

# 2012 Draft 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 2012

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 2009 through June 2011.

**Earl Ray Tomblin**

*Governor*

**Randy C. Huffman**

*Cabinet Secretary*

Department of Environmental Protection

**Scott G. Mandirola**

*Director*

Division of Water and Waste Management

[www.dep.wv.gov](http://www.dep.wv.gov)

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*pending*

**U.S. EPA Approval and Resultant Revisions**

**List Format Description**

**List Supplements Overview**

**List Key**

List Key 1

**List Supplements**

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<i>Supplemental Table A - Previously Listed Waters - No TMDL Developed</i>	A1
<i>Supplemental Table B - Previously Listed Waters - TMDL Developed</i>	B1
<i>Supplemental Table C - Water Quality Improvements</i>	C1
<i>Supplemental Table D - Impaired Waters - No TMDL Needed</i>	D1
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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 2012 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 format suggested by EPA for this “Integrated Report” includes provisions for states to place their waters in one of the five categories described in Table 1. Waters that are included on the 2012 Section 303(d) List are placed in Category 5 and are located in the back of this report (West Virginia Draft 2012 Section 303(d) List).

This Integrated Report is a combination of the 2012 Section 303(d) List and the 2012 Section 305(b) report. In general, this report includes data collected and analyzed between July 1, 2006 and June 30, 2011, 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.

Table 1 - Integrated Report categories

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

## Water Quality Standards

Water quality standards are the backbone of the 303(d) and 305(b) processes of the federal Clean Water Act. 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 2012 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/Pages/default.aspx>.

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

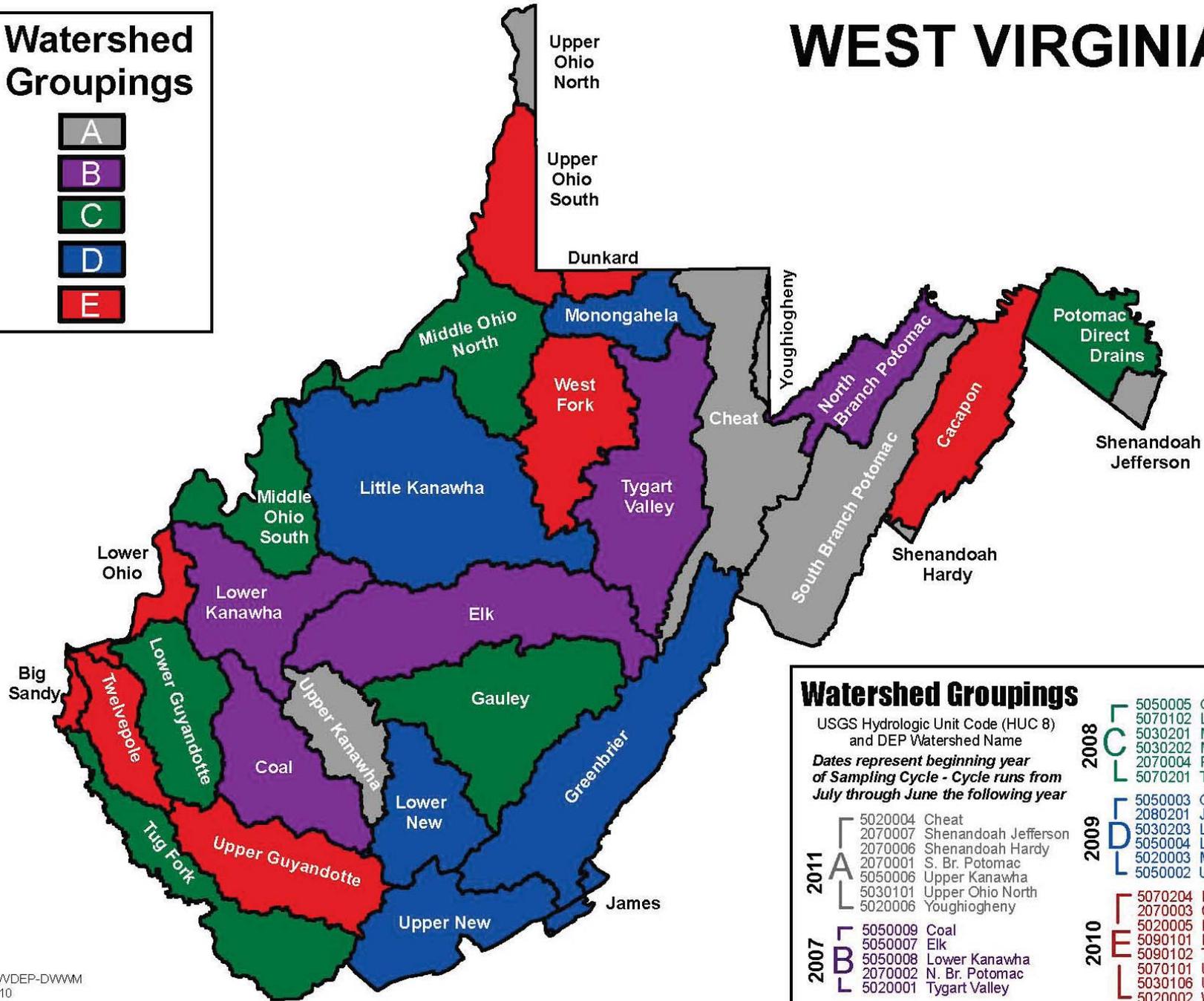
Table 2 - West Virginia designated uses

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



## 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

Year	Group	HUC 8	Watershed Name
2007	B	5050009	Coal
		5050007	Elk
		5050008	Lower Kanawha
		2070002	N. Br. Potomac
		5020001	Tygart Valley
2011	A	5020004	Cheat
		2070007	Shenandoah Jefferson
		2070006	Shenandoah Hardy
		2070001	S. Br. Potomac
		5050006	Upper Kanawha
2010	E	5070204	Big Sandy
		2070003	Cacapon
		5020005	Dunkard
		5090101	Lower Ohio
		5090102	Twelvepole
2009	D	5020003	Monongahela
		5050004	Lower New
		5030203	Little Kanawha
		2080201	James
		5050003	Greenbrier
2008	C	5050005	Gauley
		5070102	Lower Guyandotte
		5030201	Middle Ohio North
		5030202	Middle Ohio South
		5070201	Tug Fork

appropriate 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.

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

Water quality criteria also can be written in a narrative form. For example, the water quality standards contain a provision that states that wastes, present in any waters of the state, shall not adversely alter the integrity of the waters or cause significant adverse impact to the chemical, physical, hydrologic, or biological components of aquatic ecosystems. Narrative criteria are contained in Section 3 of 47CSR2. More information regarding the use of narrative criteria is contained in 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 (WAB). In addition, WAB water quality data is currently available at: <https://apps.dep.wv.gov/dwwm/wqdata/>

The data at this site is continually updated as the site is live-linked to the database. In the near future, WAB biological data will also be available.

### **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.

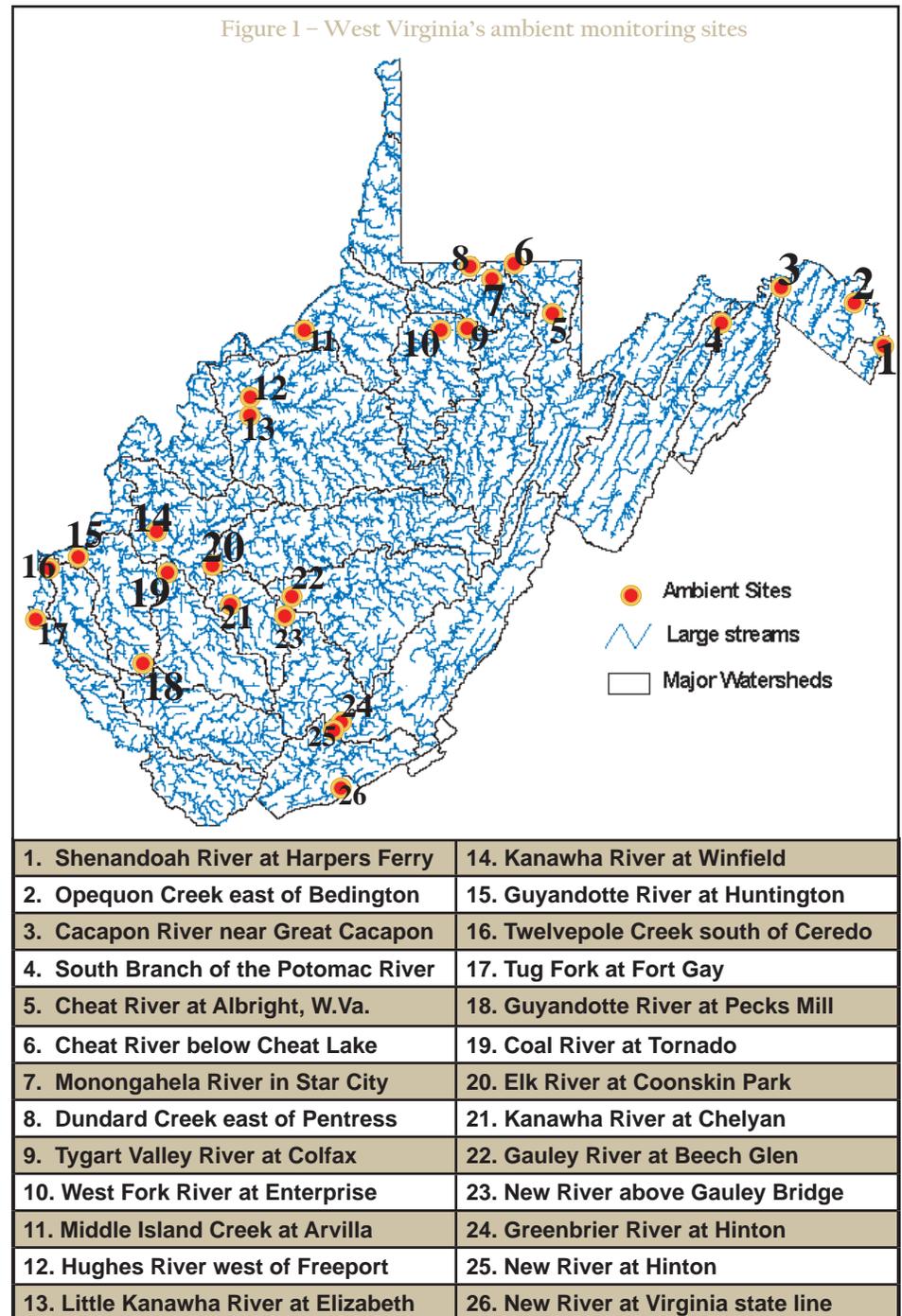
## Probabilistic (random) sampling

Probabilistic sampling in West Virginia 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 sampled in 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. In 2011, West Virginia completed its third 5 year cycle of probabilistic monitoring. The target population for this effort was all flowing wadeable stream and rivers as a sample frame. The data analyzed for this report covers sampling years 2007 through 2011 and provides an overview of major pollutants impacting state waters. Monitoring protocols are similar to those applied to other WAB monitoring programs and include the collection of water quality and stream habitat information as well as the collection of benthic macroinvertebrate samples for assessing biological integrity. Further detail is provided in the section titled Probabilistic Data Summary.

