A STREAM CONDITION INDEX FOR WEST VIRGINIA WADEABLE STREAMS

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ACRONYMS AND ABBREVIATIONS

ATV	All terrain vehicle
B-IBI	Benthic Index of Biotic Integrity
BPJ	Best professional judgement
DE	Discrimination efficiency
DEP	Division of Environmental Protection (West Virginia); also WVDEP
EDAS	Ecological Data Application System
EMAP	Environmental Monitoring and Assessment Program (USEPA); also EMAP-MAHA
EMAP-MAHA	Environmental Monitoring and Assessment Program—Mid-Atlantic Highlands Assessment (USEPA)
EPA	Environmental Protection Agency (U.S.); also USEPA
IBI	Index of Biotic Integrity
ICI	Invertebrate Condition Index
IQR	Interquartile range
NMDS	Non-metric multidimensional scaling
OWR	Office of Water Resources (West Virginia)
RBP	Rapid Bioassessment Protocol
SCI	Stream Condition Index
SWRB	State Water Resources Board (West Virginia)
TMDL	Total Maximum Daily Load
USEPA	U.S. Environmental Protection Agency; also EPA
WAP	Watershed Assessment Program (West Virginia)
WQ	Water quality
WVDEP	West Virginia Division of Environmental Protection; also DEP

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1. EXECUTIVE SUMMARY

Over the past century, land use activities such as mining, agriculture, urbanization, and industrialization have seriously threatened the quality of surface waters by contributing to nonpoint-source pollution. In West Virginia, the investigation of these nonpoint sources of water pollution has become a priority. It is the responsibility of West Virginia Division of Environmental Protection (DEP) to maintain and protect the ecosystem health of the state's waters. In keeping with the Clean Water Act and technical guidance from USEPA, DEP developed water quality standards for the protection of ecosystem health. In support of the state's water quality standards, which mandate the implementation of biological and chemical criteria and a strict antidegradation policy, the ambient monitoring program has established an assessment "toolbox" that includes physical, chemical, and biological techniques.

West Virginia DEP uses a rotating basin network of monitoring, scheduled on a 5-year rotation. A core team of biologists, naturalists, and chemists provides the technical resources to conduct the monitoring. Biological data (e.g., the diversity of organisms) are necessary to assess the health of West Virginia's surface waters and to measure the attainment of biological integrity goals as directed by USEPA and characterized by the state of West Virginia. DEP established a Biological Assessment Program patterned after the Rapid Bioassessment Protocols of EPA (Plafkin et al. 1989). The results presented in this report establish a framework for the assessment and monitoring of West Virginia's streams using rapid bioassessment procedures.

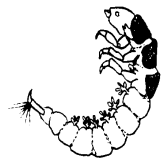
Bioassessment consists of comparing the biological condition of a stream to a reference condition, which is an aggregate of conditions in unimpaired streams of a region. Reference conditions are "best available" conditions where biological potential is at its highest for the particular region or area. These reference conditions are representative of sustainable ecosystem health. For West Virginia, the Mountain State, a single region appears sufficient for statewide and rotating basin assessments. Partitioning the streams and watersheds into Level 3 ecoregions does not appear to improve biological assessment. The information derived from a survey is aggregated into a Stream Condition Index (SCI) for West Virginia. This SCI is used as a primary

> **Biocriteria**: *under the Clean Water Act, numerical values or narrative statements that define a desired biological condition for a waterbody and are part of the WQ standards.*
>
> **Bioassessments**: *evaluations of the biological condition of a waterbody that use biological surveys of the resident biota.*
>
> **Biosurveys**: *the collection, processing, and analysis of representative portions of a resident biotic community or assemblage.*

indicator of ecosystem health and can identify impairment with respect to the reference (or natural) condition. The index includes six biological attributes, called metrics, that represent elements of the structure and function of the bottom-dwelling macroinvertebrate assemblage. Metrics are specific measures of diversity, composition, and tolerance to pollution, that include ecological information.

CORE METRICS

- EPT taxa
- Total taxa
- % EPT
- % Chironomidae
- % Top 2 Dominant Taxa
- HBI (Family biotic index)



See definitions in Table A-2.

The SCI is to be used as the basis for bioassessment in West Virginia and has been calibrated for a long-term biological index period extending from April through October. A data analysis application has been developed to ensure consistency in data management and analysis throughout the state as DEP biologists conduct biological monitoring.

Benefits expected from the implementation of the WV SCI will apply to a broad spectrum of management programs, including:

- characterizing the existence and severity of point and nonpoint source impairment;
- targeting and prioritizing watersheds and ecosystem management areas for remedial or preventive programs;
- evaluating the effectiveness of nonpoint source best management programs;
- screening ecosystems for use attainability; and
- developing a basis for establishing biocriteria that relate to regional water quality goals, an EPA priority.

The West Virginia SCI was tested with independent data collected in 1998 and was able to correctly identify the majority of the stream sites stressed in some way by human disturbance or pollution. Index scores were divided into 5 proposed rating categories for reporting on the condition of West Virginia streams.

2. THE APPLICATION OF STREAM BIOASSESSMENT IN WEST VIRGINIA

The West Virginia Division of Environmental Protection (DEP) is developing biological criteria for use in assessing the quality of streams as part of the state's Watershed Assessment Program. Through the 303(d) and Total Maximum Daily Load (TMDL) framework outlined in the Clean Water Act of 1972 (and revisions of 1977, 1987), those waters considered to be impaired and threatened must be identified and improved to meet their designated uses. The definition of impairment by natural resource management or regulatory agencies is typically based on attainment or non-attainment of numerical water quality standards associated with a waterbody's designated use. If those standards are not met (or attained), then the waterbody is considered to be impaired. Resident biota in a watershed function as continual natural monitors of environmental quality, responding to the effects of both episodic as well as cumulative pollution and habitat alteration. Conducting ambient biological surveys is one of the primary approaches to biomonitoring. These surveys, in turn, are used to measure the attainment of biological integrity. The assessment of ecosystem health cannot be done without measuring the attainment of biological integrity goals as directed by USEPA and characterized by the state of West Virginia.

The Clean Water Act of 1972 (PL-92-500) has as one of its primary goals the maintenance and restoration of biological integrity, which incorporates biological, physical, and chemical quality. This concept refers to the natural assemblage of indigenous organisms that would inhabit a particular area if it had not been affected by human activities. This integrity or naturally occurring structure and function of the aquatic community becomes the primary reference condition used to measure and assess waterbodies in a particular region.

> ***Biological integrity*** is commonly defined as "the capability of supporting and maintaining a balanced, integrated, adaptive community of organisms having a species composition, diversity and functional organization comparable to that of the natural habitat of the regions" (Karr and Dudley 1981, Gibson et al. 1996).

Careful measurement of the natural aquatic ecosystem and its constituent biological communities can determine the condition of biological integrity. Several key attributes are measured to indicate the quality of the aquatic resources. Biological surveys establish the attributes or measures used to summarize several community characteristics, such as taxa richness, number of individuals, sensitive or insensitive species, observed pathologies, and the presence or absence of essential habitat elements.

Multimetric, invertebrate indices of biotic integrity, variously called RBP (Rapid Bioassessment Protocol; Plafkin et al. 1989; Barbour et al. 1999), ICI (Invertebrate Condition Index; Ohio EPA 1989), B-IBI (Benthic IBI; Kerans and Karr 1994) and SCI (Stream Condition Index; Barbour et al. 1996) have been developed for many regions of North America and are generally accepted for biological assessment of aquatic resource quality (e.g., Gibson et al. 1996, Southerland and Stribling 1995, Karr 1991). The framework of bioassessment consists of characterizing reference conditions upon which comparisons can be made and identifying appropriate biological attributes with which to measure the condition. Reference conditions are "best available" conditions where biological potential is at its highest for the particular region or area. These reference conditions are representative of sustainable ecosystem health.

Biological measurements, called metrics, represent elements of the structure and function of the bottom-dwelling macroinvertebrate assemblage. Metrics change in some predictable way with increased human influence (Barbour et al. 1996). They include specific measures of diversity, composition, and functional feeding group representation and include ecological information on tolerance to pollution. Multimetric indices, such as the IBI, incorporate multiple biological community characteristics and measure the overall response of the community to environmental stressors (Karr et al. 1986, Barbour et al. 1995). Such a measure of the structure and function of the biota (using a regionally-calibrated multimetric index) is an appropriate indicator of ecological quality, reflecting biological responses to changes in physical habitat quality, the integrity of soil and water chemistry, geologic processes, and land use changes (to the degree that they affect the sampled habitat).

The purpose of this study was to develop a multimetric biological index for West Virginia streams. State Watershed Assessment Program (WAP) stream assessment data from 1996 and 1997 were used for developing an index, and 1998 data were used to test and validate the index. Results of the analysis were used to make recommendations for improving the state's biological sampling program to achieve more reliable assessments of West Virginia streams.

This study was designed to address the following questions:

- What is the most appropriate site classification for assessment of ecosystem health?
- What are the seasonal differences in biological metrics? (Are two index periods required for monitoring?)
- What are the appropriate metrics for a West Virginia Stream Condition Index (SCI)?
- What are thresholds that indicate the degree of comparability of West Virginia streams to reference condition?

3. ESTABLISHING BIOREGIONS AS A BASIS FOR BIOASSESSMENT

Biological systems naturally vary in composition and diversity of the fauna, depending on the physical characteristics and geomorphology of the waterbodies (in this case, streams) in which they reside. Partitioning this natural variability into relatively homogenous classes, or bioregions, can aid in establishing reference conditions, or benchmarks, from which to assess biological condition. The purpose of this classification analysis is to evaluate Level 3 ecoregions as a means of establishing bioregions for West Virginia streams. Sites sampled in 1996-1997 were located in three Level 3 ecoregions: the Ridge and Valley (No. 67), Central Appalachians (No. 69), and Western Allegheny Plateau (No. 70).

Identification of reference sites (i.e., those having the expected composition and diversity of biota for a region or class of sites) provides the basis for evaluating bioregions. Out of 720 sites sampled by West Virginia DEP in 1996-1997, there were 67 identified as reference (see Appendix A, Table A-1, for criteria). The relative geographic clustering of the benthic data from the West Virginia data set suggested that testing an ecoregional classification might not be reliable with this data set alone. Therefore, similar benthic data were obtained from EPA's Environmental Monitoring and Assessment Program (EMAP) in the Mid-Atlantic Highlands for this analysis. From the EMAP database, 79 reference sites (using same criteria as for West Virginia) were identified that were geographically distributed within the same 3 ecoregions and encompassed a broader pattern than the clustered distribution of the West Virginia database (Figure 3-1).

Methods of Analysis

- *Non-metric Multidimensional Scaling (NMDS) Ordination* — Spatial array of sites based on similarity/difference of benthic composition and abundance.
- *Similarity Analysis* — Tests for statistical significance and the strength of the classification.
- *Box-and-Whisker Plots* — Display of ranges of values for the biological data oriented by spatial and temporal groupings.
- *Scatterplots by date* — Tests for correlation of biological attributes (metrics) with sampling date.

See Appendix A for full discussion of methods.

