the approved final document, the promulgation of new State rules and/or the creation of an additional State administrative review process is not believed necessary.

Recognizing the extended period of time that may elapse between 303(d) listing and TMDL development, a commenter urged the DEP to consider the inequity of more stringent point source effluent limitations that may result from 303(d) listing even though the impairment might only be resolved by increased control of nonpoint sources.

NPDES permitting rules prohibit permit issuance that would cause or contribute to a violation of water quality standards. Identification of impairment, via 303(d) listing or other mechanisms, may necessitate point sources to achieve a water quality criterion without the benefit of a mixing zone. TMDL development may allow targeting of reductions from the primary causative sources. In some TMDLs developed by the DEP, pollutant reductions are prescribed only from nonpoint sources. In other instances both point and nonpoint source reductions are determined necessary to attain criteria. There will always be some lag time between listing and TMDL development. The commenter correctly recognized that the concern is beyond the purview of those developing the 303(d) list. Nonetheless, the concern is noted.

A commenter urged the agency to enhance its written program for stream listing by creating a transparent outline of its historical listing decisions and its current listing proposal. The commenter also urged enhancement of outreach activities to include opportunity for public

review and comment prior to finalizing the proposed list.

The DEP believes that the Section 303(d) listing process already accommodates the requests. Each list prepared by the DEP includes a detailed description of the current decision methodology and supplements that provide transparency for past listing decisions and the current classification of previously listed waters. An extended public notice and comment period is provided and comments are carefully considered and addressed.

General and stream-specific comments requested streams to be removed from the 303(d) list because of the age of the samples and data used for listing. The following streams were requested to be removed because of "old data": Maynard Branch (WVO-2-Q-23), Cutright Run (WVMTB-17), Sawmill Run (WVMTB-20), Short Creek (WVO-90), Jims Branch (WVO-2-Q-18-H) Copley Trace Branch (WVO-2-Q-18-G) Parker Branch (WVO-2-Q-18-D) Indian Creek (WVM-17) Buffalo Creek (WVPSB-5).

Some of the subject biological impairment listings had assessments performed by the 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. The 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 Section 303(d) List.

Commenters have asked that Dents Run (WVM-23-P), Foxgrape Run (WVMT-26-B), Rockhouse Creek (WVKC-10-T-13), Copley Trace Branch (WVO-2-Q-18-G), Left Fork of Beech Creek (WVKC-10-T-15-A), and Rollem Fork (WVO-2-Q-18-E) be delisted for biological impairment. The requests are based on WVSCI scores for the most monitoring events that fall within the gray zone (60.6 - 68.0).

Streams are neither initially listed nor delisted when their score falls within this zone. Any listed stream which has newer data within the 60.6 to 68.0 range will be retained on the list as there is no evidence that the stream is fully attaining its aquatic life use (i.e. greater than 68.0).

A commenter suggested that the biological impairments of East Fork/Twelvepole Creek (WVO-2-Q) and Kiah Creek (WVO-2-Q-18) be delisted due to the results of recent monitoring believed by the commenter to demonstrate non-impairment.

Both streams were sampled, at numerous locations, in the spring of 2009 by both the DEP and consultants working on behalf of the commenter. The streams were then sampled again by the consultant in the fall of 2009 and again by the DEP in the summer of 2010. It was determined, using all the data available to the DEP, that the streams will not be delisted in their entirety but instead shall be re-segmented.

Reevaluation of East Fork/Twelvepole Creek biological data determined an error in the draft listing for the segment below the dam. No new data is available for this segment. Consistent with the 2008 Section 303(d) list, the impaired length of this segment has been changed to "RM 4.4 to RM 10.5 (East Lynn Dam)". Additionally, the agency confirmed the draft listing for the segment upstream of the lake (RM 35 to headwaters).

Based upon new information, the DEP adjusted the impaired length of Kiah Creek from "RM 3.9 to HW" to "RM 3.9 to RM 11.8". Current biological results indicate non-impaired conditions from RM 3.9 downstream and at the most upstream station (RM 11.8). Results between the aforementioned stations indicate impairment or uncertainty and do not support delisting of this segment.