## 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 are sampled bi-monthly. Sampling stations are generally located near the mouths of the state's larger rivers and are co-located with USGS stream gages. The data provides information for trend analyses, general water quality assessments and pollutant loading calculations, and allows water resources

Figure 1 – West Virginia's ambient monitoring sites



managers to quickly gauge the health of the state's major waterways.

### **Targeted Monitoring**

Targeted monitoring 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 Monitoring**

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. Pre-TMDL Monitoring is intensive, consisting of monthly sampling for parameters of concern. This method captures data under a variety of weather conditions and flow regimes. Pre-TMDL monitoring 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 resumed 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 are sampled in larger lakes and profile data for temperature and dissolved oxygen are obtained.

Many of West Virginia's largest reservoirs are controlled by the U.S. Army Corps of Engineers. Although The Corps' primary mission is to manage structures to provide navigation and flood control, the agency also is committed to water quality management. Data generated by the Corps has been used for assessment purposes.

Additional lake information is available from the West Virginia Division of Natural Resources. The DNR, one of the signatory agencies in the Partnership for Statewide Watershed Management, conducts fish community surveys on many of the state's reservoirs.

### **Wetlands**

The State of West Virginia takes great interest in the management of its wetlands both large and small. The current total acreage

of wetlands within the state is 102,000 & comprises less than 1 percent of the State's total acreage (National Wetlands Inventory: WV 1980-86). As of this report, 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. A newly developed mitigation guidance document for creating and/or restoring wetlands has been drafted by the West Virginia Division of Natural Resources (DNR) and reviewed by the DEP.

Since the submission of the last 305(b) report; West Virginia's wetlands monitoring activities have expanded. Watershed Assessment personnel have been researching/developing assessment and monitoring strategies in conjunction with EPA and other states. The Wildlife Resources Section of the DNR, in cooperation with West Virginia University, has evaluated aerial photography from 2003 at a 1:4800 scale to supplement the data from the original National Wetlands Inventory. The detailed information this project provides allows for the identification of man-made changes since the 1986 NWI and enables proper Cowardin classification. The DNR recently completed the West Virginia Wetland Rapid Assessment Procedure (WVWRAP) for wetlands which can be used statewide. A WVWRAP (Level II) assessment captures in excess of 100 descriptive and assessment metrics at each site which are used directly or indirectly to provide wetland integrity and functional assessments. The WVWRAP protocol was developed in 2010 and (to date) has been applied at more than 680 sites to validate the technique. Calibration with intensive (Level III) assessments and GIS remote (Level I) assessments on the same wetlands/sites provides more confidence in data that will be generated in future rapid assessments. The DNR has also developed an Index of Biologic Integrity (IBI) for wetlands and applied it to approximately 90 wetlands which will contribute to the creation of reference standards for wetland integrity and wetland function.

In conjunction; approximately 40 landscape metrics descriptive of wetland ecological integrity and wetland functions have been extracted and/or derived for all palustrine, emergent, shrub-scrub and forested wetlands identified in the National Wetland Inventory. These metrics will be used as input data to generate indices of function and integrity in the assessment of wetland condition and functionality across the state.

The DNR submitted in spring of 2011 their West Virginia Wetland Program Plan, which describes a general direction for the state

<i>Table 3 - Current and future monitoring activities</i>
26 Ambient sites will continue to be monitored bi-monthly (monthly for Monongahela River Basin sites during low flow season)
A third round of probabilistic monitoring that began in the spring of 2007 was completed in 2011. Round four sites have been selected and monitoring will begin in 2013.
Pre-TMDL development monitoring: A year-long monitoring effort in the West Fork Watershed was completed in June 2010; streams from the South Branch of the Potomac plus streams from several watersheds that had previously been identified as biologically impaired because of ionic stress were monitored from July 2011 through June 2011; and streams in the Tygart River Watershed are being sampled from July 2012 through June 2013.
Group E Targeted Sampling – Approximately 30 sites were sampled during the 2010 summer sampling season from Upper Ohio South and Upper Guyandotte watersheds.
Group A Targeted Sampling – 43 targeted sites were sampled in 2011 from Cheat and Youghiogheny River watersheds,
Lakes – Nine lakes within Group A were sampled four times during the 2011 growing season (May through October); ten lakes within Group B were sampled in 2012; and approximately 10 Group C Lakes will be sampled in 2013.
Water quality meters were deployed at 112 locations on 97 streams in total for the years 2011 & 2012. Parameters measured include pH, temperature, specific conductance, and dissolved oxygen.
Long Term Monitoring Sites (LTMS or LitMuS). Approximate 60 sites were sampled in 2010, 2011, and 2012. A similar effort is planned for future years.
Long Term Monitoring Sites (LTMS or LitMuS). Approximate 50 sites were sampled in 2009. A similar or greater number will be assessed in 2010.

through 2015. The overall goal of the plan is to provide guidance and direction to the two state agencies (West Virginia Department of Environmental Protection and West Virginia Division of Natural Resources) directly involved with conserving and regulating wetland activities in the state. The plan includes suggestions for core monitoring elements, water quality standards, and increasing education/outreach efforts.

The West Virginia field portion of the U.S. EPA's National Wetlands Condition Assessment was completed in September of 2011. This project became a joint effort involving staff from DEP, DNR, and a variety of NRCS field offices. Besides funding provided to DEP and DNR for program development; DEP's Watershed Assessment Branch personnel received excellent field experience working in wetlands. The assessment and collection of data from numerous parameters (vegetation, soil, land uses, water quality, etc...) could provide an excellent framework to build a future West Virginia assessment method if necessary.

### **Citizen monitoring**

West Virginia Save Our Streams is West Virginia's volunteer water quality monitoring program. Initiated in 1989, this program encourages citizens to become involved in the improvement and protection of the state's streams. 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 aquatic life monitoring. 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 regularly throughout the state to train, certify and provide quality assurance. A major improvement in data accessibility for the program has been the development of an online Volunteer Assessment Database (VAD): <http://www.dep.wv.gov/WWE/getinvolved/sos/Pages/VAD.aspx>. Volunteer monitors can register and enter their own data online. The coordinator is the database administrator,

and has tools to verify the quality of the information before it is approved and included in the VAD. The database is also available for public viewing without registration. In addition, the program prepares "State of Our Streams" report. To learn more visit: <http://www.dep.wv.gov/sos>.

## **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](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 2006 and June 2011. 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 only reflects 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 2012 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 2012 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

National Park Service - U.S. Department of Interior	ARGUS Energy WV, LLC.
Greer Limestone	Hunter Ridge Coal Company
CONSOL Energy	Appalachian Mountain Advocates
Piney Creek Watershed Association	Friends of Deckers Creek
West Virginia Department of Agriculture	M&J Coal Company Inc.
ORSANCO	Preston County Coal and Coke
West Virginia Department of Environmental Protection - Nonpoint Source Program	Freshwater Institute
Mepco, LLC	Patriot Mining Company, Inc.
Deckers Creek Limestone	Dana Mining Company
American Bituminous Power Partners, L.P.	

## 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.

### **Numeric water quality criteria**

The decision methodology for numeric water quality criteria used in preparation of the draft 2012 Section 303(d) list are consistent with those used in 2010 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.

### **Evaluation of fecal coliform numeric criteria**

Fecal coliform assessments were based on the previously described decision criteria for numeric water quality criteria. Given

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 be considered “not 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 be considered impaired.

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:

*8.13 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.*

*8.13.1 Ohio River main stem (zone I) - During the non-recreational season (November through April only) the maximum allowable level of fecal coliform for the Ohio River (either MPN or MF) shall not exceed 2000/100 ml as a monthly geometric mean based on*

*not less than 5 samples per month. (This higher criterion for the Ohio River mainstem is effective only during the non-recreational season and all ORSANCO data evaluated by DEP for listing purposes is collected during the recreation season. Therefore, use of the 200 counts/100ml geometric mean criteria is appropriate).*

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 months 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**

Passage of Senate Bill 562 in the 2012 regular legislative session requires DEP to develop and secure legislative approval of new rules to interpret the narrative criterion for biological impairment found in 47 CSR 2-3.2.i. A copy of the legislation may be viewed at [http://www.legis.state.wv.us/Bill\\_Text\\_HTML/2012\\_SESSIONS/RS/pdf\\_bills/SB562%20SUB1%20enr%20PRINTED.pdf](http://www.legis.state.wv.us/Bill_Text_HTML/2012_SESSIONS/RS/pdf_bills/SB562%20SUB1%20enr%20PRINTED.pdf).

In response to the legislation, DEP is not adding new biological impairments to the 2012 Section 303(d) list. Previously listed impairments are being retained. When new rules become effective, delisting without TMDL development may occur if the application of the assessment methodology demonstrates a non-impaired condition. The following section describes the methodology historically used by DEP to assess the narrative criterion at 47 CSR 2-3.2.i. Once developed, the revised assessment methodology called for in SB 562 will be made available for public review as part of the legislative rule making process.

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 have been listed as biologically impaired based on a survey of their benthic macroinvertebrate community. Benthic macroinvertebrate

communities were 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 were considered biologically impaired and included on the 303(d) List. Benthic macroinvertebrates are collected with a 500 µm mesh rectangular dip net. The kick sample is collected from the 1.0 m<sup>2</sup> area of substrate. Identifications are completed for a 200-organism subsample. The WVSCI was developed from data using these methods. Streams were 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.

### **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 worked together on fish

contamination issues since the 1980s and an executive order from the governor and subsequent Interagency Agreement signed in 2000 formalized the collaborative process for developing fish consumption advisories. 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 14 state streams and five 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 <http://www.wvdhhr.org/fish/>

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 meals per month advisory trigger.

In regard to mercury, West Virginia water quality standards contain

both methylmercury and total mercury criteria for water column and body burden (fish tissue) criterion for methylmercury. The body burden criterion of 0.5 µg/g applies to public water supply and water contact recreation designated uses. Because of variability in the ratio of methylmercury to total mercury in fish tissue results, DEP has decided to use only methylmercury results from whole fish analyses for 303(d) listing purposes.

For the mainstem Ohio River, the applicable ORSANCO body-burden criterion is 0.3 µg/g. As with previous 303(d) lists, DEP has deferred to ORSANCO's assessment results for mercury listing purposes. ORSANCO's assessment methodology is included in their Biennial Assessment of Ohio River Water Quality Conditions for 2012.

### **Excess filamentous algae**

Section 3.2.g of West Virginia Water Quality Standards specifically prohibits algae blooms which may impair or interfere with the designated uses of affected waters and section 3.2.h prohibits conditions that require an unreasonable degree of treatment for the production of potable water by modern water treatment processes as commonly employed.

#### *Greenbrier River*

In the past, the DEP has received a number of reports of excessive algal growth along certain sections of the Greenbrier River which made fishing and swimming in these 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. In-stream 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, substrate and the elevated levels of nitrogen and phosphorus– proved to be ideal for growth of filamentous algae. 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.

West Virginia does not currently 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 which has been attributed to anthropogenic phosphorous inputs. Based on these findings, the DEP assessed the Greenbrier River as impaired from its mouth upstream to mile point 102.7 (confluence of Beaver Creek) in the 2010 303(d) list. The existence of prohibited algal blooms continued to be documented in the summers of 2010 and 2011 and the Greenbrier River continues to be listed as impaired from its mouth to mile point 102.7.