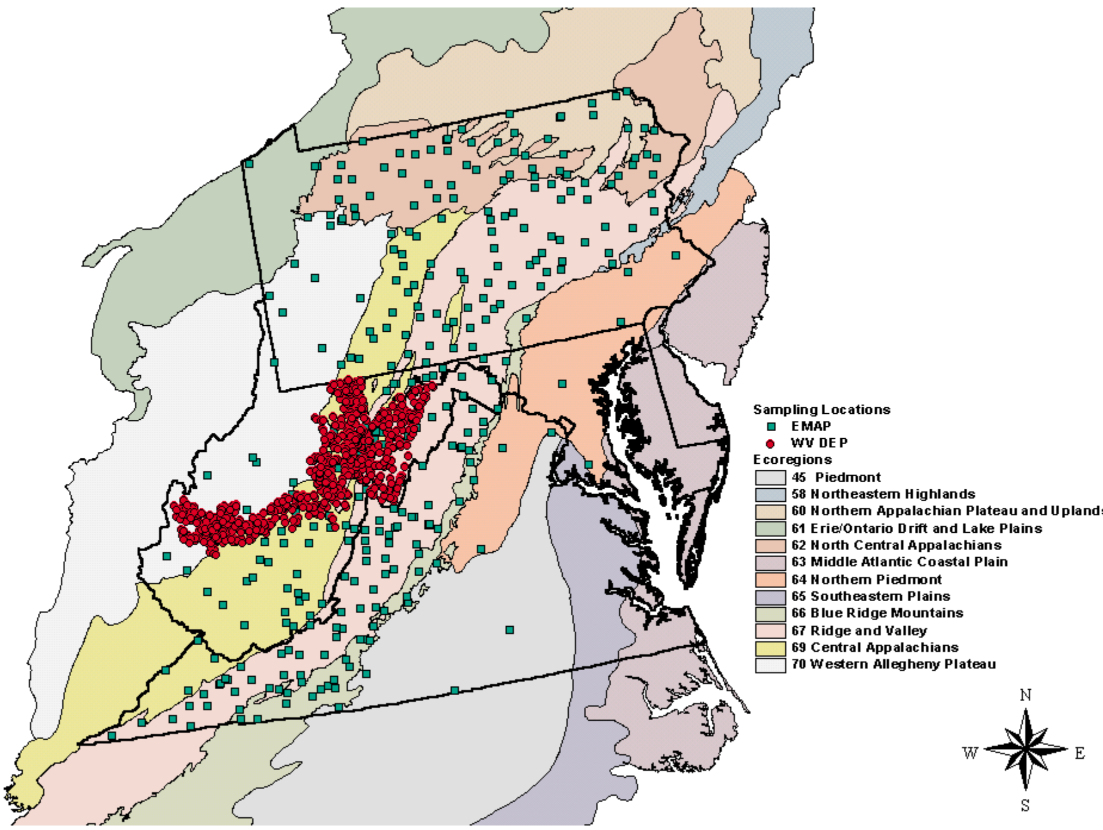


Figure 3-1. Geographic distribution of benthic macroinvertebrate sampling sites by data source and ecoregion.

The development of an appropriate classification for bioassessment was confounded by a broad temporal range of collections (May - September). The issue of seasonal differences in the benthic macroinvertebrate assemblage might require grouping the data by narrower date ranges for classification. Therefore, analyses were performed to evaluate both ecoregions and date.

Conclusion for Classification into Bioregions

- Use of ecoregions to serve as bioregions for benthic assessments of cobble habitat in streams of West Virginia is not necessary.
- While the broad collection timeframe of West Virginia DEP introduces variability into the dataset, no clear differentiation of sampling periods was discernable.

Documentation for results are as follows:

- Ordination of the benthic data by ecoregion indicated that a spatial classification was not distinct (Figure 3-2). Neither the EMAP data (based on genus-level taxonomy) nor the West Virginia data (based on family-level taxonomy) were able to distinguish ecoregions adequately to serve as bioregions.
- Ordination of the West Virginia benthic data by date was not distinct enough to partition into separate sampling periods (Figure 3-3). There was a slight indication that the early sampling dates May - June would provide less variability for assessments. The EMAP data were primarily restricted to a July - August time period, and thus not tested for date differences in this analysis.
- The classification into ecoregions did not explain differences among sites (0% difference explained) for EMAP data, and only a weak explanation (6.5% difference explained) for the West Virginia data (Table 3-1).
- By grouping the benthic data into individual months, classification was improved over ecoregions (9.7% difference explained), but still inconsequential to explaining variability (Table 3-1).

- Comparisons of frequencies and relative abundance of taxa did not reveal distinct differences among sites in the 3 ecoregions (Table 3-2).

- Correlation of various biological attributes or metrics with day of the year sampled illustrated a weak relationship only with abundance of Chironomids (Figure 3-4).

- Box-and-whisker plots performed on various benthic attributes illustrated only weak distinction among ecoregions and sampling periods (Appendix D, Figures D1-D2). The lack of distinction supports using a single class structure for assessment of West Virginia streams.

Recommendations From this Analysis

- Classification by some regional physiographic structure (e.g., ecoregions) was not supported by this analysis of the benthic assemblage from cobble substrate in wadeable streams within the Appalachian Mountains. The issue of using bioregions to stratify or partition the aquatic community may still be valid if collecting methods change, level of taxonomy changes, and/or non-cobble habitats are sampled.

- A narrower sampling window of late spring to early summer would improve the assessments by reducing variability.

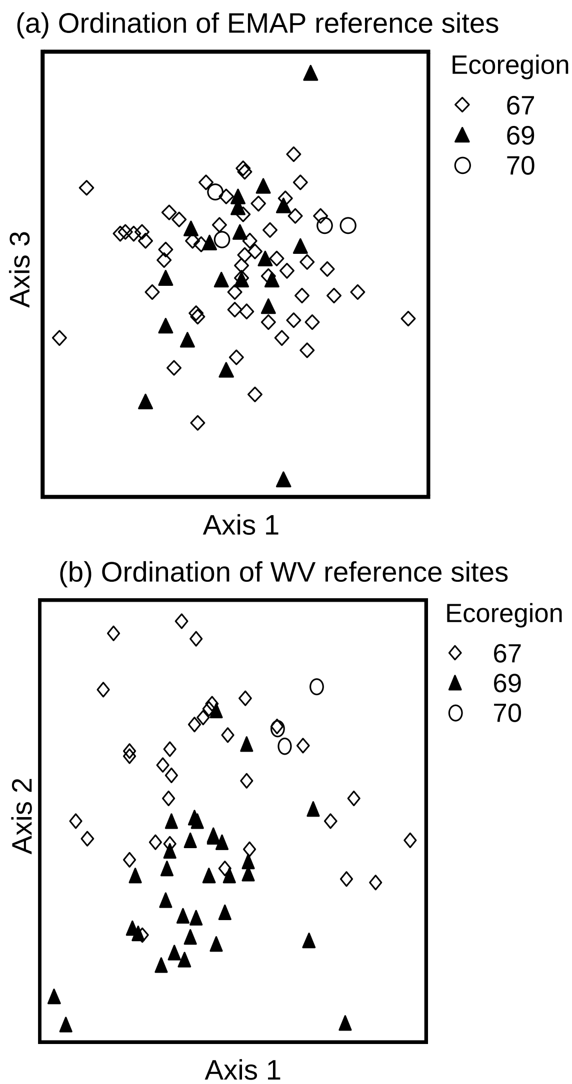


Figure 3-2. Ordination (NMDS) of EMAP (a) and West Virginia (b) reference site macroinvertebrate data by 3 ecoregions: Ridge and Valley (67), Central Appalachians (69) and Western Allegheny Plateau (70). *The ordination plots allow sites to be visualized in "ordination space," such that sites that are similar to each other (i.e., they share a similar species composition) are close together in the plot, while sites that are highly dissimilar are plotted far apart. Ordination of the EMAP macroinvertebrate data (79 sites) from the 3 ecoregions revealed no clear ecoregional pattern, as seen by the overlapping locations of points (Figure a). West Virginia benthic data (67 sites) show a weak but discernible pattern associated with ecoregion (Figure b). Ridge and Valley sites (No. 67) are more abundant in the top half of the plot, Central Appalachian sites (No. 69) are more abundant in the bottom half of the plot, and the 3 Allegheny Plateau sites (No. 70) occur close together in the upper right area. Further similarity analysis is reported in Table 3-1.*

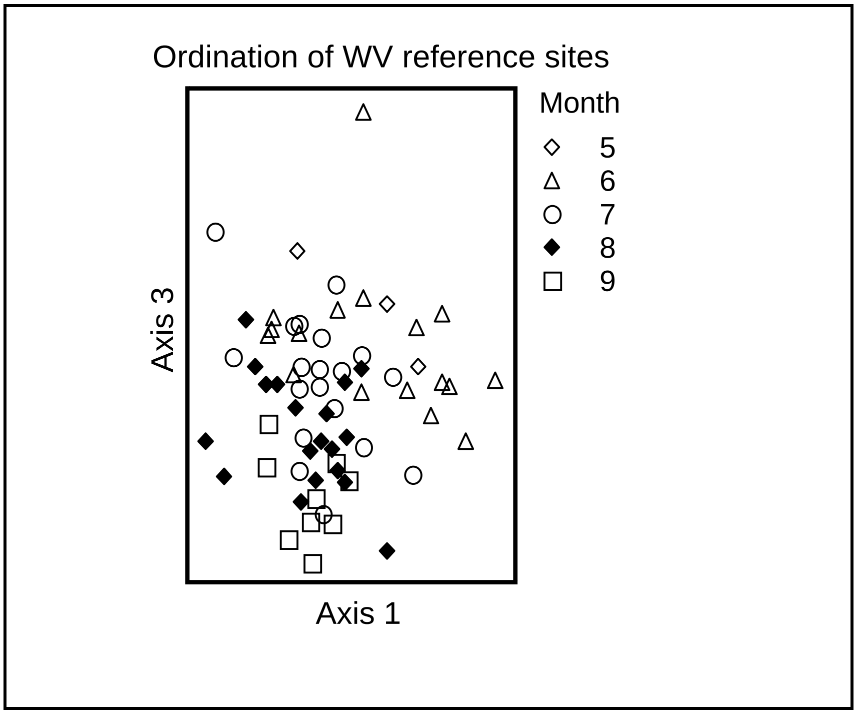


Figure 3-3. Ordination (NMDS) of West Virginia reference site macroinvertebrate data by month of sampling. *The plot shows a slight effect due to time-of-sampling, but as with ordination by ecoregion, there is considerable overlap of data points among the different sampling months.*

Table 3-1. Strength of alternative classifications of macroinvertebrate assemblages in reference sites. *Similarity analysis revealed that the ecoregional classification for West Virginia data accounted for approximately 6.5% of the dissimilarity among sites. Similarly, month of sampling accounted for approximately 9.7% of the total dissimilarity. We found that the effects of ecoregion and date were confounded but that neither gave a particularly strong classification: both were less than 10% of the total average dissimilarity.*

Data Source	Classification	Percent Differences Explained
EMAP data	ecoregions (n=79)	0
WV data	ecoregions (n=67)	6.5%
WV data	month (n=67)	9.7%

Table 3-2. Frequency and relative abundance of top 20 taxa in West Virginia reference sites, by ecoregion. Frequencies of top 10 taxa in each ecoregion are in bold. *Differences among sites in this analysis are caused by differences in taxa composition. Overall, these were relatively minor at the family level. Four families were at least 25% more common and abundant in the Ridge and Valley ecoregion than in the Central Appalachians: the Chloroperlidae, Ephemerellidae, Peltoperlidae, and Gammaridae. Taxa more common in the Central Appalachians were the Tipulidae, Rhyacophilidae, and Cambaridae. There were only 3 sites in the Western Appalachians, so estimates of frequency of occurrence are unreliable (not shown).*

	Ridge and Valley (Region 67) n=32		**Central Appalachians (Region 69) n=32**	
	frequency	**mean rel. abund.**	**frequency**	**mean rel. abund.**
Chironomidae	**94%**	**6.0%**	**97%**	**9.3%**
Heptageniidae	**91%**	**12.6%**	**97%**	**9.0%**
Baetidae	**94%**	**18.0%**	**88%**	**9.1%**
Capniidae	**97%**	**9.8%**	**84%**	**20.2%**
Hydropsychidae	**100%**	**10.4%**	**81%**	**21.2%**
Philopotamidae	**84%**	**5.1%**	**81%**	**6.1%**
Chloroperlidae	**91%**	**5.1%**	**66%**	**6.9%**
Tipulidae	63%	2.5%	**91%**	**4.6%**
Perlidae	66%	4.4%	**69%**	**3.7%**
Perlodidae	**72%**	**3.5%**	50%	3.2%
Leptophlebiidae	63%	5.1%	56%	4.3%
Rhyacophilidae	34%	2.1%	**81%**	**2.6%**
Pteronarcydae	**69%**	**3.8%**	47%	1.8%
Ephemerellidae	63%	2.3%	38%	4.0%
Peltoperlidae	**75%**	**6.7%**	28%	3.2%
Simuliidae	47%	2.5%	41%	2.7%
Cambaridae	31%	2.6%	56%	1.4%
Elmidae	25%	1.8%	47%	2.8%
Oligochaeta	25%	3.1%	44%	3.7%
Nemouridae	31%	5.2%	19%	17.9%