A commenter provided biological data requesting the delisting of Wet Branch (WVK-61-C).

The DEP evaluated the data and found that it could not be used. The DEP has an accepted period of time in which biological samples are collected. In order for a sample to be considered comparable in must be sampled within the WVSCI index period of April 15th to October 15th. The WVSCI data submitted by the commenter was associated with a sample collected outside of the index period.

A commenter requested that Rollem Fork (WVO-2-Q-18-E), Parker Branch (WVO-2-Q-18-D), Honey Branch (WVO-2-Q-29), Jims Branch (WVO-2-Q-18-H), Copley Trace Branch (WVO-2-Q-18-G) and Maynard Branch (WVO-2-Q-23) be reevaluated as to length of listing and propriety of listing due to existing impoundments and beaver dams.

A field investigation of Rollem Fork in 2008 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 mile point 0.9. The impaired reach of Rollem Fork was revised from 1.9 miles to 0.9 miles in the 2008 Section 303(d) list.

In response to the comment, the DEP re-measured Maynard Branch, Jims Branch and Parker Branch and determined impaired lengths indicated in the Draft 2010 303(d) List to be accurate. Copley Trace Branch was re-measured and the listing was revised from "entire length" to "mouth to river mile 1.5."

The presence of impoundments in a watershed and an implication that the observed biological impairments might be caused by the impoundment rather than by pollutants in the water is taken into consideration when listing a stream. The 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 the 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 the 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 the EPA guidance, the 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.

One commenter requested delisting of Frances Creek (WVO-2-Q-18-F), contending the most recent data indicates a non-impaired condition.

The most recent data available (July 2010, WVSCI score = 58.4) indicates Frances Creek is biologically impaired.

One commenter suggested the source for Jims Branch (WVO-2-Q-18-H) biological listing is habitat based not related to upstream mining activities.

The DEP recognizes that there are multiple possible sources of biological impairment and identifies sources as unknown for most initial listings. The source for Jims Branch is currently listed as "unknown" and will be evaluated when the TMDL for this watershed is developed.

A commenter asked the DEP that Wiley Branch (WVO-2-Q-28) be removed from the 2010 Draft 303(d) list for biological impairment based on biological data from Fall 2009 submitted by the commenter.

The impairment was not previously listed and the most current qualifying

biological data (July 2010, WVSCI score = 64.7) falls within the gray zone and does not support a new listing. As such, the proposed listing has been removed.

A commenter requested delisting of biological impairments for Honey Branch (WVO-2-Q-29) and Right Fork/Cub Branch (WVO-2-Q-31-A) based on new data from samples collected in October 2009 and April 2010.

The DEP re-sampled Honey Branch and Right Fork/Cub Branch in July 2010 and resultant WVSCI scores (55.9 and 53.0, respectively) do not support delisting.

A commenter requested delisting of biological impairments for Indian Creek (WVM-17), Dents Run (WVM-23-P) and Sawmill Run (WVMTB-20) citing issues of representativeness of samples.

The DEP reviewed the sample information and determined the samples were comparable per the WVSCI methodology. The listings have been retained.

A commenter asked that Vance Branch (WVO-2-Q-18-C-1) be removed from the Draft list as the entire length of stream had received a Section 404 permit for its filling.

The DEP verified the existence of a permit to fill the stream and determined filling of the stream had taken place. The remaining section of stream does not contain suitable sample area to support the WVSCI protocol, therefore the small remaining portion of Vance Branch has been removed.

One commenter requested that the iron impairment of Indian Creek (WVM-17) be delisted.

The DEP has reviewed Division of Mining and Reclamation trend data for iron in Indian Creek and found one violation out of 51 samples in the past three plus years (2% rate of exceedance). Based on this data, the iron impairment was removed.

A comment was received requesting delisting of the biological impairment for Short Creek (WVO-90), stating the age of data used for listing and the number of samples were insufficient. The commenter also mentioned a more recent biological result (WVSCI score = 60.4 at mile point 3.4). Additionally, the commenter wanted the source of the Short Creek impairment changed from "mining" to "undetermined."