#### *South Branch Potomac River and Cacapon River*

Over the past three years, DEP evaluated algal growth in the South Branch Potomac and the Cacapon rivers to determine the magnitude and extent of impacts to the designated uses of those waters. The evaluation documented seasonal non-attainment of designated uses due to excessive algal growth in segments of both rivers.

In the South Branch Potomac River between Moorefield and Romney and in the Cacapon River between Wardensville and Forks of Cacapon, algae were observed in amounts that may interfere with the water contact recreation designated use. At various locations within those reaches, algae covered the entire stream substrate and/or formed mats that covered large portions of the stream. Additionally, the City of Romney advised DEP that algal-related taste and odor in their finished drinking water required activated charcoal addition to control. That condition impairs/interferes with the public water supply designated use.

The DEP has determined the South Branch Potomac River to be impaired due to algal blooms from MP 23.7 (confluence with Johns Run) to MP 58 (confluence with South Fork) and the Cacapon River from MP 39 (confluence with North River) to MP 76 (Route 259 Bridge near Wardensville).

### **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, alternative designated uses, when knowledge of a specific pollutant source allowed clear distinction of impaired and unimpaired segments, or streams with multiple monitoring locations having different results. If data from multiple monitoring locations on a stream are available, any observed impaired condition is extended in both upstream and downstream directions until contradicted by an observed condition that indicates criterion attainment.

Segmentation based upon the limited amount of water quality monitoring data that is usually available may not accurately portray the extent of impairment and may contradict the ultimate findings of the TMDL that the listing mandates. The DEP believes the TMDL development process, which links 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.

## **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 36% 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 41% of West Virginia’s streams are impaired and fall into either Category 4 or 5.

The lists of Category 1, Category 2, and Category 3 waters are quite large; therefore, they are not published in this document. The waters included in these three categories can be viewed on DEP’s Web site, [www.dep.wv.gov](http://www.dep.wv.gov). Waters listed in category 4 are included in the supplements toward the back of this document in Supplemental B, and D sections. Category 5 waters are included in the document and is the 303(d) List.

Category 5 includes 1,176 impaired stream segments, covering approximately 6,027 stream miles that are impaired and need TMDLs developed. This number has decreased from 6,685 miles

Table 6 - 2012 Category Summary Report for West Virginia

LAKES					
Type	CATEGORY	# of lakes	% lakes	acres	% acres
Lake	1	27	20	533	2
Lake	2	47	36	6721	29
Lake	3	43	32	8357	35
Lake	4a	9	7	189	1
Lake	5	6	5	7756	33
	<b>TOTAL</b>	<b>132</b>	<b>100</b>	<b>23556</b>	<b>100</b>
STREAMS					
Type	CATEGORY	# of stream segments	% stream segments	miles of streams	% miles
Stream	1	1191	11	4380	14
Stream	2	861	8	2621	9
Stream	3	6533	57	11007	36
Stream	4a	1570	14	6562	21
Stream	4b	1	0	2	0
Stream	4c	34	0	31	0
Stream	5	1176	10	6027	20
	<b>TOTAL</b>	<b>11366</b>	<b>100</b>	<b>30630</b>	<b>100</b>

of impaired streams identified on the 2010 list. The decrease 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 Categories 1, 2 or 3 to Category 5.

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 list and the summary results of Table 8 and Table 9 provide an overview of the impairment status of West Virginia waters.

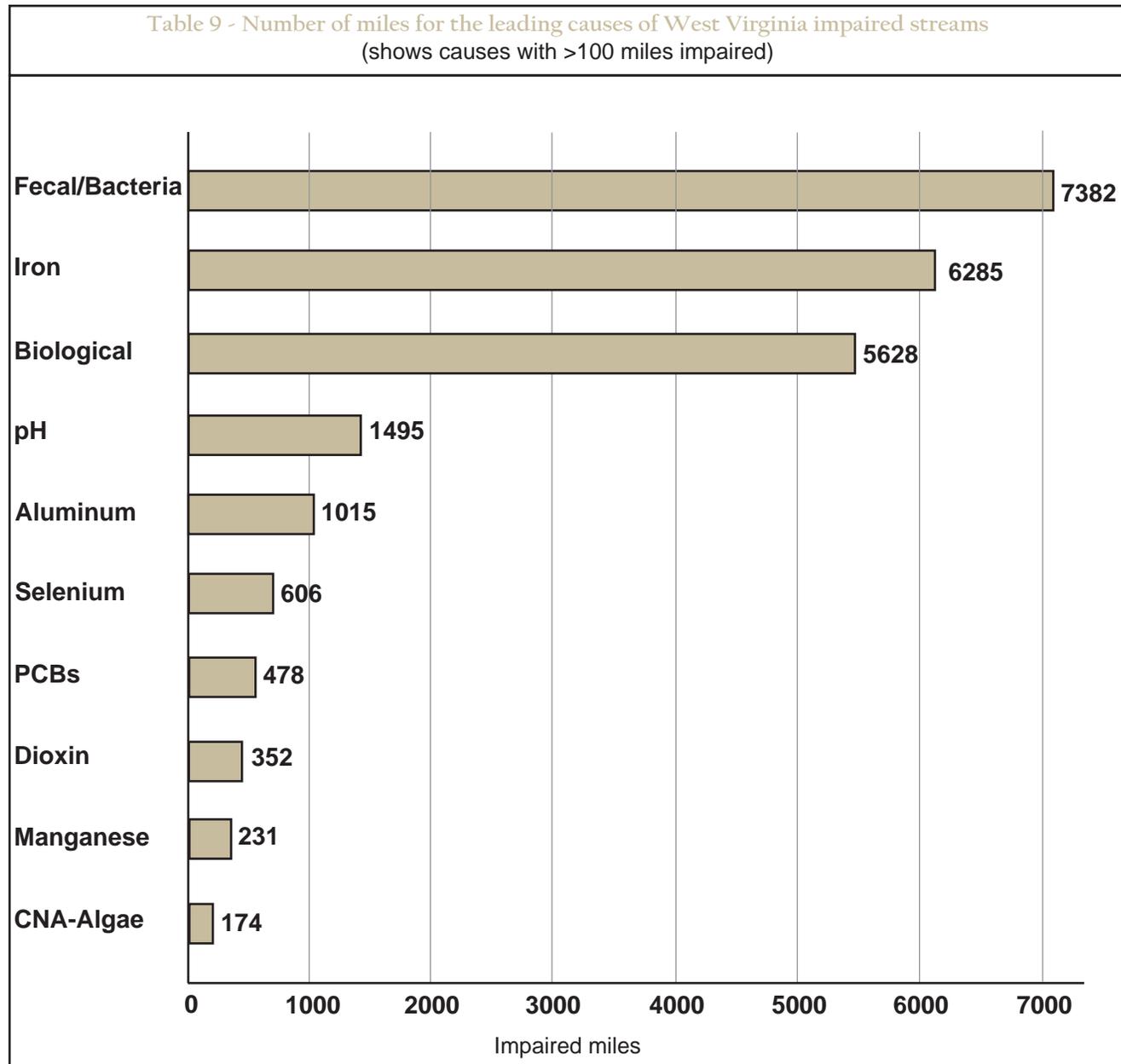
The most common impairments of West Virginia waters are:

- ↳ 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, selenium and/or manganese)
- ↳ PCB fish tissue contamination, and
- ↳ Low pH associated with acid rain

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	23556	33	25	862	4	53	40	16117	68	34	26	1730	7	12	9	4847	21
B1 - Warm Water Fishery	113	18219	26	23	838	5	44	39	15462	85	34	30	1730	9	9	8	189	1
B2 - Troutwater	19	5337	12	63	999	19	7	37	4338	81	0	0	0	0	0	0	0	0
C - Contact Recreation	132	23556	62	47	3405	14	26	20	10608	45	37	28	1783	8	7	5	7760	33
D - Agriculture and Wildlife	132	23556	71	54	8561	36	23	17	13209	56	37	28	1783	8	1	1	4	0
E -Industrial	132	23556	71	54	8561	36	23	17	13209	56	37	28	1783	8	1	1	4	0
<b>Total</b>	<b>132</b>	<b>23556</b>																
STREAMS																		
Designated Use	Number of Stream Segments	Size (miles)	Fully Supporting				Insufficient Data				Not Assessed				Not Supporting			
			#	%	Miles	%	#	%	Miles	%	#	%	Miles	%	#	%	Miles	%
A - Public Water	11363	30627	2198	19	8576	28	585	5	1131	4	6305	55	10583	35	2275	20	10337	34
B1 - Warm Water Fishery	10328	25618	1058	10	3768	14	1151	11	3340	13	6026	58	9937	39	2093	20	8573	33
B2 - Troutwater	1038	5012	367	35	2127	42	184	18	955	19	282	27	652	13	205	20	1278	25
C - Contact Recreation	11366	30630	2425	21	9259	30	693	6	1598	5	6499	57	10977	36	1749	15	8796	29
D - Agriculture and Wildlife	11365	30630	3929	35	16769	55	382	3	967	3	6511	57	10996	36	543	5	1898	6
E -Industrial	11366	30630	3929	35	16769	55	382	3	967	3	6512	57	10996	36	543	5	1898	6
<b>Total</b>	<b>11366</b>	<b>30630</b>																

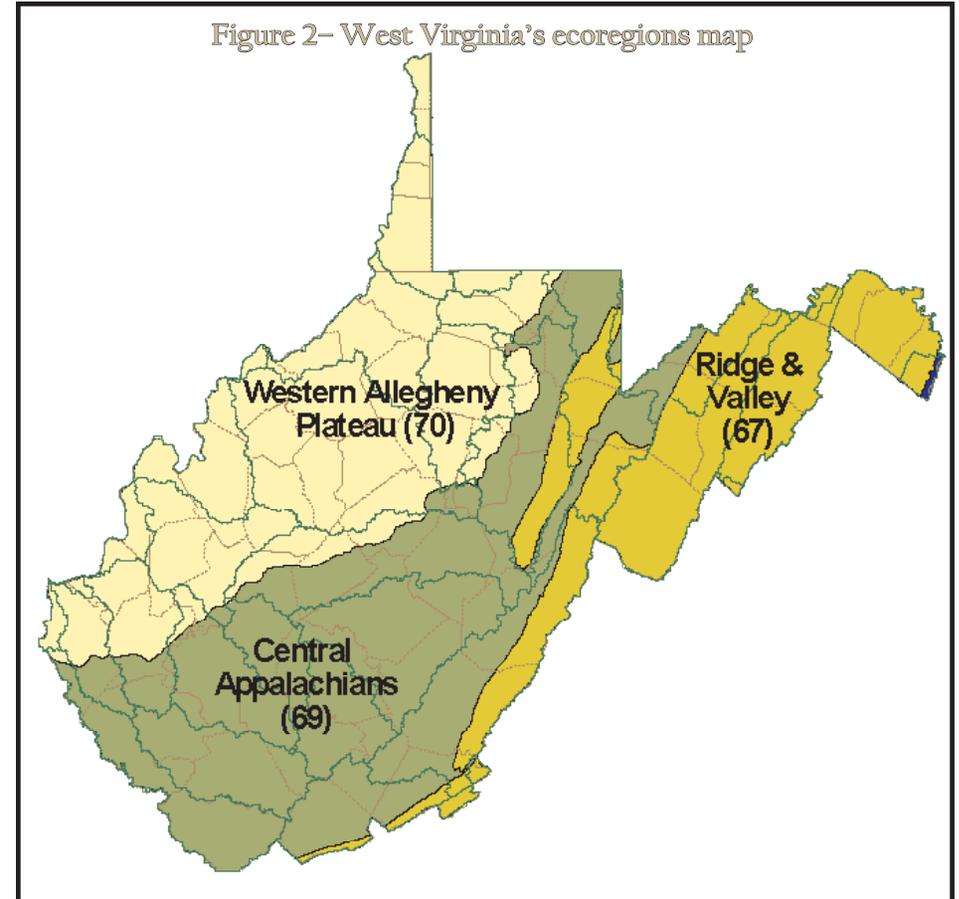
Table 8 - Summary of the causes for impaired streams		
TYPE	CAUSE	SIZE (acres)
Lake	Methylmercury	7126
Lake	PCBs	630
Lake	Sedimentation/ Siltation	189
Lake	Trophic State Index	96
Lake	Iron	54
Lake	DO	4
TYPE	CAUSE	SIZE (miles)
Stream	Fecal/Bacteria	7382
Stream	Iron	6285
Stream	Bio-Impairment	5628
Stream	pH	1495
Stream	Aluminum	1015
Stream	Selenium	606
Stream	PCBs	478
Stream	Dioxin	352
Stream	Manganese	231
Stream	CNA-Algae	174
Stream	Chloride	86
Stream	Low Flow Alterations	44
Stream	DO	34
Stream	Nitrite	13
Stream	Ammonia	5.4
Stream	Temperature, water	2.3
Stream	Lead	1.5