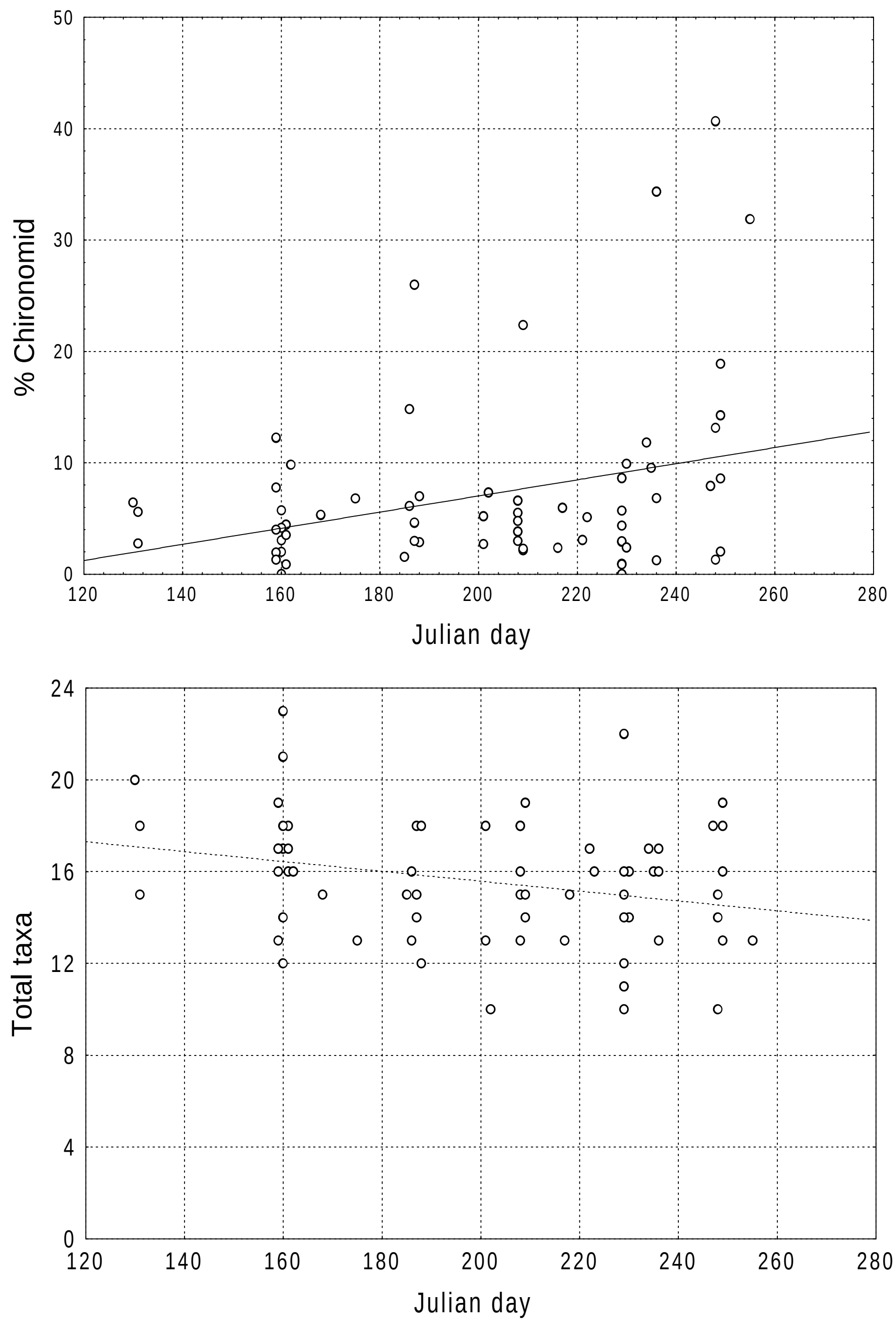


Figure 3-4. Metric values in 67 West Virginia reference sites plotted by Julian day. *This analysis showed a weak relationship in the %Chironomid metric (top), but other candidate metrics, such as Total taxa (bottom), showed no discernible relationship.*

4. TRANSFORMING BIOLOGICAL ATTRIBUTES INTO METRICS

> A *metric* is a characteristic of the biota that changes in some predictable way with increased human influence.

Various attributes of the benthic macroinvertebrate community have been characterized in the form of quantitative measures called metrics. The attributes of the community that are measured by these metrics fall into several categories of benthic community characteristics, and the specific metrics within those categories can indicate different aspects of the community condition. For example, metrics dealing with species richness or diversity, such as Total Taxa, can be used as indicators of community health because an ecologically healthy system is generally expected to support a more diverse community of fauna than can be supported in an ecologically impaired area. Multiple metrics evaluated together can give an overall indication of ecological integrity.

West Virginia's benthic macroinvertebrate samples collected in the 1996-1997 seasons were identified to the family taxonomic level, and 100 organisms were counted for each sample. Within each 100-organism sample, the number of individuals of each family were tallied. The identifications and counts of organisms collected at each site provide the information used to calculate a suite of metrics for each benthic sample.

Metrics evaluated for use with the West Virginia 1996-1997 benthic macroinvertebrate data represented four categories: taxonomic richness, taxonomic composition, feeding groups, and tolerance (see metric categories box). Habit metrics were not calculated because they are not useful with family level taxa identification. Since classification analysis did not demonstrate the need for partitioning West Virginia data collection sites into separate bioregions or index periods (Chapter 3), all 720 sampling sites were considered as one site class. Candidate metrics were calculated for each of the 720 benthic samples. Selection of specific metrics for use in a stream condition index was based on several evaluation criteria (see metric evaluation box).

Metric Categories

- *Taxonomic richness* — counts of distinct taxa within selected taxonomic groups.
- *Taxonomic composition* — proportions of individuals belonging to specific selected taxonomic groups.
- *Functional feeding group* — dominant mode of feeding, though not the specific nutritional source or benefits (e.g., suspension feeder, predator, etc.).
- *Habit* — dominant behavior of an animal for moving and maintaining physical position in its habitat (e.g., sprawling, clinging, etc.).
- *Degree of tolerance* — counts, proportions, or weighted scores of taxa based on ability to survive exposure to pollutants.

See Appendix A, A.4.1 for full discussion.

Criteria for identifying stressed sites were established using parameters similar to those used by West Virginia DEP for identifying reference sites (see stressed site criteria box, below). To be categorized as stressed, a site needed to meet only one of the listed conditions. Out of the 720 benthic samples used in this analysis, there were 69 sites identified as meeting at least one of the criteria for stress.

Metric Evaluation. Metrics are included if they:

- are able to differentiate between reference and impaired sites (methods: box plots, discrimination efficiencies [DE]);
- represent at least some different aspects of the community (taxa composition, richness, tolerance, and the like); and
- minimize redundancy among individual component metrics (method: Pearson correlations).

Stressed Site Criteria. 69 sites were deemed stressed by meeting at least one of these criteria:

- Dissolved oxygen < 4.0 mg/l
- pH < 4.0
- Conductivity > 1000 µmhos
- Epifaunal substrate score < 7 and Total habitat score <120
- Channel alteration score < 7 and Total habitat score <120
- Sediment deposition score < 7 and Total habitat score <120
- Bank disruptive pressure score < 7 and Total habitat score <120
- Riparian vegetation zone width score < 4 and Total habitat score <120

- **Discrimination of site impairment**

Box-and-whisker plots for 24 candidate metrics, comparing the distribution of values in 67 reference sites with the distribution of values in 69 impaired sites, are presented in Appendix D (Figures D3-D6). The distributions displayed in these plots were evaluated as described in Appendix A (section A.4.2; Figures A-1 - A-2). Eleven candidate metrics exhibited discrimination efficiencies (as described in Appendix A.4.2) above 60% (Table 4-1).

- **Representation of different community attributes**

Discriminatory metrics, identified on the basis of boxplots and discrimination efficiencies, represent three different categories of benthic community attributes: taxonomic richness, taxonomic composition, and tolerance to environmental stress (Table 4-1).

- **Minimized redundancy**

Pearson correlation coefficients (Table 4-2) identified that EPT taxa and Intolerant taxa had a correlation of 0.92, and that %Chironomidae was highly correlated with %Diptera (0.91) and with %Tolerant (0.88). In addition, with the family-level West Virginia data, individual component metrics involving Ephemeroptera, Plecoptera, and Trichoptera were eliminated in favor of the more highly discriminatory composite metrics of %EPT and EPT taxa.

The process of metric selection is iterative, with the areas of consideration being revisited and weighed throughout the process. Table 4-1 reports the final recommended metrics for use in a stream condition index, along with reasons for including or excluding each metric.

Recommendation for Use of Metrics to Measure Biological Attributes

For scoring West Virginia stream condition based on 1996-1997 data collected in riffle habitats, six recommended metrics are: EPT taxa, Total taxa, %EPT, %Chironomidae, HBI (family level), and % 2 Dominant taxa.

Table 4-1. Candidate metrics: Expected response to stress, discrimination ability, and final recommendation for WV stream condition index

Metric	Expected response ▲ increase ▽ decrease	Discrimination efficiency[1] (DE)	Used in final index	Reason for including or excluding metric in the final index
Taxonomic Richness				
Total taxa	▽	71.0%	✔	Good DE in this category
EPT taxa	▽	82.6%	✔	Good DE in this category
Ephemeroptera taxa	▽	58.0%		Included in EPT taxa with family-level data
Plecoptera taxa	▽	59.4%		Included in EPT taxa with family-level data
Trichoptera taxa	▽	65.2%		Included in EPT taxa with family-level data
Diptera taxa	▽	—		Poor discrimination
Chironomidae taxa	▽	—		Poor discrimination
Taxonomic Composition				
%EPT	▽	78.3%	✔	Good DE in this category
% Ephemeroptera	▽	58.0%		Included in %EPT with family-level data
% Plecoptera	▽	62.3%		Included in %EPT with family-level data
% Trichoptera	▽	68.1%		Included in %EPT with family-level data
% Diptera	▲	72.5%		91% correlated with %Chironomidae
% Chironomidae	▲	73.9%	✔	Good DE in this category
% Oligochaeta	▲	—		Poor discrimination
% Dominant taxon	▲	49.3%		Poor discrimination
% 2 Dominant taxa	▲	55.1%	✔	Acceptable DE; included after ruling out %tolerant and %diptera
Feeding groups				
% Filterers	▲	na		Trend opposite from expected; interpretation unclear
% Scrapers	▽	—		Poor discrimination
% Collectors	▽	na		Trend opposite from expected; interpretation unclear
% Predators	▽	—		Poor discrimination
% Shredders	▽	55.1%		Skewed distribution, high variance; marginal discrimination
Tolerance/Intolerance				
Intolerant taxa	▽	79.7%		92% correlated with EPT taxa
% Tolerant	▲	73.9%		88% correlated with %Chironomidae
HBI (family level)	▲	68.1%	✔	Acceptable DE in this category, after ruling out other tolerance metrics

[1] See Appendix A, section A.4.2

Table 4-2. Pearson Correlation Coefficients among 15 Candidate Metrics. Metrics for all 1996-1997 samples (n=720) were included in the correlation. **Bold** R values are greater than 0.85.

