

Chapter I. INTRODUCTION TO WATERSHED ASSESSMENT BRANCH SAMPLING ACTIVITIES

Function of the Watershed Assessment Branch

The purpose of the Watershed Assessment Branch (WAB) is to collect waterbody (*i.e.*, streams, rivers, and lakes) data in order to determine their quality in West Virginia according to the Federal Clean Water Act (CWA). This is accomplished by visiting hundreds of streams and lakes throughout the state collecting water and biological samples (*e.g.*, fish, benthic macroinvertebrates, and periphyton) and assessing the quality of the instream and streamside habitat. The data collected is used to determine which streams and lakes are in violation of water quality standards or impaired biologically.

All waterbodies (*i.e.*, streams, rivers, lakes, reservoirs, ponds, navigable waters, wetlands, etc.) in the state are grouped into 32 watersheds based on the USGS 8-digit HUCs (Hydrologic Unit Codes). These watersheds are sampled on a five-year rotation (aka the rotating Watershed Basin Schedule) so that any given year approximately one-fifth of the watersheds are being intensively sampled and assessed. The data produced by the sampling efforts of WAB provides information regarding the severity of pollution, the potential for cleanup, and supports the implementation of management and control measures.

Sampling Programs of the Watershed Assessment Branch

WAB consists of many different sampling programs that are each unique in their sampling methods, protocols, and intensities of habitat assessment. The sampling programs include:

Wadeable Streams Monitoring occurs on streams that are considered to be wadeable (*i.e.*, easily traversed without having to use a boat). This applies to almost all 1st-4th order streams, but may include some smaller 5th and 6th order streams. The components of sampling include water quality and biological assemblage samples (mainly benthic macroinvertebrates and periphyton, but sometimes fish) as well as an intensive habitat assessment. Two differing strategies of wadeable stream monitoring are as follows:

Random (Probabilistic) Sampling is a sampling subset within the Watershed Assessment Branch designed to allow unbiased, statistical interpretations of water quality using water chemistry, biological, and habitat data. The state is further subdivided into Level III Ecoregions statewide and examined on a 100k scale. The sample stations include 1-4th order streams (based on the NHD Plus

stream coverage-100k scale) and are weighted based on the relative abundance of those orders in WV. Sampling does not coincide with the rotating Watershed Basin Schedule and occurs primarily in the Spring/Early Summer (April-Early June). Fish surveys to monitor populations & communities will be conducted on stations that are target and have watershed drainages greater than 2000 acres (+/- 10%). The fish surveys will occur later in the summer during a fish index period.

Targeted Sampling is designed to investigate:

1. Streams that have no previous data collected,
2. Streams that have only outdated data collected,
3. Streams with data previously collected that rendered inconclusive results (e.g., streams with IBI scores that are uncertain or “gray” or streams with prior collections),
4. Streams that have known impairments (i.e., legacy 303(d), AMD or Acid Mine Drainage, Biological impairments),
5. Streams of particular public interest (i.e., high-quality streams, trout streams, streams undergoing restoration projects).

This targeted sampling is driven by the rotating Watershed Basin Schedule and sampling is a one-time event that occurs mainly in the Summer/early fall (June-October). Fish surveys occur on a limited number of select larger streams.

TMDL stands for Total Maximum Daily Load. A targeted sampling strategy is used to gather information about the full extent of pollution impairments (i.e., which streams are problem areas or not and what are the sources of pollution). The resultant data is used to develop and calibrate TMDL models for streams listed on the CWA Section 303(d) list. Candidate streams for TMDL development coincide with the rotating Watershed Basin Schedule and sampling occurs monthly for one year. The components of sampling include water quality samples and a limited habitat assessment. At streams with biological impairments sampling includes a one-time biological sample and intensive habitat assessment.

Ambient Water Quality Network (AWQN) is a bimonthly statewide trend monitoring program at 26 targeted stations on major rivers and streams (both wadeable and non-wadeable) for water quality constituents. The ambient network is perhaps the oldest program within the Watershed Assessment Branch with data existing as far back as the 1960s. The bimonthly components of sampling include water quality samples and limited habitat observations. These sampling activities are covered mainly in **Chapter X. AMBIENT WATER QUALITY NETWORK PROTOCOLS starting on page 224.**

Long Term Monitoring Stations, or LTMS, are sampled to develop long-term biological trend data at targeted wadeable streams scattered throughout the state.