## Probabilistic Data Summary

The goal of DEP's probabilistic monitoring program is to provide statistically unbiased estimates of stream condition throughout a particular region (i.e., watershed, ecoregion or state) without assessing every stream mile in that region. This approach can be used to describe various aspects of stream condition including, the proportion of stream miles with biological impairment, the proportion of stream miles with specific water quality criterion violations, and the characterization of the relative importance of stressors such as sedimentation or acid precipitation. The probabilistic design used for this summary allows DEP to characterize overall water quality conditions at an ecoregional (Omernik Level III) scale in addition to providing estimates of conditions statewide. Probabilistic assessment sites were distributed within the three major ecoregions in West Virginia: the Western Allegheny Plateau (70), Central Appalachians (69), and Ridge and Valley (67). Due to its small extent in West Virginia, the Blue Ridge Mountain Ecoregion (66) was combined with Ecoregion 67 for assessments and data analysis.

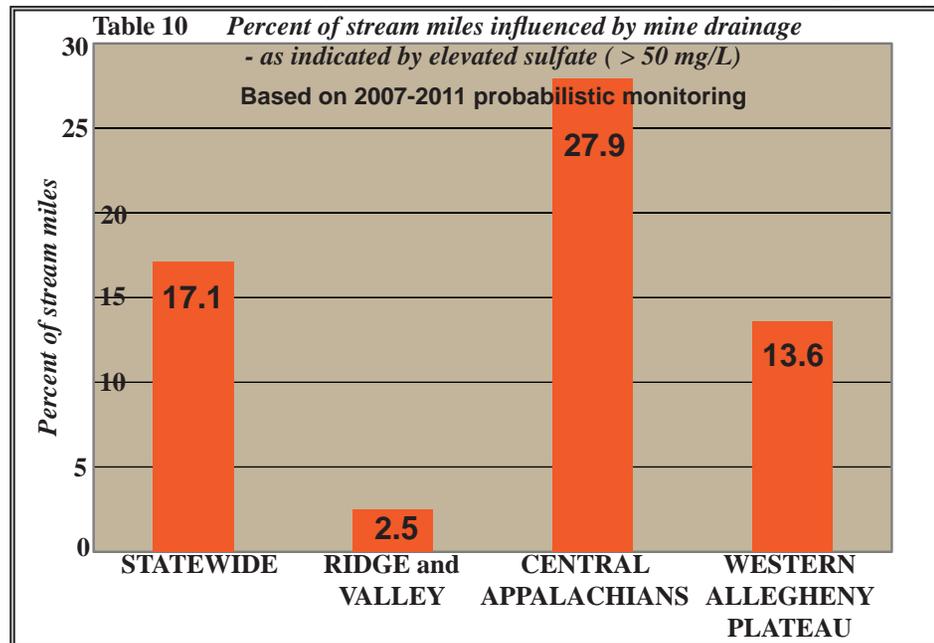
In 2011, West Virginia completed its third 5-year cycle of probabilistic monitoring. The target population for this effort was all flowing wadeable streams and rivers (1st - 4th Strahler order size class) using USGS's 100k NHD Plus as the sample frame. Based on this sample frame, West Virginia has 31,912 miles of streams (excluding the Ohio River), with approximately 30,231 miles in the 1st-4th order size class. Of these, an estimated 26,337 miles of streams statewide are in the target population from which data for this summary were obtained (Ridge and Valley = 5,860 miles; Central Appalachians = 10,925 miles; and Western Allegheny Plateau = 9,552). The DEP is currently preparing for a fourth cycle of monitoring ambient conditions using the Probabilistic Method. This report summarizes the data from all five years of the third cycle (2007 – 2011). Approximately 26 sites were sampled within each ecoregion every year from 2007 - 2011, resulting in 130 samples per ecoregion at the end of five years. This level of



effort allows for estimations of stream condition across the state with a high degree of confidence. Additionally, this summary includes results from the second cycle (2002-2006), allowing for basic temporal observations between time frames. Comparisons between probabilistic results in this Integrated Report (2012) to previous reports, with the intent to derive temporal trends, are not appropriate because previous reports used data from a time frame that spanned two cycles. For the stream condition indicators discussed below, values in brackets ([xx.x]) are results from the second cycle (2002-2006).

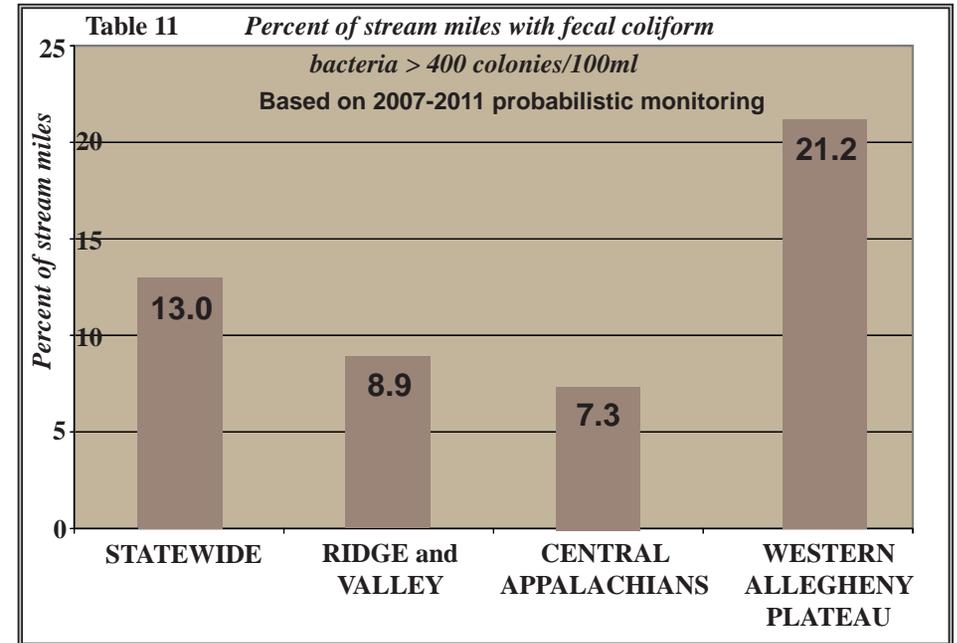
## Mine drainage

Streams receiving mine drainage 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 background levels. A sulfate concentration greater than 50 mg/L was used to identify probabilistic sites influenced by mine drainage. Following this guideline, approximately 17.1% [18.1%] 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 27.9% [27.2%] of the stream miles in the Central Appalachians are influenced by mine drainage. Contrastingly, about 2.5% [6.7%] and 13.6% [13.3%] of stream miles are influenced by mine drainage in the Ridge and Valley and Western Allegheny Plateau, respectively. Based on a 95% confidence interval, the % of stream miles influenced by mine drainage has not changed significantly between cycle 2 and cycle 3 on a statewide scale or ecoregionally.



## Bacterial contamination

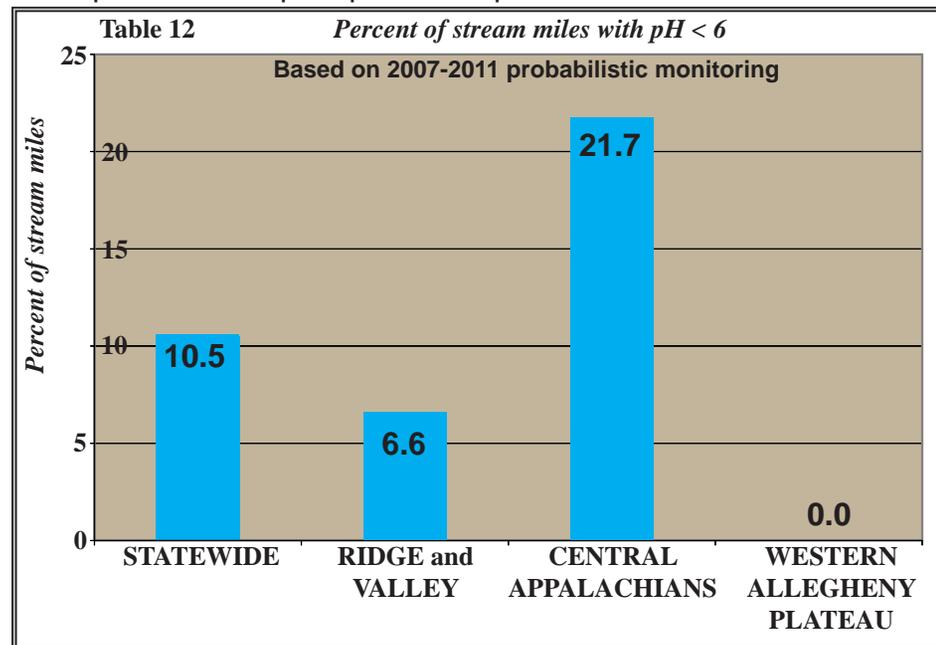
Many West Virginia streams contain elevated levels of fecal coliform bacteria. Contributors to the problem include leaking or overflowing sewage collection systems, illegal homeowner sewage discharges by straight pipes or failing septic systems, and runoff from urban or residential areas and agricultural lands. Based on probabilistic data, about 13.0% [17.1%] 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. Among ecoregions, the proportion of stream miles violating the criterion was highest in the Western Allegheny Plateau with 21.2% [22.7%] of stream miles exceeding the criterion. The proportion of stream miles exceeding the criterion was somewhat lower in the Central Appalachians at 7.3% [13%] and Ridge and Valley Ecoregions at 8.9% [15.3%]. It should be noted that DEP's probabilistic monitoring is performed at baseflow conditions. Because samples are not collected during storm runoff events, bacteria levels that may increase under these higher flow conditions are not represented in the results. A



modest decrease in the percentage of stream miles exceeding the criterion was evident between the two cycles in both the Central Appalachians and Ridge and Valley Ecoregions. However, confidence intervals did not indicate a significant change between cycles on an ecoregional or statewide scale.