	Total taxa	EPT taxa	Ephem taxa	Plecop taxa	Trichop taxa	% EPT	% Ephem	% Plecop	% Dip	% Chiro	%top 2 dom	Intol.. taxa	% Tolerant
Total taxa	1.00												
EPT taxa	0.85	1.00											
Ephemeroptera	0.72	0.76	1.00										
Plecoptera taxa	0.55	0.78	0.35	1.00									
Trichoptera taxa	0.64	0.66	0.36	0.25	1.00								
% EPT	0.35	0.57	0.34	0.54	0.36	1.00							
% Ephemeroptera	0.33	0.45	0.58	0.29	0.12	0.47	1.00						
% Plecoptera	0.02	0.19	-0.11	0.46	-0.02	0.47	-0.21	1.00					
% Trichoptera	0.07	0.03	-0.08	-0.13	0.38	0.27	-0.27	-0.28					
% Diptera	-0.32	-0.45	-0.26	-0.42	-0.30	-0.79	-0.37	-0.36	1.00				
% Chironomidae	-0.29	-0.39	-0.20	-0.36	-0.30	-0.72	-0.31	-0.35	**0.91**	1.00			
% top 2 dominant	-0.67	-0.66	-0.56	-0.47	-0.43	-0.33	-0.33	-0.05	0.34	0.37	1.00		
Intolerant taxa	0.82	**0.92**	0.62	0.82	0.57	0.55	0.35	0.28	-0.45	-0.41	-0.60	1.00	
% Tolerant	-0.35	-0.46	-0.27	-0.40	-0.35	-0.80	-0.36	-0.36	0.80	**0.88**	0.39	-0.47	1.00
HBI (family)	-0.34	-0.50	-0.22	-0.56	-0.29	-0.76	-0.18	-0.71	0.65	0.67	0.38	-0.56	0.82

5. AGGREGATING METRICS INTO A BIOLOGICAL INDEX

Using the final six selected metrics (Chapter 4), a working index for scoring West Virginia stream condition was determined following the steps summarized in the box to the right. Appendix A describes the entire procedure in detail. The range of reference site values for the working West Virginia stream condition index was compared with the range of values in the impaired sites by means of box-and-whisker plots (Figure 5-1), and these boxplots confirmed that the working index is able to discriminate between reference and stressed sites.

Metrics and Scoring

- *Select metrics* —

Total taxa	% Chironomidae
EPT taxa	% 2 dominant taxa
% EPT	HBI (Family)

- *Calculate metrics* — Calculate values for the 6 selected metrics for all 720 sampling sites.
- *Standardize scores* — Convert all metric values to a standard 0-100 point scale.
- *Calculate index* — Average the 6 standardized metric scores for each benthic sampling site.

See Appendix A, A.5 for full discussion.

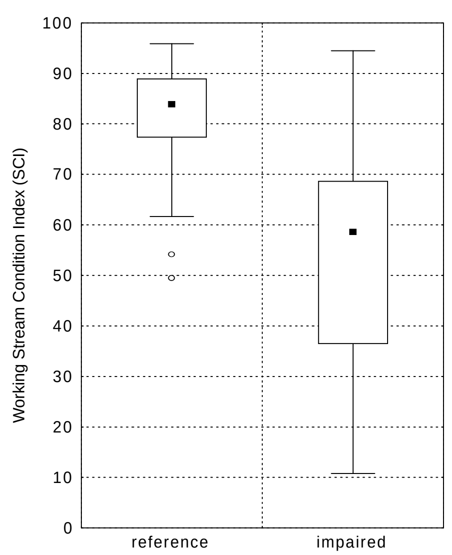
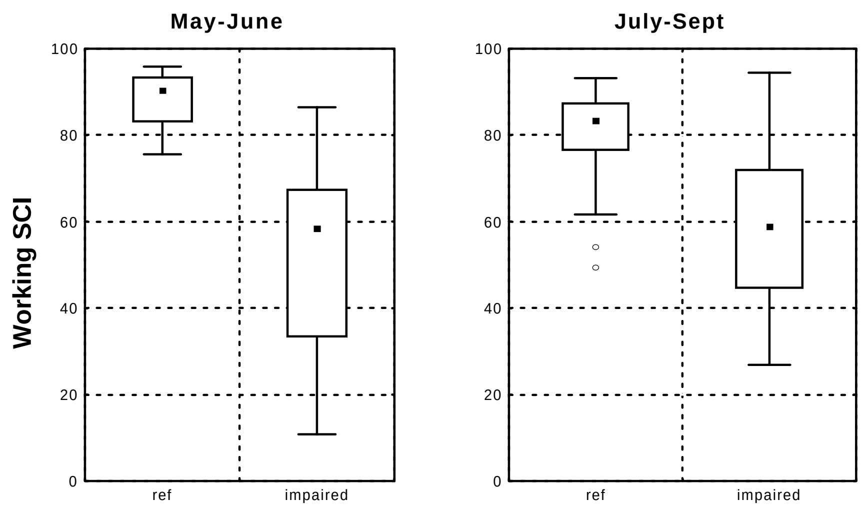
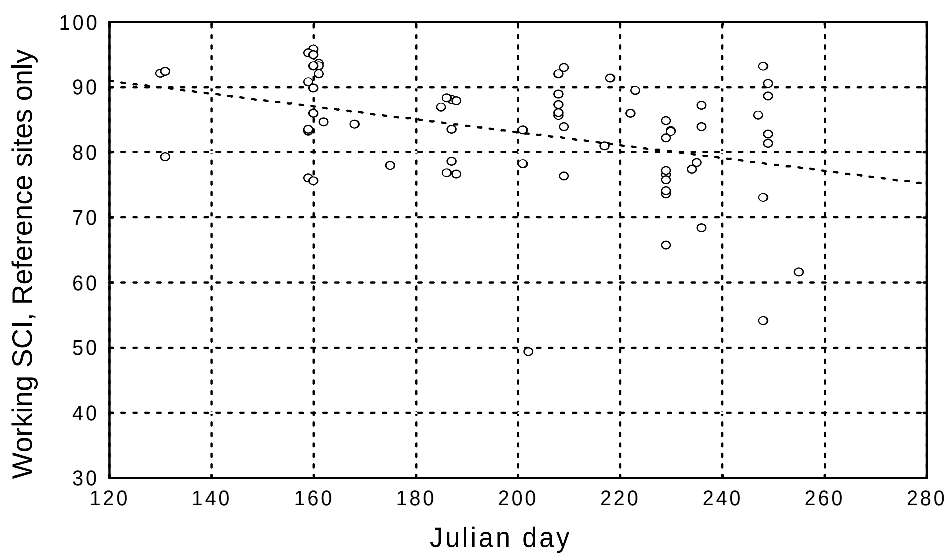


Figure 5-1. Working SCI discriminates between West Virginia reference and impaired sites in the 1996-1997 calibration data.

Though classification analysis (Chapter 3) did not indicate distinct partitioning of sampling into separate index periods, the possible variability of a long sampling period was examined again in the working index. Figure 5-2, showing boxplots of the working index by sampling period and a scatterplot of reference site index scores by Julian day, demonstrates that though the degree of discrimination is slightly better in the May-June period (Figure 5-2[a]), the working index does discriminate between reference and impaired sites in both sampling periods.



(a) Performance of working index score by index period.

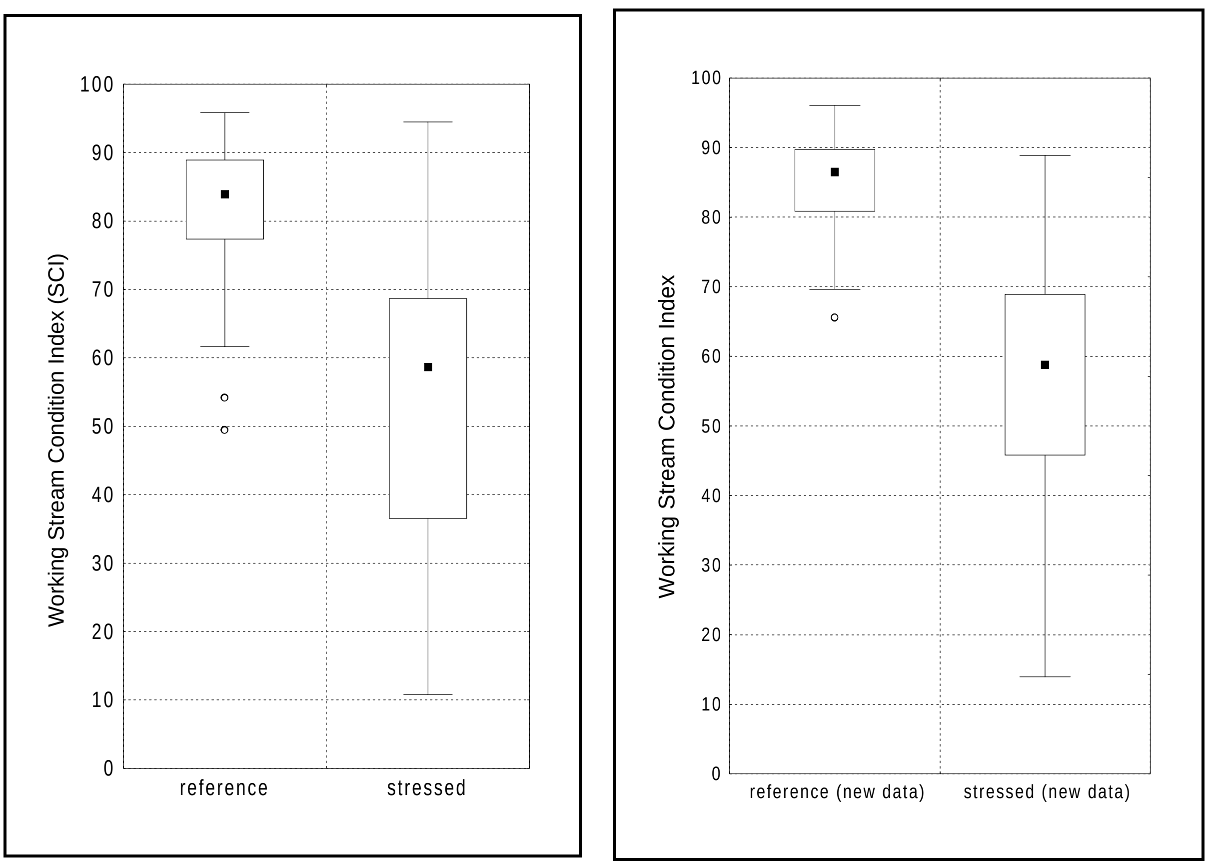


(b) Reference site index scores by Julian day.

Figure 5-2. Effect of sampling season on working West Virginia stream index (SCI). *This graph shows slight improvement in discrimination between reference and impaired sites in the earlier sampling period (a), though the index does discriminate impairment in the later sampling period as well. A narrower sampling window of late spring to early summer might improve the assessments by reducing overall variability.*

6. TESTING AND REFINING THE INDEX USING INDEPENDENT DATA

New data provided by WV DEP were used (as described in Appendix A.6) to test the discrimination efficiency of the recommended West Virginia multimetric index. A comparison of the working index values in the original data with those in the independent test data shows good agreement (Figure 6-1). Discrimination efficiencies of the test data set were also good: 85% of the 40 test reference sites scored higher than the 25th percentile of the original reference sites. Stressed sites in the test data also were very similar to the original sites: 92% scored below the 25th percentile of the original reference sites.



a. Original 1996-1997 data (Figure 5-1).

b. Independent 1998 data.

Figure 6-1. Working SCI discriminates between West Virginia reference and stressed sites in the new independent data (b) as well as in the original data set (a).

Final Recommended West Virginia Stream Condition Index (SCI):

To refine the working index by making use of the entire set of data provided by WVDEP (1996-1998), all samples were combined. Percentile distributions of each metric's values were determined for the entire set of 1996-1998 data (n=1268 benthic samples). The revised, final Stream Condition Index (SCI) makes use of the 95th or 5th percentile (depending on the metric) standard values determined from this combined set of all samples. Table 6-1 presents metric standard values and standardization formulas for the six metrics that compose the final recommended West Virginia multimetric SCI. Individual metrics in exceptionally high quality streams may score higher than 100, but a maximum metric score of 100 is used when averaging the six metrics to determine the final SCI score; this assures that each metric contributes equally to the multimetric index.

Table 6-1. West Virginia final SCI: Metric standard values and standardization formulas.