The WVSCI scores observed in 2005 clearly indicate biological impairment from the mouth through mile point 7.6. At that location, the observed WVSCI score of 61.3 falls within the 'gray zone.' As described previously, gray zone scores represent uncertain biological conditions and are not evidence of an acceptable condition. As per the listing methodology, the entire length of the stream will remain listed. The recent biological score of 60.4 does not contradict the assessment.

The 2005 monitoring of Short Creek and its tributaries was a component of pre-TMDL monitoring for the Upper Ohio South Watershed TMDL development project. Within that project, the biological stressor identification process determined ionic stress as a significant stressor of Short Creek. TMDL development for the biological impairment was deferred. Since a TMDL has not been developed for the biological impairment of Short Creek, it must remain on the 303(d) list. The EPA has directed the DEP to consider the results of stressor identification in identifying sources associated with 303(d) listings. In this instance, the sources of ionic stress are active and/or historical mining activities.

A commenter questioned the iron impairment for Paint Creek (WVK-65) based upon trout water criteria.

After consultation with the DNR, the DEP has determined Paint Creek to be a trout water for the section between Burnwell (RM 13.24) and Pax (RM 31.48). This is consistent with the segment identified as trout water in the 2001 Paint Creek TMDL. In the 2010 Draft 303(d) List, the DEP mistakenly identified the section above Pax as trout water and has corrected the listing.

Several commenters submitted data and/or WVSCI scores requesting reevaluation of the biological impairment listings of Pine Creek (WVOG-65-H), Right Fork of Pine Creek (WVOG-65-H-1), Cow Creek (WVOG-65-J), Rockhouse Creek (WVKC-10-T-13), and Left Fork of Beech Creek (WVKC-10-T-15-A).

The DEP requires basic information (i.e. location, methods, etc) be supplied with data in order for it to be qualified and evaluated. These submissions did not contain the necessary information; therefore, the DEP did not accept the data for evaluation.

A commenter requested changing the biological impairment listing for Spruce Fork (WVKC-10-T) from "entire length" to "mouth to river mile 13." The commenter provided a WVSCI score of 67.1 at river mile 13.

A WVSCI score that falls within the gray zone (60.6 to 68.0) does not indicate a non-impaired condition. Also, the submitted data did not meet the necessary qualifications. As such, Spruce Fork will remain on the 303(d) list for its entire length.

U.S. EPA Approval and Resultant Revisions*

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

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

FEB 0 8 2011

Dear Mr. Scott Mandirol

Thank you for the West Virginia Department of Environmental Protection's (WVDEP) final submission on October 4, 2010 of its identification of waters under Section 303(d) of the Clean Water Act (2010 Section 303(d) List).

The U.S. Environmental Protection Agency Region III (EPA) 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 2010 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.

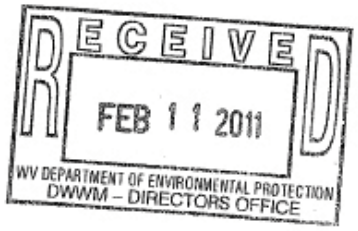
Thank you again for this submission. If you or your staff has any questions, please feel free to contact Mr. Larry Merrill at (215) 814-5452 or Ms. Cheryl Atkinson at (215) 814-3392 for assistance.

Sincerely,

Jon M. Capacasa, Director
Water Protection Division

Enclosure

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



* Note: The **format** of the EPA approval letter has been moditfied to place in the document. The contents of the letter have not been altered. The original letter may be downloaded off DEP's Web site:
http://www.dep.wv.gov/wwe/303d/

West Virginia's 2010 Section 303(d) Approval Rationale

Introduction

EPA has conducted a complete review of West Virginia's 2010 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 2010 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 Section 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 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 Total Maximum Daily Load (TMDL).

- o Category 4a - waters that already have an approved TMDL but are still not meeting standards.
- o Category 4b - waters that have other control mechanisms in place which are reasonably expected to return the water to meeting designated uses.