Stations are selected to represent a wide array of unique and varying impairments (e.g., Acid Mine Drainage, Acid Rain, Sediment, Nutrient Enrichment, etc.) as well as represent best attainable or reference conditions. Ambient Network stations (or nearby proxy stations) that are wadeable in the summer months are also included in this monitoring effort. Sampling occurs once per year for approximately five years to establish a baseline and then once every two to three years to monitor for changes. Sampling includes biological, intensive habitat, and water quality components. Some selected stations may also be surveyed for fish.

Lake Monitoring uses the rotating Watershed Basin Schedule much like TMDL sampling and the targeted Wadeable Stream Monitoring. Sampling occurs on targeted lakes (within the watershed group for that year) four times during the summer months (June - September or May - August). The number of stations per lake varies and is generally proportional to the size of the lake. The components of sampling include a vertical water chemistry profile (including the physiochemical properties, nutrients, and turbidity measurements), chlorophyll-a fecal coliform sampling, Secchi depth, and some limited habitat and disturbance observations. These sampling activities are covered mainly in ***Chapter XI. LAKE SAMPLING PROTOCOL starting on page 260.***

Special Surveys or **Projects** are temporary targeted sampling designs conducted on request from internal West Virginia Department of Environmental Protection (WVDEP) programs, external agencies, private industries, or public groups/individuals that are concerned about the water quality of particular streams or segments of streams and require additional data to supplement their own data. These surveys or projects are often done in association with land transactions, spills, pending legal actions/litigation, permit applications/renewals, water quality improvement projects (e.g., mitigation projects, infrastructure improvements), emerging pollution issues, or as a part of larger studies. Special Surveys are more limited in scope in that they concentrate on a very specific area and the stations are only visited once or twice. Special Projects are more long term and widespread. They may involve monthly sampling at a large number of sites over the course of a year or two. The components of sampling vary greatly depending on the survey or project needs and may include any combination of the following: simple habitat observations, water quality samples, deployable sondes, biological samples, limited habitat assessments, or intensive habitat assessments.

Deployable Sondes are often used to provide continuous water quality data (time-series) in support of other sampling programs (e.g., TMDL, Special Projects). Deployment and retrieval of the sonde may be accompanied by a water quality sample and habitat observations at targeted locations.

Monitoring Programs in development:

Wetlands Monitoring
Non-Wadeable Streams and Large Rivers

Scope of SOP for Watershed Assessment Branch Sampling Programs

The following Standard Operating Procedure (SOP) chapters and sections are designed primarily for use with the **Wadeable Streams Monitoring (Random and Targeted), TMDL, AWQN, LTMS** and **Lake Monitoring** programs which cover the bulk of sampling activities by WAB. Since these sampling programs may share aspects/components with the other sampling programs (e.g., Coordinate data collection, Sonde Calibration and Use, Flow Measurement, Photography) their individual sections in this document may refer to other sections for further reference.

In some cases, a **Special Survey** or **Project** may be unique enough that it may require the development of its own SOP document. However, the majority of the special surveys or projects can adequately rely on this document to cover its sampling components.

This document represents the first time the AWQN, Lake Monitoring, Golden Algae Sampling, and Fish Collection Protocols have been integrated into this document (*i.e.*, prior to this document, these protocols resided within their own distinct documents or as draft protocols). The SOP documents for the **Deployable Sondes Protocols** are still in development and not included in this document version.

General Quality Assurance/Quality Control

Once a year, all field participants in the WAB attend mandatory training sessions in March-April prior to the initiation of the major sampling season. The purpose of these sessions is to ensure that all field personnel are familiar with sampling protocols presented in this SOP document and calibrated to sampling standards. These sessions occur at a field location to provide real examples and situations. Any persons unable to attend the annual training session will be instructed and evaluated on the job in the following month by one of the WAB training instructors.

In the field, individuals who are more experienced in using these sampling protocols will be teamed up with the less experienced to assure reinforcement of training and accurate results before they are allowed to work solo or lead a sampling team.

Several staff meetings also occur throughout the year to update field personnel (those collecting the data) and office personnel (those using, analyzing, and distributing the data) with any running changes to protocol and address reoccurring problems and issues in front of the two groups. These staff meetings also serve as communication

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forums between field and office personnel to help each group better understand where and how the data is collected, how the data is used in fulfilling WVDEP's Clean Water Act requirements, and the specific needs of each group.

This SOP document is annually reviewed for completeness and accuracy coinciding with the mandatory training sessions and printed hard copies are provided to all program personnel for review and use in the field. In addition, any changes that occur between annual reviews of the SOP document are updated in the SOP document's electronic format and marked with a revision number.

The field personnel are to print copies of the revised SOP pages and insert them into their existing hard copy for use until a new annual hard copy is provided.