Metrics that decrease with stress	Standard (best value) X_{95}	X_{min}	Standardization formula (Appendix A.5, Equation 2; X=metric value)
Total taxa	21	0	score = 100 × (X/21)
EPT taxa	13	0	score = 100 × (X/13)
%EPT	91.9	0	score = 100 × (X/91.9)
Metrics that increase with stress	**Standard (best value) X_5**	**X_{max}**	**Standardization formula (Appendix A.5, Equation 3; X=metric value)**
%Chironomidae	0.98	100	score = 100 × [(100-X)/(100-0.98)]
% 2 dominant	36.0	100	score = 100 × [(100-X)/(100-36.0)]
HBI (family)	2.9	10	score = 100 × [(10-X)/(10-2.9)]
Final index score (SCI) for a site is determined by averaging the site's 6 standardized metric scores, using a maximum metric score of 100 for any metric whose individual score at a site may have exceeded 100.			

Percentile distributions of the final SCI in the 1996-1998 combined set of 107 reference samples are reported in Table 6-2. Metric values, metric standardized scores, and SCI scores for all sites in the original and new data sets are provided in Appendix C.

Table 6-2. Percentile distribution of Index (SCI) values in all 1996-1998 Reference samples.

N	minimum	5th	10th	25th	median	75th	90th	95th	maximum
107	49	68	74	78	86	90	93	94	96

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 Rating System

The macroinvertebrate Stream Condition Index (SCI) for West Virginia streams is robust and repeatable and can be used to assess the biological condition of West Virginia streams. The relatively low variability of scores in the reference sites suggests that at least 5 rating classes can be used. A rating of "highly comparable to reference sites" could apply to sites that score greater than the 25th percentile of reference sites. A "comparable" to below-average reference sites could apply to sites scoring greater than the 5th percentile of reference sites (Table 7-1, Figure 7-1). Scores below the 5th percentile of reference sites are increasingly different from the reference condition. Alternatively, the range of scores from 0 to 100 could be divided into 5 equal categories (80-100, 60-80, etc.).

Table 7-1. Example rating system for West Virginia SCI scores.

SCI score	Rating
> 78 - 100	Highly comparable to reference sites (above 25th percentile)
> 68 - 78	Comparable to below-average reference sites (between 5th and 25th percentiles)
> 45 - 68 > 22 - 45 0 - 22	} Increasingly different from reference condition

7.2 Refining the index

The preliminary breakdown of site scores in Table 7-1 could be refined and narrowed by reducing the index period and by examination of outliers:

- The length of the sampling index period (spring to fall) was shown to contribute to index variability, although not fatally. This variability could be reduced by restricting sampling to a smaller window in spring and early summer, for example, May and June.

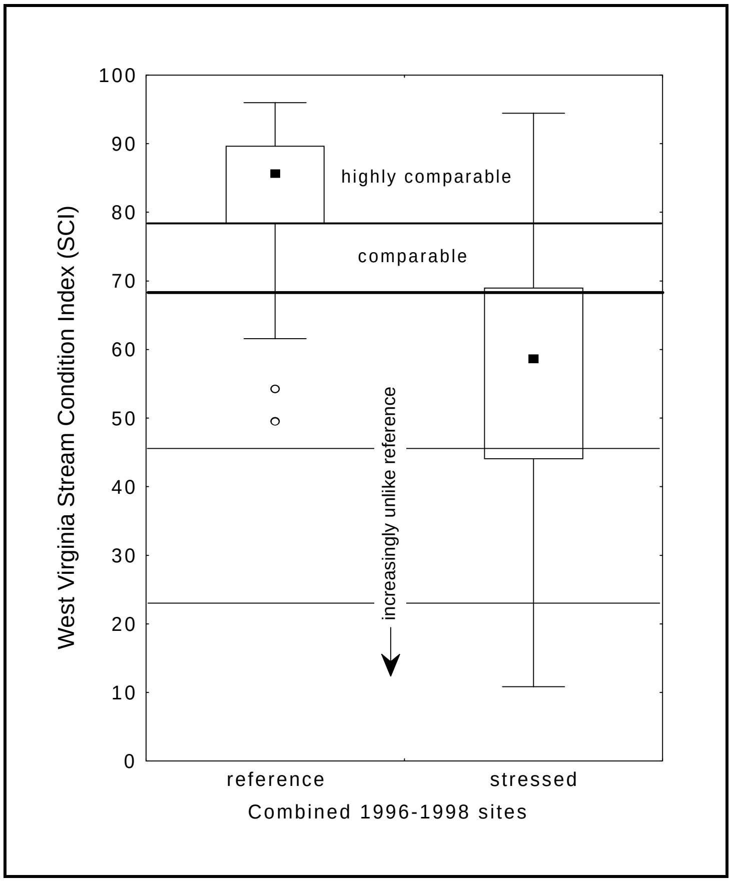


Figure 7-1. Reference and stressed sites, combined 1996-1998 data, and possible rating categories.

- Several reference sites scored low (less than 68) in the original data (and one in the test data). These outliers should be examined in more detail to determine if they were misidentified as reference sites, or if they are not representative of reference sites. They should not be excluded simply because of a low SCI score, but should be excluded if previously undetected human-caused stress or pollution is found at the sites (unknown discharges, erosion, non-point source pollution, habitat disruption).

- The outliers also may be excluded from the reference sites if their physical-chemical habitat is not representative of the other reference sites. For example, there were too few reference sites in limestone valleys to identify valley streams as a separate class. Limestone valley streams may be outliers, unless it can be demonstrated that they are similar to non-limestone streams. Another example of a non-representative outlier is a site where the stream bed is composed entirely of bedrock. The habitat in all-bedrock sites is impaired and not representative, although it is entirely natural. Such sites should be identified as special cases and removed from the list of reference sites, yet they should not be listed impaired in an assessment only because the (natural) habitat is impaired.

7.3 Maintaining the index

In West Virginia's sampling program, new reference sites will be sampled each year. Confidence in the index will be enhanced if new data are incorporated into the index, especially as more watersheds are sampled and a more representative coverage is obtained of the entire state.

New reference sites can be added to the reference data set, and both the metric standard values (Table 6-1) as well as the distribution of reference scores (Table 6-2) can be recalculated on an annual basis. As the database becomes more representative of the entire state, both the standard values and the distribution should become quite stable.

A larger reference site database will allow WVDEP to revisit the issue of classification, especially with respect to under-represented ecoregions in the current database (e.g., valley streams of the Ridge and Valley; Greenbrier Karst streams). Limestone valley streams are thought to be different from ridge streams, but there were not sufficient reference sites from the valley subregions to make this determination in the current database.

APPENDIX A

ANALYTICAL METHODS AND STEP-BY-STEP PROCESS

ANALYTICAL METHODS

The analytical framework used in site classification, final metric selection, biological index development, and development of scoring criteria follows that used in other states and regions (e.g., Barbour et al. 1996, Maxted et al. in press, Stribling et al. 1998), with application to West Virginia's biological sampling and monitoring program. The approach used for development of a regionally-calibrated multimetric biotic index for West Virginia streams (a Stream Condition Index, or SCI) followed these basic steps:

1) Develop database
2) Identify criteria for stream reference sites
3) Determine site classification strata
4) Compile and test candidate metrics
5) Combine metrics into an index
6) Test and validate the index (SCI)

A.1 Database development

Biological, habitat, and water quality data from 1996 and 1997 were received from West Virginia DEP as FoxPro® data files and were transferred into EDAS (Ecological Data Application System, version 1.1c) (Tetra Tech, 1999), for ongoing data management and analysis. In EDAS (a custom application developed for use with Microsoft Access97®), data, metadata, and other information reside in a series of relational tables, including: stations, samples, benthic taxa, chemistry, habitat, and related information. Use of a relational database such as EDAS allows for data elements to be stored in a compact, efficient manner that reduces the redundancy of spreadsheet-style data management systems. EDAS also incorporates pre-designed queries that can be used to calculate and export metrics and other needed information.

West Virginia's 1996-1997 data were collected during the months of May through September from 720 stream sampling sites. Each sample consisted of 100 macroinvertebrates identified to the family taxonomic level. In West Virginia's monitoring program, streams state-wide are sampled on a five-year cycle, with each year's sampling sites consisting of a subset of the entire state. In the 1996-1997 sampling seasons, sample sites were concentrated in an area across the central portion of the state (Figure 3-1).

A.2 Reference site criteria

Reference site selection criteria were developed by West Virginia DEP Watershed Assessment Program personnel to obtain reference conditions for streams that were assessed in the 1996 and 1997 field seasons. Generally, no effort was made to select candidate reference sites before assessments began. Reference site selection criteria are reported in Table A-1. To be classified as reference, a site must have met all of the listed conditions. Based on these criteria, West Virginia DEP identified 67 reference sites out of the 720 benthic sites sampled during the 1996-97 field seasons. Tetra Tech used the 67 reference sites identified by West Virginia to characterize reference conditions.

Table A-1. Reference criteria for West Virginia 1996-1997 Stream Assessment[1]

	Parameter	Criterion	Explanation
1	Dissolved oxygen	≥ 6.0 mg/l	Taken from "WV Water Quality Standards" as developed by the State Water Resources Board (SWRB)
2	pH	≥ 6.0 and ≤ 9.0	Conductivity and pH are based on observations of WAP and OWR data and from BPJ of experienced OWR field personnel
3	Conductivity	<500 umhos/cm	
4	Fecal coliform	<800 colonies/ 100 ml	This limit is double the maximum set by the SWRB (where the standard is no more than 400 colonies/100 ml in more than 10% of all samples taken during the month. Reference criterion value was raised to 800/100ml due to the lengthy holding time of fecal samples (24 hours in many cases). In addition, experienced field personnel have encountered fecal levels exceeding the standard in some streams where no human impacts were possible (possibly due to wildlife populations), so the higher level of 800/100ml would reduce the possibility of excluding some anthropogenically undisturbed streams from reference consideration.
5	No obvious sources of non-point-source pollution (NPS)		
6	Epifaunal substrate score	≥11	Criteria 6-11 are adapted from RBP habitat assessment modified for use in the USEPA/EMAP program. These criteria were selected because they are presumably most indicative of anthropogenic perturbation. A value ≥11 indicates that stream habitat is at least sub-optimal for that particular parameter. The WV WAP sampling strategy dictates that assessments be conducted at or near the mouths of streams. This strategy tends to bias the habitat scores (many sites are roadside-accessible or below bridges) and in many cases results in relatively low scores for those parameters which are most indicative of human disturbance. It is for this reason that the minimum values are set to 11 (#6-9) and 6 (#10). Otherwise, few streams (if any) would meet the selection criteria.
7	Channel alteration score	≥11	
8	Sediment deposition score	≥11	
9	Bank disruptive pressure score	≥11	
10	Riparian vegetation zone width score	≥6 (variable depending on watershed)	
11	Total habitat score	65% of maximum 240 (% is variable depending on watershed)	
12	Evaluation of anthropogenic activities and disturbances	Best professional judgement is employed to make reference site inclusions based on the number and type of disturbance. For example, a surface mine site would generally be considered a greater disturbance than the combination of an ATV trail and a small road and would exclude the site from reference condition consideration. However, impacts from the ATV trail and/or road may be considered so minor that they do not exclude the site from reference consideration.	
13	No known point source discharges upstream of assessment site		(completed after 1-12 are met)

[1] As provided in "WVDEP Watershed Assessment Program Reference Site Selection Guidance for Riffle/Run Streams" memo dated 2/4/98.

A.3 Site classification

Detection of changes in the biological assemblage due to human effects must take into account inherent differences due to natural factors. Natural variability in the macroinvertebrate assemblage may result from natural variability in the physical and chemical site characteristics across a geographic range. Much of the natural variability can often be accounted for by dividing the area into ecological regions (ecoregions; Omernik 1987). Level 3 ecoregions (Omernik 1987) have been used as an accepted geographic framework for delineating regions of relatively homogeneous natural conditions (e.g., Barbour et al. 1996). West Virginia data in this analysis were collected from sites in three Level 3 ecoregions: Ridge and Valley (No. 67), Western Allegheny Plateau (No. 70), and Central Appalachians (No. 69). We examined whether the Level 3 ecoregions accounted for variability of biota among sites, and whether additional physical and chemical information could account for the variability.