- o 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 2010 Integrated Report. West Virginia also provided the 2010 Section 303(d) list in the same format as the 2008 Section 303(d) list consisting of the 303(d) list of impaired waters and six supplemental tables that track previously listed waters. The format of the 2010 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 2010 list.

Six supplemental tables were provided to track previously listed waters that are not present on the 2010 Section 303(d) list.

"Supplemental Table A - Previously Listed Waters - No TMDL Develop - 2010" 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 303(d) list. 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 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 onto 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 2010" is a list of impaired waters that were not previously included on the 2008 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 make reasonable decisions 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 2010 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 2010 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 2010 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 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 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.

Agency 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 applicable numeric or narrative criteria. 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 2010 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 stream water quality assessments, the DEP generally used water quality data generated between July 2004 and June 2009. EPA

finds West Virginia's screening protocol and criteria described in its 2010 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 2010 Section 303(d) List for public comment on March 15, 2010 through May 19, 2010. Notices of the availability of the Draft 2010 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. In March 2010, WVDEP provided EPA with its 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 May 18, 2010, requesting clarification of individual waterbody listings and if any data and/or waters were screened out or not used to make listing impairment decisions based on single pollution events. West Virginia received written comments from several 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 2010 Integrated Water Quality Monitoring and Assessment Report package combining the Section 303(d) list and Section 305(b) report on October 06, 2010. This package included: (1) a listing rationale narrative describing: (a) an overview of the process for development of the 2010 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 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. 40 C.F.R. 130.7(b)(3) and (b)(5). 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 nonattainment 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 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).

Since 2002, WVDEP has used the West Virginia Stream Condition Index (WVSCI) to evaluate whether streams are meeting the narrative criteria contained in West Virginia's Water Quality Standards. WVSCI is a family-level multi-metric index and was developed in coordination with EPA in 2000. Since publication of WVSCI in 2000, the data and science have progressed. The number of available reference sites has increased from 107 to 394. In addition, the state of the science has moved from family-level analysis to genus-level analysis. EPA used genus-level analysis as part of its Wadeable Streams Assessment (EPA 841-B-06-002 December 2006), the first-ever statistically valid survey of biological condition of small streams in the United States. Genus-level data are also used by biological monitoring programs in surrounding states, including Kentucky, Pennsylvania, Maryland and Ohio.

To date, EPA has approved WVDEP's continued use of WVSCI as its tool for assessing whether streams are achieving the narrative water quality criterion. EPA's approvals have, in part, been based upon WVDEP's recognition that there has been significant development of the science and data since WVSCI was published in 2000 and upon the fact that WVDEP has taken steps to update its assessment tool, such as its request to EPA for assistance in developing the Genus Level Index of Most Probably Stream Status (GLIMPSS).

EPA notes that West Virginia has been a regional leader in monitoring its waters and has collected 10 years' worth of genus-level data. Because a final version of GLIMPSS became available during summer of 2010., and thus after the public comment period for the 2010 Section 303(d) list, EPA is approving the Section 2010 list based upon use of the family-level WVSCI analysis. However, EPA expects that West Virginia will match the high quality of its monitoring program by moving to a genus-level analysis for its 2012 Section 303(d) List.

WVDEP has indicated that there are a number of steps necessary for its use of a genus-level analysis, including external peer review of GLIMPSS. GLIMPSS is a product that was developed jointly by EPA and WVDEP. EPA also would like to see GLIMPSS undergo external peer review to further support EPA's use of GLIMPSS for purposes other than the Section 303(d) list. To that end, EPA intends to submit GLIMPSS for external peer review in the coming months. EPA's effort will be consistent with EPA policies and guidance regarding peer review of scientific products. EPA encourages WVDEP to participate with EPA in this external peer review effort as a first step toward use of a genus-level analysis, and we will be in contact with WVDEP to coordinate WVDEP's participation. EPA notes that, while it is EPA's strong preference that WVDEP work with EPA to jointly submit GLIMPSS for external peer review, EPA intends to proceed with external peer review to support EPA's use of GLIMPSS.