### Acidity

Aquatic life communities in the headwater sections of many West Virginia streams continue to be impacted by low pH, and thus, 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 potentially more severely) by acid mine drainage. An evaluation of probabilistic data indicates that approximately 10.5% [8.3%] 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 21.7% [17.4%] of the stream miles within this area. Specifically, the Forested Hills and Mountains section of this ecoregion are largely susceptible to acid precipitation 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 6.6% [3.4%] of the stream miles in this ecoregion are impacted by acidic conditions. Although present, the extent of stream miles impacted by acidic waters within the Western Allegheny Plateau Ecoregion is near 0% [0.3%]. In fact, their proportion to the overall size of the total population of stream miles is insignificant enough to result in no acidic stream miles based on this cycle's probabilistic analysis. Again, this ecoregion has well buffered soils that limit the impacts of acid precipitation. Furthermore, where they do exist in this ecoregion, acidic waters are more likely the result of acid mine drainage than acid precipitation. Based on confidence intervals, there were no significant changes in the proportion of acidic waters between cycles for ecoregions or the entire state.

### 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 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 parameters 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 – max score 200 pts.) were categorized as good, fair, or poor (Table 13). Based on probabilistic data, about 17.7% [21.5%] of stream miles statewide have good habitat quality (total RBP score of 160 or greater), 68.9% [67.9%] of stream miles have fair habitat quality (110–159), and 13.4% [10.6%] of stream miles have poor habitat quality (< 110). While

these categorical thresholds are somewhat arbitrary, they do provide a good comparison of habitat conditions between two or more geographic areas. Based on confidence intervals, there was not a significant change in overall habitat quality on a statewide scale between cycle 2 and 3.

The Ridge and Valley had the highest proportion of stream miles rated in the good category for overall habitat quality at 36.3% [35.3%]. Additionally, this ecoregion had the least number of stream miles rated as poor for overall habitat quality at only 3.9% [4.2%]. There was almost no change in habitat quality in this ecoregion between cycle 2 and cycle 3.

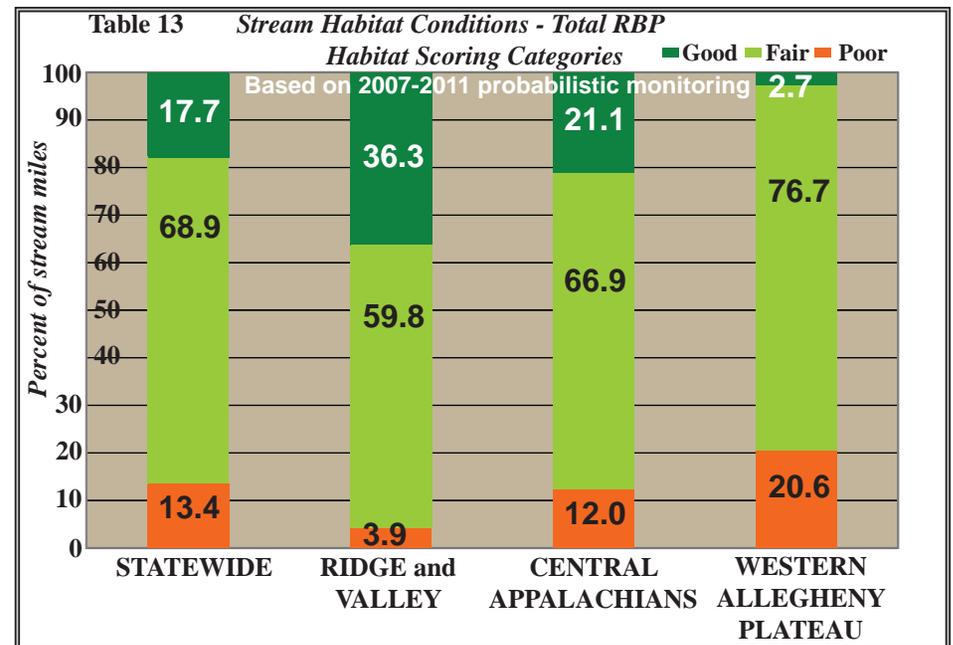
The Central Appalachians Ecoregions ranked second in the state for the proportion of stream miles rated as good for overall habitat quality with a value of 21.1% [31.4%]. Although not significant based on confidence intervals, there was a notable decrease between cycle 2 and 3 in the proportion of stream miles with good habitat. A corresponding change was evident in the proportion of stream miles rated as poor with the percent increasing from 4.5% in cycle 2 to 12.0% in cycle 3. Confidence intervals for the two cycles indicated a significant increase in the percent of stream miles having poor habitat quality within this ecoregion.

In comparison to the other ecoregions, 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 2.7% [3.0%] of its stream miles being rated as good in overall habitat quality. Additionally, the proportion of stream miles with poor habitat quality 20.6% [20.9%] is substantially higher in this ecoregion. There was almost no change in habitat quality in this ecoregion between cycle 2 and cycle 3.

It is important to consider that approximately 82.3% [78.5%] of stream miles in the state are in the fair or poor habitat categories. This indicates that most of the state's stream miles have at least

some degree of habitat degradation.

Although DEP may gain insight into overall habitat conditions by combining the individual measures, it is useful to examine specific habitat characteristics. Sedimentation is one of the most important problems facing West Virginia streams. 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 the eggs of aquatic life. The categories used to rate the individual habitat characteristics are labeled as good, fair, and poor (as with the Total RBP Habitat above). Sedimentation results for the state as a whole indicate that 42.1% [40.6%] of stream miles are in poor condition, 38.9% [41.8%] of stream miles are fair, and 19% [17.5%] of stream miles are in good condition (Table 13). As with the overall habitat scores, the widespread impacts of sedimentation in West Virginia are apparent in that over 81% [82.4%] of the wadeable streams miles in the state score below



the good category. Confidence intervals for the statewide analysis do not indicate a significant change in sedimentation rates between cycle 2 and 3.

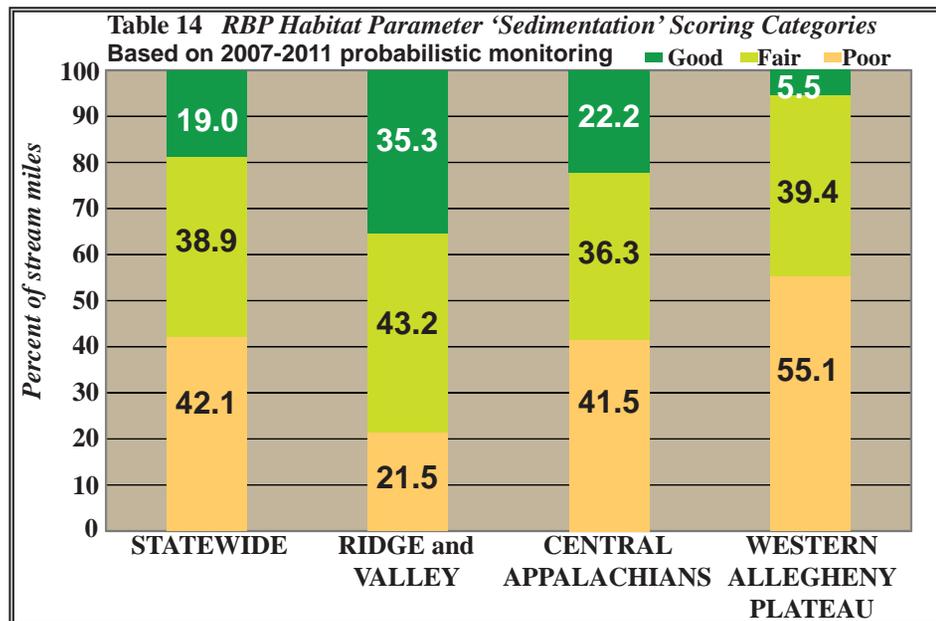
The Ridge and Valley Ecoregion is better than both the Central Appalachian and the Western Allegheny Plateau Ecoregions with respect to sedimentation. In the Ridge and Valley ecoregion, 35.3% [35.8%] of stream miles are in good condition and 21.5% [18.1%] are in poor condition. Results for the Central Appalachians indicated higher sedimentation rates than for the Ridge and Valley Ecoregion, but lower than the Western Allegheny Plateau, with 22.2% [20.0%] of stream miles in good condition and 41.5% [41.3%] 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, 5.5% [5.4%] of stream miles in this ecoregion are in good condition and 55.1% [51.3%] of stream miles are in poor 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. Confidence intervals for the ecoregional analysis do not indicate a significant change in sedimentation rates between cycle 2 and 3.

### Biological integrity

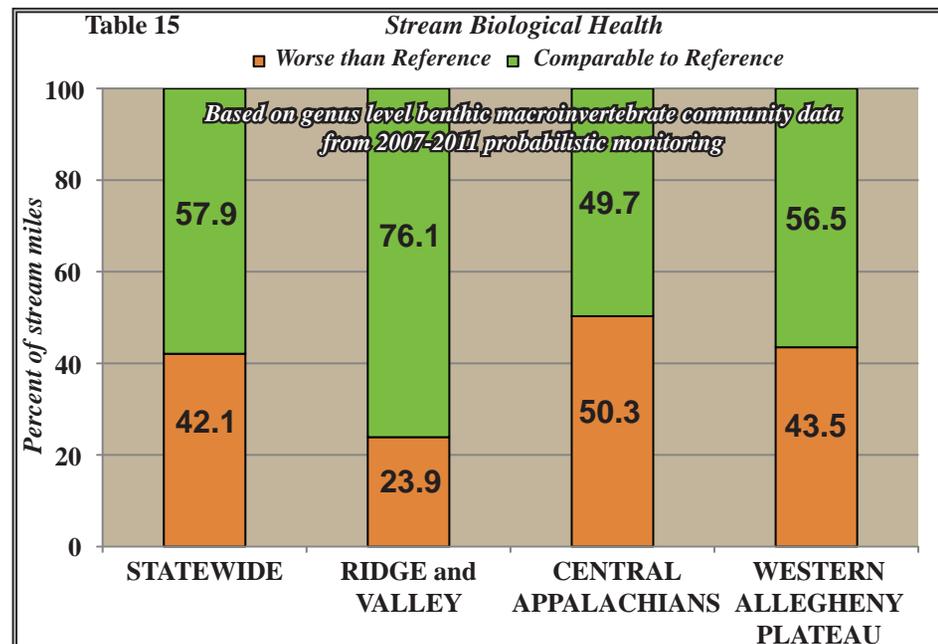
The biological communities living in West Virginia streams are exposed to many stressors, including toxic contaminants, sedimentation, nutrient enrichment, and acid precipitation. The DEP uses benthic macroinvertebrates to assess the biological condition of streams in the state. These organisms provide reliable information on water and habitat quality in streams and have been used as indicators all over the world for nearly 100 years. They are extremely diverse and exhibit a wide range of tolerances to pollutants. Further, they serve as an excellent tool for measuring overall ecological health, especially when summarized into a single index of biological integrity. In West Virginia prior to 2012, the health of benthic macroinvertebrate communities had been rated using a statewide family level multimetric index developed for use in wadeable riffle/run streams, the West Virginia Stream Condition Index (WVSCI). Beginning in 1998, DEP started identifying benthic macroinvertebrates to genus level with the intention of eventually developing a new biotic index. Development of a genus level index is now complete. The new tool, known as GLIMPSS (Genus Level Index of Most Probable Stream Status), which is stratified by season and ecoregion, has now been peer reviewed and published and is ready for use in this summary report. However, the new index is not yet ready for use in determining attainment of a stream's Aquatic Life Use (AQL). Because of actions taken during WV's 2012 legislative session, the DEP has been left without a usable tool for determining AQL use attainment for this reporting cycle. Work is ongoing to develop and evaluate options for assessing stream health more "holistically", specifically considering the use of fish community information along with benthic macroinvertebrate index scores as part of the assessment methodology.