The geographic distribution of West Virginia sampling sites for 1996-1997 was not sufficiently broad to fully address site classification based on ecoregions (see Figure 3-1). Tetra Tech obtained data from EPA's Mid-Atlantic Highlands Assessment of the Environmental Monitoring and Assessment program (EMAP-MAHA) from 1993-1994 to expand the data set to achieve a sufficient geographic distribution of reference sites for analyzing possible site classification. Because of the use of different field collection methods in the two programs, EMAP and West Virginia data were not combined. Instead, West Virginia's reference site criteria (Table A-1) were applied as closely as possible to the EMAP data in order to select substitute reference sites for use in classification analysis. Water chemistry (criteria 1-3; Table A-1) and habitat (criteria 6-11; Table A-1) could b e applied to the EMAP data. Using this procedure, 80 EMAP sites (all riffles) were selected from the three ecoregions of Ridge and Valley (67), Western Allegheny Plateau (70), and Central Appalachians (69). The EMAP reference sites were not required to be located in West Virginia as long as they were located in an ecoregion that extended from an adjacent state into West Virginia. Locations of West Virginia sampling sites, EMAP sites, and EMAP reference sites are shown in Figure 3-1.

Alternative classification schemes were examined with multivariate ordination of the sampling sites based on their species composition, following methods outlined in Jongman et al. (1987) and Ludwig and Reynolds (1988). Ordination is a family of methods for reducing the dimensionality of multivariate information (many species in many sites), by placing sites or species in an order. The ordination method we use is non-metric multidimensional scaling (NMDS) using the Bray-Curtis dissimilarity coefficient. This method has been shown to be robust for ordination of species composition (e.g., Kenkel and Orloci 1986, Ludwig and Reynolds 1988) and has been used successfully for classification of stream communities (e.g., Barbour et al. 1996; Reynoldson et al. 1997).

NMDS is a nonlinear ordination that attempts to place sites in a spatial orientation that agrees with some distance measure between the sites. It is analogous to creating a map using only the distances between cities. In the case of our ordination of biological samples, the "distance" between two samples is their percent similarity, as measured by one of several similarity indexes. The Bray-Curtis index is the percent that two assemblages are similar to each other.

A matrix of Bray-Curtis similarities was calculated from the species-relative abundance data. This matrix was then used in the NMDS procedure. The NMDS ordination (McCune and Mefford 1995) follows the procedure of Kruskal (1964). The final ordination was required to have a stress coefficient (a measure of goodness-of-fit of the ordination to the original data) of less than 20%. This usually required 3 ordination axes. The final NMDS configuration was plotted (as a scatterplot) to determine any obvious groupings and to evaluate alternative classes (Figures 3-2 and 3-3). Candidate classifications were tested with similarity analysis (Van Sickle 1997) to determine the strength of the classification. This procedure calculates the mean similarity of sites within classes, and the mean similarity of sites among classes. The difference between the two is the % of dissimilarity that is explained or accounted for by the classification. Thus, a value of 10% indicates that the classification (say, ecoregions) explains 10% of the total dissimilarity (difference) among all sites (Table 3-1).

A.4 Testing of Candidate Metrics

Various attributes of the benthic macroinvertebrate community have been proposed as metrics to quantitatively characterize aspects of the community condition (e.g., Gibson et al. 1996, Stribling et al. 1998). Twenty-four candidate measures were considered for use with the West Virginia benthic macroinvertebrate data. These metrics were selected based upon their known or suspected ability to discriminate impairment. The 24 candidate metrics fall into five categories of community attributes: taxonomic composition, taxonomic richness or abundance, feeding or trophic groups, life habit, and degree of tolerance to stress in the environment.

A.4.1 Metric Categories

Taxonomic richness. Metrics in this category are counts of the distinct number of taxa within selected taxonomic groups. “Total taxa” and “EPT taxa” are widely used metrics that provide information on overall and group-specific taxonomic variety. “EPT taxa” measures richness in three insect orders known to be generally sensitive to disturbance (Ephemeroptera [mayflies], Plecoptera [stoneflies], and Trichoptera [caddisflies]), thereby conferring information both on variety and community tolerance. Other candidate metrics of this category are focused on different orders, families, or non-insect groups of ecological importance.

Taxonomic composition. These metrics are based on the proportion of individuals in a sample belonging to a specified taxonomic group. They are expressed as percentages and reveal the relative abundance of insect and non-insect groups, each of which may respond differently to environmental conditions and community dynamics.

Feeding group. The functional feeding group designation for an organism reflects the dominant mode of feeding, not the specific nutritional source or benefits (Cummins and Klug 1979, Merritt and Cummins 1984, Wallace and Webster 1996). Designations for each taxon include filterers, scrapers, collector-gatherers, predators, shredders, and others. Scrapers are those organisms that remove periphyton or other algal material and the associated microbes from mineral or vegetable substrates. Predators engulf or actively capture living animal tissue or prey. Collector-gatherers feed on organic materials that are deposited or trapped within episubstrate layers of fine sediments or detritus. Filterers trap, engulf, or strain suspended particulates from the water column that may be plant or animal in origin. Shredders chew and break up woody materials, coarse organic particulates, or living macrophyte tissue.

Habit. The habit description categorizes a benthic organism's behavior with regard to how it maintains its location or moves. Designations for a taxon include skaters, swimmers, divers, climbers, clingers, burrowers, and others. Although habit metrics have been used successfully, they are considered unreliable for family-level data, because there is no assurance that all genera in a family have the same habit. Because of this, habit metrics were not tested.

Tolerance/Intolerance. Tolerance of a taxon is based on its ability to survive short- and long-term exposure to organic pollution. The Hilsenhoff Biotic Index (HBI) weights each taxon in a sample by its proportion of individuals and the taxon's tolerance value. Following the basic framework established by Hilsenhoff (1982), tolerance values were assigned to individual taxa on a scale of 0-10, with 0 identifying those taxa least tolerant (most sensitive) to stressors, and 10 identifying those taxa most tolerant (least sensitive) to stressors. Tolerance values compiled by USEPA (USEPA 1990) and Merritt and Cummins (1984) were used for this analysis.

Specific metrics tested with West Virginia benthic macroinvertebrate data, grouped by the five categories described above, are presented in Table A-2 , along with the expected response of each metric to increasing impairment of the waterbody.

A.4.2 Metric discrimination ability

Metrics are selected for use in the multimetric index on the basis of their ability to differentiate between unimpaired, or reference, sites and sites whose physical and/or chemical quality is impaired. As previously noted, West Virginia DEP identified 67 reference sites according to physical and chemical parameters reported in Table A-1. Tetra Tech used the following criteria, using parameters similar to those used by WVDEP for identifying reference sites, to identify likely impaired sites. To be categorized as impaired, a site needed to meet only one of the listed conditions. Using these criteria, 69 sites were identified.

- Dissolved oxygen < 4.0 mg/l
- pH <4.0
- Conductivity > 1000 µmhos
- Epifaunal substrate score <7 and Total habitat score <120
- Channel alteration score <7 and Total habitat score <120
- Sediment deposition score <7 and Total habitat score <120
- Bank disruptive pressure score <7 and Total habitat score <120
- Riparian vegetation zone width score <4 and Total habitat score <120

Table A-2. Attributes of Benthic Macroinvertebrates used as Candidate Metrics, and Expected Response of Metric to Increasing Disturbance.

Category **Specific Metrics**	**Definition**	**Expected response** **▲ = increase** **▽ = decrease**
Taxonomic richness:	*Number of taxa:*	
Total taxa	in the entire sample; measures the overall variety of the macroinvertebrate assemblage	▽
EPT taxa	that is the sum of taxa in the insect orders Ephemeroptera, Plecoptera, and Trichoptera	▽
Ephemeroptera taxa	in the order Ephemeroptera (mayfly nymphs)	▽
Plecoptera taxa	in the order Plecoptera (stonefly naiads)	▽
Trichoptera taxa	in the order Trichoptera (caddisfly larvae)	▽
Diptera taxa	in the order Diptera (“true” flies)	▽
Chironomidae taxa	in the family Chironomidae (midge larvae)	▽
Taxonomic composition:	*Percent abundance (of individuals in the sample) of:*	
% Dominant taxon	the single most abundant taxon	▲
% 2 Dominant taxa	the 2 most abundant taxa	▲
%EPT	Ephemeroptera (mayfly nymphs), Plecoptera (stonefly naiads), and Trichoptera (caddisfly larvae)	▽
% Ephemeroptera	mayfly nymphs (order Ephemeroptera)	▽
% Plecoptera	stonefly naiads (order Plecoptera)	▽
% Trichoptera	caddisfly larvae (order Trichoptera)	▽
% Diptera	”true” fly larvae and pupae	▲
% Chironomidae	chironomid (midge) larvae pupae	▲
% Oligochaeta	aquatic worms	▲
Feeding groups	*Percent abundance of individuals belonging to the functional feeding group:*	
% Filterers	filterers	▲
% Scrapers	scrapers	▽
% Collectors	collectors	▽
% Predators	predators	▽
% Shredders	shredders	▽
Tolerance/Intolerance		
Intolerant taxa	Number of taxa with a Tolerance Value ≤3	▽
% Tolerant	Percent abundance of organisms with a Tolerance value ≥7	▲
Hilsenhoff Biotic Index (HBI)	Abundance-weighted average tolerance of assemblage of organisms	▲

Box-and-whisker plots were used to display differences in ranges of values of the metrics between stream-quality categories (reference and impaired sites). This type of plot displays the statistics of median value, minimum value, maximum value, and 25th and 75th percentile values of a population of sites. Figure A-1 illustrates how the statistical values are displayed by the box-and-whisker plots employed in this report (after Statsoft 1998). The box shows the range from the 25th percentile to the 75th percentile of the metric values (the interquartile range, or IQR), and whiskers show the range from the non-outlier minimum (often 0) to non-outlier maximum value. The non-outlier maximum limit is equal to the 75th percentile value plus 1.5 times the interquartile range, and the non-outlier minimum limit is equal to the 25th percentile value minus 1.5 times the interquartile range. The whiskers show the range of data values that are within these limits, not necessarily the actual 1.5*x* limits. *Extremes* are values that are either (1) greater than the 75th percentile value plus 3 times the interquartile range, or (2) less than the 25th percentile value minus 3 times the interquartile range (Figure A-1). *Outliers* are values falling between the 1.5×IQR whisker threshold and the 3×IQR *Extremes* threshold.

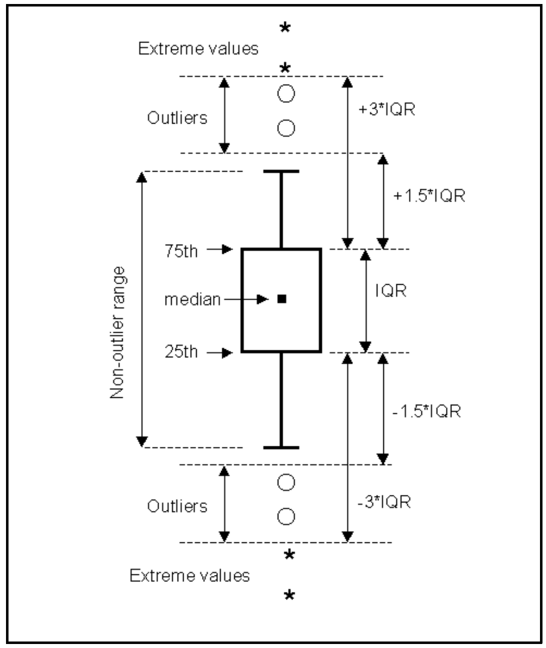


Figure A-1. Ranges of outliers and extremes in box-and-whisker plots (after Statsoft 1998). IQR is the interquartile range.