In addition to the foregoing, we note that WVDEP continues to consider 60.7-68 as a "gray zone" to account for uncertainty. EPA notes that questions have been raised regarding the statistical validity of the gray zone in light of the way that WVSCI is scored. For the 2010 Section 303(d) List, EPA notes that WVDEP has correctly treated WVSCI scores within the gray zone as not reflecting instream water quality that fully supports the narrative water quality criterion. Currently, streams with biological scores in the "gray zone" may be in Categories 2, 3, 5 or on the TMDL completed list depending on additional water quality data associated with the stream. At EPA's request, a list of streams scoring in the "gray zone", along with its current assessment category, was provided and is attached to this rationale. EPA accepts this approach for purposes of the 2010 Section 303(d) List and encourages WVDEP to address statistical validity concerns prior to any future use of a gray zone.

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 2010 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 on Table 4 of the Integrated Report. West Virginia relied heavily on ORSANCO's 305(b) report and use 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 2010 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 2010 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 nonattainment 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 2010 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 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 2010 Section 303(d) list as a result of data collected by agencies other than WVDEP as identified in Table 4 of the Integrated Report.

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 2010 Section 303(d) list. In the 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). See also 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 2010 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 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 2010 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 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 2010 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 2010 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 2010 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.

Regarding the delisting of Crab Orchard Run, which was not in the draft Supplemental Table A but added to the final Supplemental Table A. West Virginia provided the following additional explanation for the delisting. The noncomparability of biological samples for Crab Orchard Run results from a predominance of one organism that is not necessarily indicative of impairment (gammarus). That is EPA understands that for Crab Orchard, the data used for (previous) listing has been deemed inappropriate based on karst geology or the need for a limestone IBI. In general, if a biological assessment previously used to identify a water as "impaired" is later deemed noncomparable, then there are multiple possibilities for the IR categorization of the stream. As stated above water placed in Supplemental Table A are moved from Category 5 to Category 1, 2, 3, or 4, as appropriate. But in the case of Crab Orchard, the stream is still impaired for another parameter (iron), therefore the stream is still placed in Category 5.

WVDEP has also identified on "Supplemental Table B" those waterbodies where a TMDL has been completed. Consequently, these waterbodies are not included on the 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 2010 Section 303(d) list, EPA Region III staff requested and received additional information from West Virginia.

- **Justification for differences between EPA recommendations and WVDEP's final 2010 Section 303(d) list.** In comment letters dated May 18, 2010, EPA requested clarification and amendments to West Virginia's 2010 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 2010 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 Region III requested of the state during the review of the 2010 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 2010 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 2010 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 with 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 2010 Section 303(d) list identifies 6 lakes and 1091 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.

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 2010 Section 303(d) list in electronic correspondence on March 29, 2010, to the U.S. Fish and Wildlife Service (FWS). EPA requested comments from FWS regarding the draft list. No comments from FWS were received.

List Format Description

The format of the 2010 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 2008 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 the Total Maximum Daily Load Process section. A West Virginia Watershed Management Framework map on page 6 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," "Supplemental Table E - Manganese TMDLs" and "New Listings for 2010."

Supplemental Table A - Previously Listed Waters – No TMDL Developed

Previously listed waters from the 2008 list that are not on the 2010 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 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, the state placed total aluminum TMDLs onto a separate table from Supplemental Table B.

Supplemental Table E - Manganese TMDLs Developed

Manganese TMDLs identify waters which had TMDLs developed based upon water quality criteria that is no longer effective. After the subject TMDLs were developed, EPA approved revisions to West Virginia water quality standards that restricted the applicability of the manganese criterion to five mile zones upstream of known water supply intakes. The table is included to document the development of the obsolete TMDLs and to distinguish them from the effective TMDLs identified in Supplemental Table B.

Supplemental Table F - New Listings for 2010

This table is a list of impaired waters that were not previously included on the 2008 Section 303(d) list.