GLIMPSS, similar to WVSCI and other indices of biotic integrity,



summarizes scores of various metrics into a single index value. The metrics were selected to maximize discrimination between streams with known stressors and reference streams. Reference streams have little or no human disturbances. All identified reference streams were combined and a subsequent reference condition was established based on their benthic macroinvertebrate communities.

Based on the probabilistic data utilized in this summary and a comparison to low-end reference condition (5th percentile of all appropriate (season and ecoregion) reference sample GLIMPSS scores), 57.9% of wadeable stream miles are comparable to reference condition statewide with the remaining 42.1% scoring less than this threshold. Breaking this down by ecoregion, the Ridge and Valley ecoregion has the highest percentage of streams with healthy aquatic ecosystems, with 76.1% scoring above the 5th percentile threshold. The Western Allegheny Plateau ecoregion is estimated to have 56.5% of stream miles comparable to reference which is a greater percentage than estimated in the past (42.5%) when based on WVSCI. The percent of stream



miles in the Central Appalachians that score above the GLIMPSS threshold is estimated to be 49.7% which is somewhat lower than previous estimates (65.3%) that had been derived based on WVSCI.

## Major Basin Summaries

### Dunkard Creek

The DEP completed, and the EPA approved, Total Maximum Daily Loads for iron, fecal coliform, chloride and biological impairment related to sediment in September 30, 2009. The fish kills that occurred in the fall of 2009 were a new development caused by toxins associated with a golden algae (*Prymnesium parvum*) bloom.

Since 2009, DEP has continued monitoring in the Dunkard watershed. In addition to the ambient monitoring station located on Dunkard Creek, DEP has deployed water quality sondes at four in the watershed: one at the ambient site at Mason-Dixon Park; two on West Virginia Fork; and another on Miracle Run.

DEP collected water samples from several sites in Dunkard Creek and surrounding watersheds to analyze for the presence of golden algae in the months following the fish kill and again during the 2010 growing season. Additionally, a private consultants have collected weekly samples from many sites throughout the watershed and beyond for golden algae analysis by an independent lab since 2009. There have been no confirmed reports of golden algae in West Virginia since the bloom on Dunkard Creek ended in late 2009 or early 2010. Earlier reports of golden algae being present in other West Virginia streams, based on sensitive analytical methods, are now thought to have been 'false positives' with samples being contaminated at some point during the sample collection, filtering, or analytical process.

## **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. Upper Guyandotte also has four streams listed for fecal coliform impairment. Additionally, five streams in the Lower Guyandotte and 14 streams in Upper Guyandotte watershed are listed for selenium, and R. D. Bailey Lake is listed for PCBs based on fish tissue monitoring.

## **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.

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.

DEP recently received EPA approval for TMDLs developed for all tributaries of the Lower Kanawha River and the mainstem Elk River and all tributaries from the outlet of Sutton Dam to its confluence with the Upper Kanawha River. Impairments addressed included dissolved aluminum, dissolved oxygen, fecal coliform bacteria, pH, total iron, total selenium and biological integrity. Selected tributaries of the Lower Kanawha and Elk Rivers slated for TMDL development efforts to be completed by 2014 will remain listed for biological impairment due to recent legislative changes. As previously noted in this report, Senate Bill 562 resulted in a change of schedule for the state's TMDL efforts for these waters until a new stream assessment methodology for biological impairment is developed and presented to the state legislature for their review.

Fecal coliform TMDLs have been developed for the major tributaries of the Kanawha River including the Elk, Coal, New and Greenbrier Rivers. The Bluestone River TMDL also addressed the biological impairment documented from river mile 44.9 to headwaters, however, the Bluestone River remains listed for its entire length based for PCBs. The Lower Kanawha mainstem remains listed as impaired for fecal coliform. In addition, the Kanawha River mainstem remains listed as impaired because of fish consumption advisories related to elevated fish tissue concentrations of Polychlorinated Biphenyls (PCBs).

## **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 for the Monongahela River (entire length) and the Tygart Valley River (entire length). The West Fork River (mouth to Stonewall Jackson Lake Dam) is listed as impaired for both fecal coliform and

biological integrity and from RM 93 to RM 100.2 for fecal coliform bacteria. The previous listing for PCBs has been removed due to new data indicating no impairment. Both Cheat and Tygart Lakes have also been delisted for PCBs based on new fish tissue data.

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. Water quality sampling and biological assessments were conducted on all tributaries with known or suspected impairments from July 2009 through June 2010. TMDL model development is currently underway for all impaired Monongahela tributaries. The DEP expects to submit the TMDLs to the EPA for approval by Spring 2013.

On July 27th, 2010, the DEP held a public meeting to provide an opportunity for public review and input for the proposed TMDL sampling plans for the West Fork Watershed. In the same month, DEP began a 12 month sampling project in support of TMDL development. Upon completion of sampling in June 2011, TMDL model development began with draft TMDLs expected to be submitted to EPA the first quarter of 2014.

### **Cheat River**

The DEP and the EPA began a large-scale revision of the Cheat River watershed TMDLs that the EPA first developed in 2001. This effort resulted in finalized TMDLs approved by EPA in December 2010. The revision involved 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. In addition to the re-evaluation component, the new effort developed TMDLs for streams in the watershed where fecal coliform bacteria and/or biological impairments have been identified. Both DEP and DNR have established water quality improvement projects throughout the watershed designed to improve water quality. DEP efforts included installation of

several AMD restoration projects within the watershed and 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. These efforts have restored many miles of trout water and pH data at the head of Cheat Lake has consistently indicated significant improvement with no violations of pH for the last six years.

### **Little Kanawha River**

The segment of the river from Burnsville Dam (river mile 132.6) downstream to the mouth is impaired by fecal coliform. 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 June 2008 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.

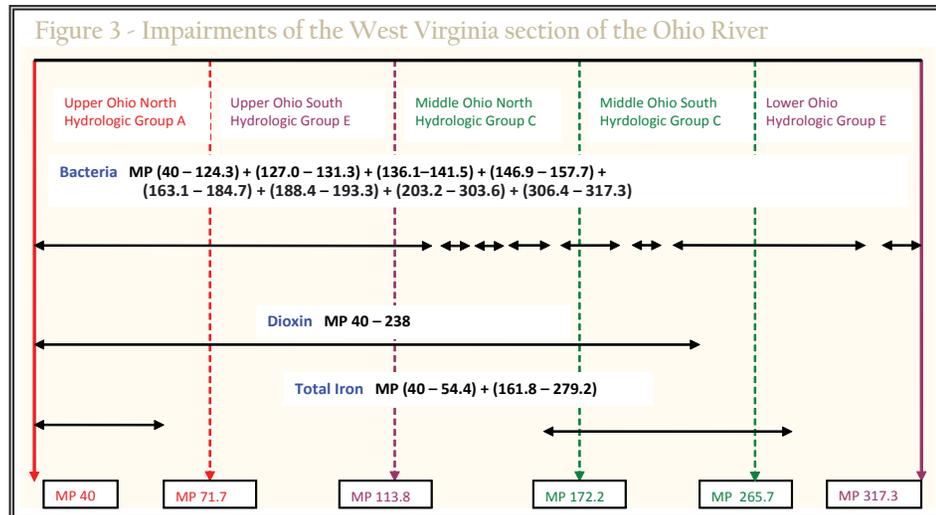
### **Ohio River**

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.

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, segments of the river continue 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. Total iron, total aluminum, total manganese and pH TMDLs were also developed for 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 of the total aluminum and manganese TMDLs. Currently, the Tug Fork mainstem is identified on the 2012 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 27.5 to the headwaters. Many tributaries of the Tug Fork are listed for various types of impairments including fecal coliform, biological integrity and selenium.

## Interstate Water Coordination

### PCB monitoring and TMDL development with Virginia

DEP has been working with the Virginia Department of Environmental Quality (VADEQ) 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. West Virginia DEP, Virginia 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, if any, need to be taken in the future.

### Ohio River Valley Water Sanitation Commission - ORSANCO

As with previous reports, the DEP's 2012 Integrated Report includes assessments based on data provided by ORSANCO. Throughout the development of ORSANCO's 2012 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 nutrient and sediment load reductions.

In November 2005, West Virginia proposed pollutant reduction plans in the West Virginia Potomac Tributary Strategy. In December 2010, EPA finalized TMDLs for the Chesapeake Bay and other impaired tidal waters in Virginia and Maryland.

In response to the TMDLs, West Virginia and the other Bay jurisdictions developed Watershed Implementation Plans (WIPs). The West Virginia WIP identifies actions and controls that the State will pursue to implement the TMDLs, and West Virginia will accomplish its TMDL responsibilities if the WIP is successfully executed. Many DEP programs are actively participating in this effort. The West Virginia WIP and supporting documents may be viewed at: <http://www.wvca.us/bay/documents.cfm>

### **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 Ohio River Basin Water Resources Association was dissolved in 2010. A former Association member now resides on ORSANCO's Water Resources Committee in a continuing effort to represent the issues of concern to the Association.

## **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 the Camp Creek portion of the Twelvepole Creek watersheds in 2009 fulfilled the last of 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 2012, 2013 and 2014 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 are 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 16 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 16 - West Virginia TMDL development progress

Hydrologic Group	Watersheds	Progress
A3	South Branch of Potomac Upper Kanawha Upper Ohio North	Pre-TMDL sampling completed in June 2012.
B2	Elk Lower Kanawha North Branch of the Potomac	U.S. EPA approved in 2012
B3	Tygart Valley	Pre-TMDL monitoring in progress from July 2012 thru June 2013.
C2	Middle Ohio North Middle Ohio South	Submitted for U.S. EPA approval in 2012.
D2	Monongahela	TMDL modeling and development ongoing.
E2	West Fork	TMDL modeling and development ongoing.

## Water Pollution Control Programs

### **Division of Water and Waste Management**

The Division of Water and Waste Management's mission is to preserve, protect, and enhance West Virginia's watersheds for the benefit and safety of all its citizens through implementation of programs controlling hazardous waste, solid waste and surface and groundwater pollution, from any source.