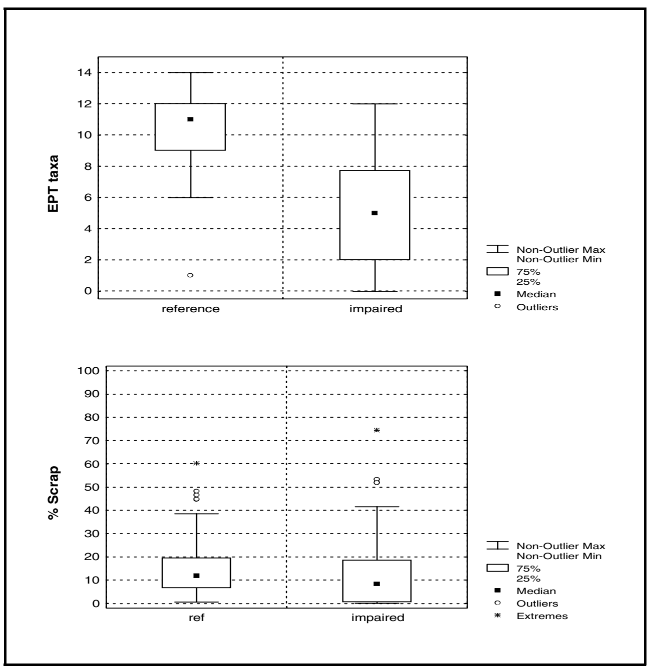


Figure A-2. Use of boxplots to discriminate between West Virginia reference and impaired sites. EPT taxa (top) shows better discrimination ability than does Percent Scrapers (bottom).

Boxplots of the metrics "EPT taxa" and "Percent Scrapers" may be examined to illustrate differences in the ability of the metrics to discriminate between reference and impaired sites. Figure A-2 illustrates these metric values calculated from the 1996-1997 West Virginia data. For the Percent Scrapers metric (Figure A-2, bottom), there is substantial overlap between the interquartile ranges of the reference and impaired populations of sampling sites. This metric does not differentiate well between the two populations of sites. In contrast, the EPT taxa metric (Figure A-2, top) shows no overlap between the interquartile ranges of the reference and impaired sites. This metric differentiates clearly between the two populations of sites.

For quantitative comparison of the discrimination ability of a metric, each metric's discrimination efficiency (DE) was examined. The DE of a particular metric measures the agreement between metric values and the reference status of a site. The DE is a numerical description of the degree of separation between metric value distributions of reference and impaired sites and is calculated as a percentage according to Equation 1:

(Eq. 1) $$DE = 100 * \frac{a}{b}$$

For metrics that are expected to decrease in value with increasing site impairment, such as Total taxa or %EPT, the values for a and b are:

a = the number of stressed samples scoring below the 25th percentile of the reference distribution
b = the total number of stressed samples

For metrics that are expected to increase in value with increasing site impairment, such as HBI or %Diptera, the value for a is:

a = the number of stressed samples scoring above the 75th percentile of the reference distribution

A higher DE indicated better performance of a metric, or a better ability to distinguish between unstressed and stressed conditions.

A.5 Index development

A multimetric index is a simple additive approach for combining metric value information from different types of biological metrics into a single numeric assessment value. Each metric, as described in Section A.4, is a quantitative measure of some specific attribute of the benthic community structure or composition. In developing a multimetric index, care is taken to include metrics that

- are most able to differentiate between reference and impaired sites,
- represent at least some different aspects of the community (species composition, richness, tolerance, feeding groups, and the like), and
- minimize redundancy among individual component metrics.

The process of multimetric index development involved first scoring the selected metrics and then averaging these scores into a single numerical index value. To score the metrics, the range of values for each metric was standardized on a 100-point scale, assigning all metric values a score ranging from 0 (worst) to 100 (best). The specific scoring procedure used for achieving the 100-point scoring range differed depending on the direction of expected response by the metric value to disturbance or impairment. For those metrics in which higher values are considered a "better" condition and lower values are considered "worse"(such as, %EPT in Table A-2, where the expected response to increasing perturbation is a decrease in %EPT individuals), the scoring procedure is described in section A.5.1 below. Conversely, for those metrics in which higher values are considered "worse," such as %Diptera in Table A-2, whose expected response to increasing perturbation is for the metric value to increase, the scoring procedure is described in section A.5.2 below. Note: in exceptionally high quality streams, one or more of a site's individual metrics may score greater than 100. The effect of such cases on the site index is addressed in Section A.5.3.

A.5.1 Scoring for metrics whose values are expected to decrease with site degradation

For metrics such as Total Taxa or %EPT, which are expected to decrease in value with increasing site impairment (i.e., higher values represent "better" sites), the 95th percentile metric value was assigned a score of 100. By choosing the 95th percentile value rather than the 100th percentile as the "best" score, we reduce the effect of unusual outlier values that might otherwise skew the ultimate index (Section A.5.3). Values between the minimum ("worst," usually 0) and the 95th percentile value (standard, or best value) were scored proportionally from 0 ("worst") to 100 ("best") according to Equation 2:

(Eq. 2) $$score = \left(\frac{x}{x_{95} - x_{min}}\right) x100;$$

where,
- x = the metric value
- x_{95} = the 95th percentile value
- x_{min} = the minimum possible value, usually 0.

A.5.2 Scoring for metrics whose values are expected to increase with site degradation

For metrics such as HBI or %Diptera, which are expected to increase in value with increasing site impairment (higher values represent "worse" sites), the 5th percentile metric value was assigned the "best" score of 100. Again, by choosing the 5th percentile value rather than the minimum value as the "best" score, we reduce the effect of unusual outlier values that might skew the ultimate index (Section A.5.3). For these metrics, values between the maximum ("worst") value in the range and the 5th percentile ("best") value were scored proportionally between 0 ("worst") and 100 ("best") according to Equation 3:

(Eq. 3) $$score = \left(\frac{x_{max} - x}{x_{max} - x_5}\right) x100;$$

where,
- x = the metric value
- x_5 = the 5th percentile value
- x_{max} = the maximum possible value; e.g., 100% for percentage metrics; 10 for HBI.

A.5.3 Combining scores into an index

By standardizing the metric values to a common 100-point scale, each of the metrics contributes to the combined index with equal weighting, and all of the metric scores represent increasingly "better" site conditions as scores increase toward 100. Once all metric values for sites were converted to scores on the 100-point scale, a single multimetric site index value was calculated by simply averaging the individual metric values for the site. To assure that each metric did indeed contribute equally to the final index, any individual metrics that may have scored greater than 100 in any exceptionally high quality stream sites were converted to a maximum score of 100 when averaging to calculate the index. An example of metric standardization, showing raw metric values, score standardization, and index scoring is given in Table A-3.

Table A-3. Metric standardization example for site WVMC-60-K (Glady Fork).

Metric	Change with impairment	Percentile for "best" value	Standard (best value)	Measured metric value	Standardized metric score
%EPT	decrease	95th	91.9	83	90
%Chironomidae	increase	5th	0.98	10	91
Total taxa	decrease	95th	21	16	76
EPT taxa	decrease	95th	13	10	77
% 2 dominant taxa	increase	5th	36	43	89
HBI	increase	5th	2.9	4	84
			Final index (SCI) value for the site:		85

A.6 Index validation and refinement

New data were received from West Virginia DEP in August 1999 for use in validating the working index. These data consisted of sampling and taxonomic results from 549 sites, sampled from four major basins during the 1998 field season and from one basin (Coal) during fall 1997 and not included with the previously analyzed data. For the working index to be valid, it should separate reference from stressed sites in the new data just as with the original data used to develop the index.

Reference and stressed sites in the new data set were identified using non-biological criteria as in the original data set. The same parameters used for identifying reference and stressed sites in the original 1996-1997 data were used where possible to identify the new data set's reference and stressed sites. WVDEP habitat data collection procedures differed somewhat in 1998 from earlier years, so that the selection criteria for reference and impaired sites were slightly modified for analysis of the 1998 validation data set. West Virginia DEP personnel identified 40 reference sites in the new data set using criteria similar to those used for the 1996-1997 calibration data set (Table A-1). To identify stressed sites in the new data, Tetra Tech used parameters similar to those used to identify the original data set's stressed sites, modified according to revised data collection procedures. Table A-4 lists selection criteria that were used to identify 102 stressed sites in the validation data.

To test the effectiveness of the working index, the six recommended metrics (Chapter 4) were calculated for the new data set. These metric values were standardized, and index values were calculated, as described in section A.5. The degree to which the recommended index correctly classified these new test data was examined by calculating the discrimination efficiency (DE) of the working index as applied to the new data. The DE of the working index for classifying the new data's reference sites was found according to Equation 1 (Section A.4.2), where:

> a = the number of reference sites from the test data (1998) scoring above the 25th percentile of the original data's reference sites, and,
>
> b = the total number of test data reference sites (n=40).

The DE of the working index for classifying the new data's stressed sites was found according to Equation 1 (Section A.4.2), where:

> a = the number of stressed sites from the test data scoring below the 25th percentile of the original data's reference sites, and,
>
> b = the total number of test data stressed sites (n=102).

Table A-4. Selection criteria for stressed sites in the new data set. A site was identified as stressed if it met at least one of the listed criteria.

	Stressed (sites meet at least one of the criteria) n=102
Dissolved oxygen (mg/L)	<4
pH	<4
Conductivity (µmhos)	>1000
Fecal coliform (colonies/100mL)	not used
Channel alteration score	<7 and total habitat score <120
Sediment deposition score	<7 and total habitat score <120
Riparian vegetation zone width:	
• Coal basin (1997); one combined score for both banks (as in original 1996-97 data)	<4 and total habitat score <120
• 1998 basins; reported separately for each bank	<2 for each bank, and total habitat score <120

Table A-4 (cont'd). Selection criteria for stressed sites in the new data set. A site was identified as stressed if it met at least one of the listed criteria.

	Stressed (sites meet at least one of the criteria) n=102
Bank disruptive pressure:	
• Coal basin (1997); one combined score for both banks (as in original 1996-97 data)	<7 and total habitat score <120
• 1998 basins; data not reported; substituted Bank Stability scores, reported separately for each bank	<4 for each bank and total habitat score <120
Epifaunal substrate score:	
• Coal basin (1997)	<7 and total habitat score <120
• 1998 basins, data not reported; no substitute parameter used	

Refinement of standard "best" values

Once the discrimination efficiency of the working index was found to be acceptable, the standard, or "best" values (section A.5) for each metric were re-determined by combining the original 1996-1997 data with the 1998 data. Percentile distributions of each metric's values were determined for the combined data set (n=1268 benthic samples). The standard, or "best" values, for each metric were revised to the 95th or 5th percentile (depending on the metric) of the distribution of this combined data set.

Consideration of the effect of different organism sub-sample sizes

Because WVDEP's benthic macroinvertebrates were sub-sampled to 200 organisms in the 1998 data, rather than 100 organisms as in the earlier data set, there was some concern over whether the difference would cause taxa richness metrics to be over-estimated in the new data (higher numbers of taxa simply because more organisms were counted and identified). Tetra Tech examined the correlation between the number of organisms and number of taxa (Total and EPT) in the reference sites of both data sets (Figure A-3) in order to determine whether it might be appropriate to apply a statistical procedure called rarefaction to the 200-organism data. This procedure would examine the distribution of metric values against sample size and adjust the two taxa richness metrics in larger-sized samples to what the expected values would be at the smaller 100-organism sample size. Although there does appear to be some effect between sample size (number of organisms) and taxa richness (wherein the number of taxa is greater in part simply because more organisms are counted and identified), the effect is not great with the family-level identifications of West Virginia's data. It was decided among Tetra Tech, EPA Region 3, and WVDEP that rarefaction would not be applied to the data, since WVDEP plans to continue the 200-organism subsampling protocol in their future biological monitoring, so that any effect from different sample sizes will be diminished as the bioassessment program progresses. The adjustment to the index, described above, of using distributions from all 1996-1998 data to determine each metric's standard/best value also will help to reduce possible effects from the different sub-sample sizes in the data.