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 2009 and ending in June 2011. (Need to add new graphic from Permits)

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

## West Virginia Department of Environmental Protection - Division of Water and Waste Management - Report Date 11/14/2012

NPDES PERMITTING	- PERMIT ACTION REPORT (7/1/2009 - 6/30/2011)											
	Applications Recieved This Period	Applications Denied this Period	Permits Registrations and Modifications Issued This Period	Permits Registrations and Modifications Issued Year-to-Date for Current Fiscal 2013	Withdrawn and Voided This Period	Applications Pending as of 6/30/2011					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	203	0	194	46	10	12	12	29	53	20	155	169
<b>GENERAL PERMITS</b>												
Home Aeration Units	2697	4	2566	89	13	25	29	144	198	145	89	99
Sewage General	758	0	332	22	9	204	78	148	430	272	131	140
Storm Water Construction	1105	0	1062	219	47	1	1	64	66	3	32	38
All Others	915	2	1244	178	30	6	2	79	87	52	75	95
MODIFICATION PERMITS	583	2	460	94	43	39	18	101	158	59	74	85
TRANSFER PERMITS	158	0	120	51	23	4	5	35	44	14	55	60
<b>TOTAL - PERMITS</b>	<b>6419</b>	<b>8</b>	<b>5978</b>	<b>699</b>	<b>175</b>	<b>291</b>	<b>145</b>	<b>600</b>	<b>1036</b>	<b>565</b>		
<b>NOTE:</b> The permits used to calculate for the “Average DEP Time” column are those that were submitted after June 30, 1999, when IRIS was deployed by the Division of Water and Waste Management												

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 27 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, DEP's Groundwater Program is responsible for compiling and editing information for a biennial report to the Legislature on the status of the state's groundwater and groundwater management program. 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 current biennial report to the Legislature covers the period from July 1, 2009 through June 30, 2011. Copies of the report "Groundwater Programs and Activities: Biennial Report to the West Virginia 2012 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/WWE/Programs/gw/Documents/2012\\_Biennial\\_Report.pdf](http://www.dep.wv.gov/WWE/Programs/gw/Documents/2012_Biennial_Report.pdf).

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.

### **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 their regulatory activities - Environmental Resources Information System (ERIS) and Applicant Violator System (AVS, the federal OSM 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.

## 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 Division of Water and Waste Management that provide funding for water quality improvements and a summary of the funds dispersed between July 2009 and June 2011 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 technical 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 and project

engineer. 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 2009 through June 2011, 50 wastewater treatment facility loans totaling \$155,563,307 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 2009 through June 2011, nine nonpoint source agriculture BMP loans totaling \$353,145 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 2009 through June 2011, a total of \$350,000 was provided for onsite systems.

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 May 11, 2012 through June 26, 2012. This period included a 15-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

Table 17 - 2012 Section 303(d) List Commenters		
Argus Energy WV, LLC	Patriot Coal	Appalachian Mountain Advocates
CONSOL Energy	Duke University	Baylor University
American Electric Power	West Virginia Coal Association	West Virginia Department of Agriculture
West Virginia Municipal Water Quality Association	Patriot Coal	

comments and made adjustments to the list where appropriate.

Table 17 identifies all entities that provided comments. All relevant 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.

***Numerous and opposing comments were received in response to the agency's approach to listing biological impairments pursuant to the narrative water quality criterion at 47 CSR 2-3.2.i. as directed by Senate Bill 562, which passed the West Virginia Legislature in March 2012.***

***Multiple commenters endorse not adding new biological impairments and also request delisting of all biological impairments that were based upon the West Virginia Stream Condition Index (WVSCI). Arguments include:***

- ***The legislative intent expressed in S.B 562 makes clear that DEP cannot base biological impairment solely on WVSCI.***
- ***Previous biological impairment listings were based upon an illegitimate assessment tool.***
- ***Comments provided in response to the 2010 West Virginia Section 303(d) List regarding the use of WVSCI were reiterated.***
- ***Various stream-specific comments addressing biological impairments were received. Some endorsed delistings proposed in the draft 303(d) list and others requested delisting based upon new biological monitoring and application of the WVSCI methodology***

***Another commenter contends that DEP's interpretation and implementation of Senate Bill 562 is incorrect and that DEP must continue to use the same or an equally protective***

***approach to list biologically impaired streams that it used prior to the passage of S.B. 562. Arguments include:***

- ***S.B. 562 constitutes a change to West Virginia's water quality standards, and new or revised water quality standards cannot be implemented until approved by the EPA.***
- ***S.B. 562 did not accomplish the Clean Water Act requirements for public participation, certification, and submission to EPA that are necessary to secure approval of a water quality standard revision.***
- ***S.B. 562 includes language that mandates new rules not reduce existing protections and does not allow the use of measurements that would establish less protective standards or requirements.***

***Multiple commenters stated that the DEP should not only add new biological impairment listings, but also include more waters than those that would be impaired using WVSCI protocols.***

- ***Two commenters object to the use of the "gray zone" methodology and state DEP should list all waters with WVSCI scores less than 68. They argue that downgrading the impairment threshold based on precision estimates is inappropriate and that the use of a "gray zone" is inconsistent with the precautionary principle that should be applied when dealing with protective water quality standards.***
- ***One commenter stated that biological impairment assessments should be based upon genus level benthic macroinvertebrate analysis under the Genus Level Index of Most Probable Stream Status (GLIMPSS) index because EPA approval of the West Virginia 2010 Section 303(d) List was conditioned upon genus level analysis in 2012.***

The DEP interprets SB 562 as a mandate to secure prior Legislative approval of the assessment methodology under which DEP will make impairment decisions pursuant to the narrative criterion at 47 CSR 2-3.2.i. For that reason, new "biological impairment" listings are not included on the 2012 303(d) list.

Prior 303(d) listings will not be vacated in the interim, because they were made using a methodology that was valid at the time those impairments were determined. The DEP has eliminated the few biological impairment delistings proposed in the draft list. Biological impairments from the 2010 303(d) list are retained, except those for which an approved TMDL has been developed and those for which the original sampling effort has been deemed noncomparable. Other listings will remain until biological conditions can be assessed using a methodology approved by the West Virginia Legislature. The DEP is currently in the process of developing such a methodology.

The provisions of SB562 do not constitute a revision to West Virginia's water quality standards ("WQS") and, therefore, are not subject to review by the federal Environmental Protection Agency ("EPA"). As an initial matter, the statute as amended merely gives DEP the authority to propose legislative rules and does nothing to change West Virginia's EPA-approved WQS, which are set forth in West Virginia's Code of State Rules at 47 C.S.R. 2. The statute as amended specifically states, "The secretary shall propose rules measuring compliance with the biologic component of West Virginia's narrative water quality standards. . . . The secretary shall propose rules for legislative approval in accordance with the provisions of [W. Va. Code § 29A-3-1, et seq.] that implement the provisions of this subsection." W. Va. Code § 22-11-7b(f) (SB562 2012). The remainder of the language in the statute does nothing to change West Virginia's WQS as they existed the day before the bill passed, it merely gives direction to DEP on the parameters for the rule it may propose at some future date.

Further, that language giving the DEP direction on the future rule is also not a revision to West Virginia's WQS subject to approval or disapproval by EPA. In support of this determination, DEP relies on EPA's own approach for determining what is or is not a revision to a WQS. Specifically, the DEP engaged in a two-part analysis, considering (1) whether the provision related

to an attainment decision; and, if so, (2) whether the provision defined, changed or established the magnitude, duration or frequency related to water quality criteria necessary to support a designated use. See, *Florida Clean Water Network, Inc. v. United States Environmental Protection Agency*, 2012 U.S. Dist. LEXIS 44539 (U.S.D.C. N.D. Fl, 3/30/12). DEP found that the statute as amended does not affect attainment decisions made by it, because the language does not serve to define, change or establish the level of protection to be applied in those attainment decisions or affect existing standards implemented pursuant to the West Virginia Water Pollution Control Act, W. Va. Code § 22-11-7b. *Id.* Rather, the amended statute merely describes the sufficiency or reliability of information necessary for West Virginia to make an attainment decision; it does not change a level of protection and, thus, merely outlines methodologies, as contemplated by Section 303(d) of the federal Clean Water Act. *Id.* Instead, the language sets out the circumstances that must exist in order for West Virginia to make an attainment decision in the first instance and contains policy choices . . . but does not describe the condition of the water body assessed. *Id.*

Specifically, the statute as amended outlines these conditions that must exist in order for DEP to make an attainment decision:

(i) [the water body] must "support[] a balanced aquatic community that is diverse in species composition; (ii) contain[] appropriate trophic levels of fish, in streams that have flows sufficient to support fish populations; and (iii) the aquatic community is composed of benthic invertebrate assemblages sufficient to perform the biological functions necessary to support fish communities within the assessed reach, or, if the assessed reach has insufficient flows to support a fish community, in those downstream reaches where fish are present.

W. Va. Code § 22-11-7b(f) (SB562 2012). These conditions do not relate to the ambient condition in the water body, i.e. what level of

pollutant (or pollutant indicator) may be in the water body before determining that the water body is not meeting all applicable WQS; instead, they relate to the information necessary to conduct an attainment decision pursuant to Section 303(d) of the CWA and its implementing federal regulation, 40 C.F.R. § 130.7(b)(5)-(6), and as such, do not constitute WQS. Accordingly, EPA has no duty to review the subject amended statute. *Fl. Clean Water Network, supra.*

***It was recommended that DEP not identify impairments of numeric criteria for public water supply and water contact recreation designated uses based upon a single exceedance.***

In the Draft 2012 Section 303(d) list, the listing methodology for numeric criteria were described in the Use Assessment Procedures section, beginning on page 6 of the document, and in Table 3 on page 6. Under the described methodology, a single exceedance as described in the comment would not result in a listing.

***Two commenters recommended that DEP use a “weight of evidence” approach rather than “independent applicability” when assessing the Ohio River relative to the numeric total iron criterion for the protection of the aquatic life use. The commenters contend that the Ohio River aquatic life use is not impaired. One suggested that DEP embrace ORSANCO’s use of a weight of evidence approach. Another pointed out that EPA guidance does not preclude use of a weight of evidence approach and that such an approach has been used in other states and EPA regions.***

Note that West Virginia Water Quality Standards include numeric criteria for total iron for both the aquatic life protection and public water supply designated uses. Assessment was based upon all water chemistry data reported by ORSANCO in its “Biennial Assessment Report of Ohio River Water Quality Conditions” for 2007 – 2011. ORSANCO’s report includes not only samples collected at West Virginia lock and dam sites but also data collected by Pennsylvania DEP at sites in Sewickly, Pennsylvania

and East Liverpool, Ohio with violation rates of 25% and 27%, respectively. In addition, the DEP’s listing methodology is point-rather than pool-based, and impairment at a point is extended both upstream and downstream to sites with unimpaired water quality or state boundaries. The data associated with the 2012 list indicates a decreasing trend in the number of iron violations in the river and the listed lengths are significantly less than those identified in 2010. However, the available data still indicate points with violation rates exceeding the 10% listing threshold and associated impaired segments.

ORSANCO is an interstate agency dealing with water quality standards from many different states and, as such, attempts to reconcile differing state and regional standards and protocols as much as possible. Although ORSANCO publishes a biennial 305(B) report addressing overall water quality in the Ohio River mainstem and selected major tributaries, it is not required to publish a 303(d) List nor is its methodology required to be scrutinized by EPA. Although other EPA Regions have accepted a “weight of evidence” approach, Region III has made it clear in both previous listing cycles and communications regarding the 2012 listing cycle that “independent applicability” is the only acceptable course of action for 303(d) listing purposes.

The 2012 Draft 303(d) listings are based on the currently effective West Virginia water quality criteria for total iron and the assessed data clearly indicate locations with a greater than 10% rate of exceedance. Whereas ORSANCO has the discretion to base 305(b) aquatic life use support decisions using its fish index, the DEP cannot conclude that all forms of aquatic life are protected. Furthermore, the condition of aquatic life cannot be used to rationalize assessment of a criterion prescribed for protection of the public water supply designated use.

***Removal of the draft selenium listing for Conner Run (WVO-77-A) was requested. The commenter stated that Connor Run is an effluent dominated stream, with little watershed***

**contribution below an NPDES permitted discharge. A site-specific selenium criterion has been granted in the West Virginia Water Quality Standards and discharge monitoring data was provided that demonstrates consistent compliance with the criterion since 2008.**

The draft listing was based on limited the DEP monitoring in the 2006 and 2007 time period that demonstrated exceedances of the site-specific criterion. The DEP agrees that the permitted discharge is the source of the Connor Run stream segment and that it is reasonable to consider the quality of the permitted discharge with that of Connor Run. The DEP further agrees that available information, when evaluated pursuant to the listing methodology, does not support an impairment decision. The draft Connor Run selenium listing has been removed.

**DEP was requested to provide a link to its Quality Assurance Program Procedures (QAPP).**

DEP's Standard Operating Procedures and its EPA-approved Quality Assurance Program Procedures are available on the website at the following address:  
<http://www.dep.wv.gov/WWE/watershed/Pages/WBSOPs.aspx>.

**The DEP was requested to post the data used in the 303(d) list as the data are validated so that affected entities will have a meaningful amount of time to review the data and decide whether to collect additional data. The commenter further requested that the link be included in the 303(d) document.**

The DEP's Watershed Assessment Branch (WAB) collects, analyzes and records statewide data on a continual basis. WAB data constitutes the majority of data used in the 303(d) listing process. Many different types of information are entered into a database and all information is available to the public upon request. WAB water quality data is currently available at: <https://apps.dep.wv.gov/dwwm/wqdata/>. This link has been included in the Surface Water Monitoring and Assessment section of the Integrated Report.

The data at this site is continually updated as the site is live-linked to the database. In the near future, WAB biological data will also be available at this site.

Please note that qualified data from external sources, from which 303(d) decisions may be based, is normally received and validated after the cut-off date for the current listing cycle.

**DEP was requested to provide a link to an explanation of which data were used from third parties and any data which were rejected, with an explanation of why.**

DEP's requirements for qualifying external data are available at: [http://www.dep.wv.gov/WWE/watershed/IR/Documents/IR\\_2012\\_Documents/3rdParty\\_QAGuidelines\\_editted\\_Chris\\_20110527.pdf](http://www.dep.wv.gov/WWE/watershed/IR/Documents/IR_2012_Documents/3rdParty_QAGuidelines_editted_Chris_20110527.pdf)

Received data is initially reviewed and the DEP attempts to obtain any missing validation information through a request to the contact person named in the submission. Data meeting requirements is combined with other qualified data and assessed for compliance with water quality criteria.

The DEP makes a good faith effort to use external qualified data but does not advertise disqualified data. Data providers that feel their qualified data was not appropriately considered may question or comment in the 303(d) public notice process.

**A commenter suggested the 303(d) listing methodology should be put out for public comment every odd-numbered year so that the public can comment on the methodology in advance of the list preparation.**

It is a considerable challenge for the DEP to accomplish biennial 303(d) listing requirements. Often, EPA approval is received with limited time prior to the next list being due. Since the EPA approval validates the listing methodology it informs the protocols that will be deemed acceptable in the subsequent list.

DEP's listing methodology has remained relatively constant

over the past several listing cycles, with changes in response to specific changes in water quality criteria or legislative code. The basis for any changes to past practices is described in the draft list and subject to public notice and comment. The existing draft 303(d) list public notice process affords a reasonable opportunity for affected stakeholders to explore, debate and effect revision of proposed protocols. The proposed additional process would not practically enhance stakeholder involvement.

***A commenter disagreed with the approach of listing the entire stream length if one monitoring station indicates impairment and suggested that a “lesser section be listed.”***

The commenter did not explain the basis for disagreement or an alternative methodology to quantify impaired length. The segmentation protocol is the same as that successfully used in past listing cycles. The condition measured at a specific stream location is maintained in both upstream and downstream directions until contradicted by another measurement. In streams with only one assessment location, our methodology results in an “entire length” listing. Segmentation does occur if data from multiple assessment locations provide a clear distinction between impaired and non-impaired segments, or where impoundments or other factors limit the reasonable extension of the observed condition. DEP disagrees that a change to the protocol is warranted. Additional information has been added to the Use Assessment Procedures section of the Integrated Report to clarify our segmentation methodology in multiple sampling location scenarios.

***A commenter questioned the number of turbidity listings and suggested that turbidity TMDLs be given the lowest TMDL development priority.***

The draft list does not identify any turbidity listings.

***A commenter recommended that DEP should modify its bacteria impairment assessment methodology in various ways so as to be consistent with an anticipated the EPA***

***proposal of new national recommended bacteria criteria.***

DEP has a responsibility to assess impairment based upon currently effective water quality criteria. West Virginia fecal coliform bacteria criteria have not been recently revised. The bacteria assessment protocols used in the 2012 cycle are the same as those approved by the EPA in previous cycles. The methodology will be revisited in future cycles if West Virginia Water Quality Standards are revised and if the revisions are approved by the EPA.

***A commenter supported the DEP position to not assess lakes with respect to total phosphorus and chlorophyll-a water quality until the EPA approval discrepancy is resolved.***

The DEP position is unchanged.

***A commenter requested reconsideration of previously submitted fecal coliform water quality data with respect to the impairment status of the following waters: South Branch Potomac River, Johnson Run, Rockymarsh Run, and Lost River. The commenter emphasized the potential bacteria water quality improvement associated with monitoring conducted May 2011 through April 2012.***

The DEP reevaluated all qualified water quality monitoring data for the subject waters for the time period associated with the 2012 report (July 1, 2006 – June 30, 2011). The DEP found exceedance frequencies in excess of listing thresholds for Johnson Run, Rockymarsh Run and Lost River and did not revise their impairment classifications. The DEP recognizes that the May 2011 through April 2012 monitoring results suggest improving water quality trends, but that data is largely outside the prescribed monitoring period for 2012 reporting cycle. All data collected after June 30, 2011 will be retained for assessment in the 2014 cycle when reclassification may occur if positive trends continue.

The DEP agrees that available fecal coliform data for the segment of the South Branch Potomac from Old Fields Bridge to Springfield does not exceed listing thresholds. As such, the impairment listing

has been removed. The fecal coliform TMDL is applicable to the South Branch segment from the West Virginia/Virginia boundary to Old Fields Bridge. Available 2012 cycle data for this segment does not support reclassification to the “improved waters” list but continued improving water quality may allow reclassification in 2014.

***A commenter asked for reconsideration of previously submitted selenium water quality data compiled from instream monitoring by NPDES permittees as reported on Discharge Monitoring Reports (DMRs). The commenter initially requested 303(d) listing of approximately 85 streams for which their assessment indicates a selenium exceedance rate in excess of the listing threshold. The commenter recognized that the DEP included a subset of the requested streams on the draft 303(d) list and requested reconsideration of those omitted.***

In response to the original submission, DEP recognized a need to perform an independent and comprehensive review of instream monitoring data reported by NPDES permittees on DMRs. The permitting database was queried and the DEP reviewed and qualified the data, associated monitoring locations to stream names and milepoints, removed duplicate records for data reported under multiple permits, made reasonable assumptions for translating summary data to individual monitoring results and applied the protocols of the listing methodology to determine impairments and segmentation. As a result, the draft 303(d) list included many more selenium impaired waters than would have been listed without consideration of the “DMR” data source.

After public notice, the DEP discovered errors in the database query used for the original evaluation that caused incomplete data to be returned. This was corrected and the above described actions were taken on the complete dataset. This effort resulted in the addition of 68 selenium impaired streams to the final draft 303(d) list.

***A commenter requested that the associated source for selenium impairments should be changed from “unknown” to “current and/or past mining operations” because water quality data from Appalachian areas show that selenium concentrations increase with increased mining activities and that valley fills are known sources of elevated instream selenium values.***

In general, source tracking information to absolutely identify the causative sources of impairment is not available at the time of listing. The DEP maintains that causative sources are best determined after additional monitoring and source tracking performed in the TMDL development process.

Mining activities may ultimately be deemed responsible for the subject impairments and, in fact, many approved West Virginia selenium TMDLs have targeted reduction solely from mining related point source discharges. However, the DEP lacks information at this time to assess cause/sources on a stream-specific basis.

Source identification in the 303(d) list is not a prerequisite for NPDES permit controls that ensure discharges do not cause or contribute to water quality impairments. NPDES permits for discharges into selenium impaired waters must include criterion-end-of-pipe limitations if the discharge has reasonable potential to contribute selenium.

***A commenter stated that the proposed timeline of 11 to 15 years from 303d listing to TMDL implementation for selenium is insufficient to prevent significant Se bioaccumulation and probable loss of fish diversity and biomass. The commenter also questioned why the DEP’s selenium TMDL development is not following the same timeline explained on page 13 of the 2012 Draft 303(d) list.***

The projected schedule for selenium TMDL development is not different from other impairments. TMDL projects are planned in

accordance with the five-year Watershed Management Framework cycle as described in the draft Report. Projected dates for specific impairments are the latest year for which TMDLs are scheduled to be completed and represent the last of three framework cycle opportunities from the time of initial listing.

***A commenter contended the TMDL and permitting processes are not resulting in the achievement of selenium water quality standards, citing continued selenium impact and increasing selenium concentrations in the Mud River despite a Selenium TMDL being completed and new permits including selenium effluent limitations.***

The Mud River selenium TMDL prescribes appropriate allocations to achieve water quality standards. Attainment is contingent upon the imposition of, and compliance with, NPDES permit effluent limitations consistent with the TMDL wasteload allocations for existing sources and the growth requirements for new sources.

## List Supplements Overview

Six supplements are provided that contain additional information. The six supplements are entitled: “Previously Listed Waters – No TMDL Developed,” “Previously Listed Waters – TMDL Developed,” “Impaired Waters under TMDL Development,” “Water Quality Improvements,” “Impaired Waters – No TMDL Needed,” “Total Aluminum TMDLs Developed,” and “New Listings for 2012.”

### **Supplemental Table A - Previously Listed Waters – No TMDL Developed**

Previously listed waters from the 2010 list that are not on the 2012 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 impairments from the 303(d) list. Waters included in Supplemental Table B have TMDLs developed for the identified impairments, but water quality improvements are not yet complete and/or documented. Waters in Supplemental Table B will have an Integrated Report Category 4A designation unless TMDLs still need to be developed for other pollutants, in which case the stream will be included in Category 5.

### **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 can be included in Category 1 if all designated uses are being met.

### **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 waters will be contained in Integrated Report Categories 4b and 4c unless TMDLs need to be developed for other pollutant-related impairments (Category 5).

### **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. Streams are removed from this list after dissolved aluminum evaluations are made.

**Supplemental Table F - New Listings for 2012**

This table is a list of impaired waters that are new on the list for 2012 and were not on the 2010 Section 303(d) list.



west virginia department of environmental protection