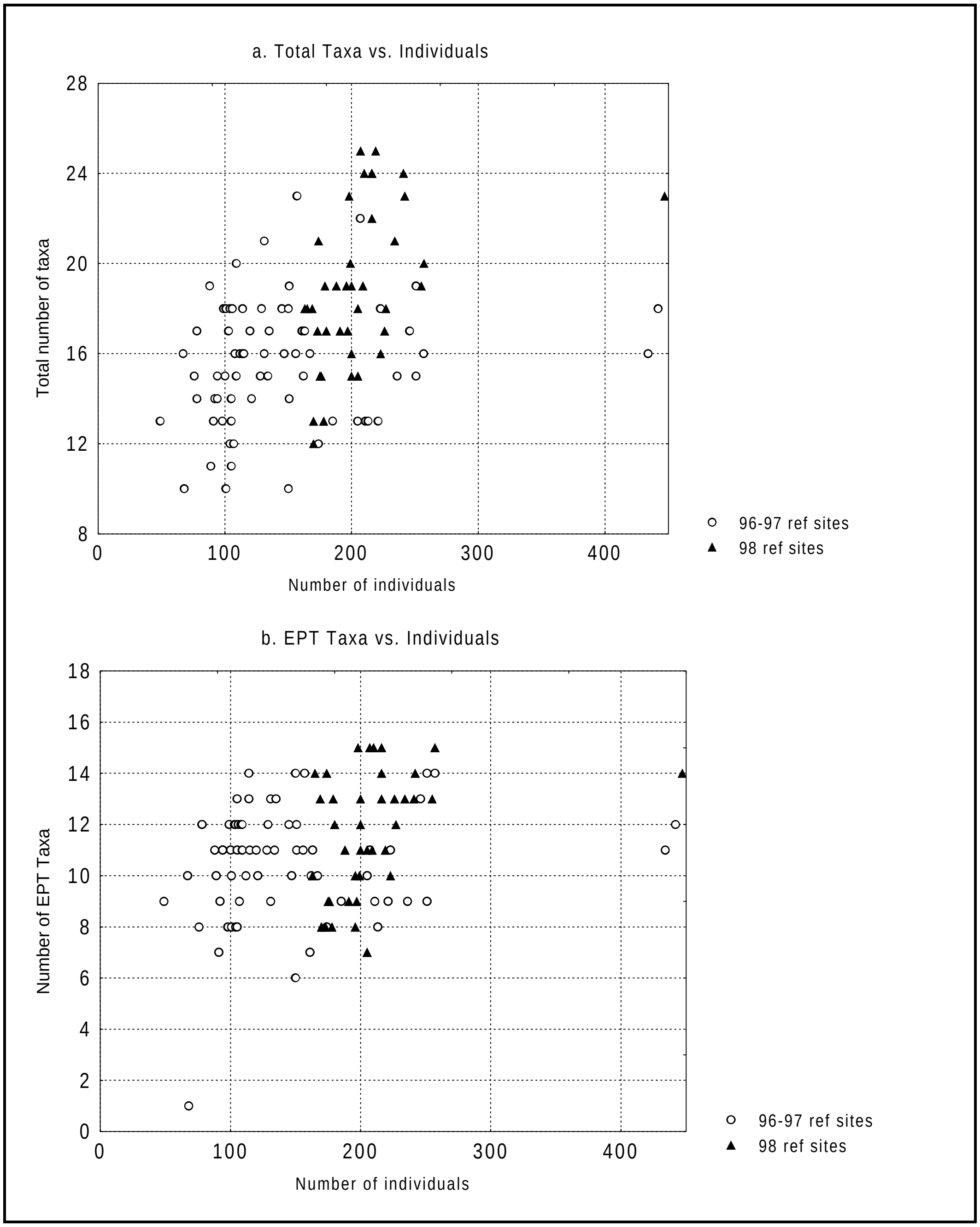


Figure A-3. Number of taxa (Total and EPT) vs. number of individual organisms in West Virginia benthic sampling reference sites.

APPENDIX B

LITERATURE CITED

LITERATURE CITED

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APPENDIX C

SITE METRICS AND METRIC SCORES

Appendix C

Site metrics and metric scores

Stations are grouped by data set (1= 1996-1997 calibration data; 2= 1997-1998 validation data). Within each data set, stations are listed by site type (reference, unlabeled, stressed), then within type by ascending Station ID.

Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
1	WVK-13	LITTLE SIXTEENMILE CREEK	reference	LOKAN B6	5/12/1997	15	71	9	69	91	99	6	95	65	55	4	85	79
1	WVK-14-B-1-97	U.T. OF FIVEFORK BRANCH	reference	LOKAN B10	5/12/1997	18	86	12	92	89	97	3	98	46	84	3	98	92
1	WVK-39-E-3-{0.6}97	BAYS FORK	reference	LOKAN B2	5/11/1997	20	95	12	92	68	74	6	95	33	105	3	95	92
1	WVK-39-M-1-A-{1.0}97	HOFFMAN HOLLOW	reference	LOKAN B93	6/12/1997	17	81	13	100	83	90	4	97	43	89	3	95	92
1	WVK-43-{156.2}	ELK RIVER	reference	ELK B143	7/8/1997	18	86	11	85	65	71	26	75	50	78	5	76	78
1	WVKE-102-A	CAMP CREEK	reference	ELK B155	7/9/1997	18	86	12	92	87	94	7	94	54	71	4	89	88
1	WVKE-111-S	FLINT RUN	reference	ELK B156	7/9/1997	12	57	8	62	93	101	3	98	71	46	3	97	77
1	WVKE-117-B	RIGHT FORK/LEATHERWOOD	reference	ELK B151	7/8/1997	14	67	11	85	87	94	5	96	55	70	4	89	84
1	WVKE-136-{0.5}	PROPS RUN	reference	ELK B128	7/6/1997	15	71	11	85	91	99	2	99	51	77	4	90	87
1	WVKE-137	LAUREL RUN	reference	ELK B132	7/7/1997	16	76	12	92	80	87	15	86	36	100	4	89	88
1	WVKE-14-P	PANTHER HOLLOW	reference	ELK B117	6/26/1997	13	62	9	69	86	94	7	94	68	49	3	101	78
1	WVKE-50-B-10	IKE FORK	reference	ELK B225	7/29/1997	16	76	10	77	79	86	3	98	45	86	3	94	86
1	WVKE-76-U-{0.8}	JOHNSON BRANCH	reference	ELK B21	7/22/1997	13	62	9	69	76	83	3	98	62	59	3	99	78
1	WVKE-98-C-1-0.5A	WILSON RUN	reference	ELK B136	7/7/1997	13	62	8	62	84	91	6	95	64	56	3	96	77
1	WVKE-98-C-14-{1.4}	FALL RUN	reference	ELK B20	7/22/1997	18	86	12	92	90	98	5	96	73	43	4	85	83
1	WVKE-98-C-15-{1.0}	BIG RUN/ LEFT FORK HOLLY	reference	ELK B141	7/8/1997	15	71	11	85	90	98	3	98	46	84	3	93	88
1	WVMC-12-A-{03}	LAUREL RN/BIG SANDY CK ABOVE PATTERSON RN	reference	CHEAT B100	6/19/1996	15	71	11	85	81	88	5	96	54	71	3	95	84
1	WVMC-2-A	DARNELL HOLLOW	reference	CHEAT B179	7/29/1996	18	86	12	92	79	86	7	94	42	90	4	85	89
1	WVMC-52-A	ROARING RUN	reference	CHEAT B185	7/29/1996	18	86	12	92	91	99	4	97	52	75	3	105	92
1	WVMC-54-A	MIKE RUN	reference	CHEAT B213	8/7/1996	13	62	9	69	93	102	2	99	57	67	4	90	81
1	WVMC-54-C	MAXWELL RUN	reference	CHEAT B204	7/30/1996	14	67	11	85	95	103	2	99	56	68	4	85	84
1	WVMC-60-C	ELKLICK RUN @ FERNOW EXP. FOREST	reference	CHEAT B17	6/11/1996	18	86	14	108	93	101	2	99	39	95	3	95	96
1	WVMC-60-C-3	JOHN B. HOLLOW	reference	CHEAT B23	6/11/1996	14	67	13	100	99	108	0	101	42	91	3	104	93
1	WVMC-60-C-4	HICKMAN SLIDE HOLLOW	reference	CHEAT B22	6/11/1996	23	110	14	108	57	62	6	95	36	100	4	87	91
1	WVMC-60-E	LAUREL RUN/DRY FORK	reference	CHEAT B25	6/11/1996	12	57	8	62	90	98	0	101	78	35	2	106	75
1	WVMC-60-F	OTTER CREEK	reference	CHEAT B27	6/11/1996	17	81	11	85	76	83	4	97	45	86	4	85	86
1	WVMC-60-I	MILL RUN /DRY FORK	reference	CHEAT B26	6/11/1996	21	100	13	100	74	81	3	98	31	107	3	94	95
1	WVMC-60-K	GLADY FORK	reference	CHEAT B50	6/13/1996	16	76	10	77	83	90	10	91	43	89	4	84	85
1	WVMC-60-K-2-A	HOG RUN/ PANTHER CAMP RUN	reference	CHEAT B180	7/29/1996	15	71	11	85	74	81	6	95	37	99	3	93	87
1	WVMC-60-N-8.5	TINGLER RUN/LAUREL FK	reference	CHEAT B47	6/12/1996	16	76	13	100	97	106	1	100	48	81	3	103	93
1	WVMC-60-T-1	LOWER TWO SPRING RUN	reference	CHEAT B8	6/10/1996	19	90	14	108	79	86	4	97	73	42	4	84	83
1	WVMC-60-T-2	UPPER TWO SPRING RUN	reference	CHEAT B15	6/10/1996	16	76	14	108	70	77	8	93	59	64	4	89	83
1	WVMC-60-T-3	SWALLOW ROCK RUN	reference	CHEAT B207	7/30/1996	15	71	8	62	57	62	22	78	38	97	4	89	76
1	WVMC-60-T-8	BIG RUN/ GANDY CK NEAR LEADING RIDGE MTN	reference	CHEAT B2	6/10/1996	17	81	12	92	90	98	2	99	50	77	3	97	91
1	WVMC-7	SCOTT RUN/CHEAT RIVER	reference	CHEAT B147	7/23/1996	10	48	1	8	35	38	7	94	71	46	5	64	49
1	WVMCS-12	LITTLE LAUREL RUN/SHAVERS FORK	reference	CHEAT B182	7/29/1996	13	62	11	85	94	103	5	96	48	82	4	90	86
1	WVMCS-14	CLIFTON RUN	reference	CHEAT B36	6/12/1996	18	86	14	108	89	97	4	97	42	90	4	91	94
1	WVMCS-28	UPPER PONDLICK RUN	reference	CHEAT B14	6/10/1996	17	81	12	92	92	100	1	100	38	96	3	105	95
1	WVMCS-53	BEAVER CREEK/SHAVERS FORK	reference	CHEAT B189	7/30/1996	19	90	11	85	84	92	2	99	39	96	3	97	93
1	WVMCS-54	SECOND FORK	reference	CHEAT B11	6/10/1996	13	62	8	62	76	82	12	89	61	61	3	103	76
1	WVMCS-8	LAUREL RUN/SHAVERS FK	reference	CHEAT B220	8/8/1996	15	71	11	85	90	98	6	95	37	99	3	101	91
1	WVMT-64-{6.7}	MILL CREEK	reference	TYVAR B377	9/10/1997	16	76	11	85	78	85	19	82	44	87	4	81	83
1	WVMT-64-C	GLADE RUN/MILL CREEK	reference	TYVAR B371	9/10/1997	19	90	12	92	83	90	9	92	47	83	4	83	89
1	WVMTB-31	RIGHT FORK BUCKHANNON RIVER	reference	TYVAR B363	9/9/1997	15	71	9	69	73	80	13	88	63	58	5	72	73
1	WVMTB-32-D	BEAR CAMP RUN	reference	TYVAR B389	9/16/1997	13	62	7	54	59	65	32	69	66	53	5	67	62
1	WVMTM-1	HANGING RUN	reference	TYVAR B287	8/25/1997	17	81	7	54	66	72	12	89	47	82	4	86	77
1	WVMTM-11-{7.6}	RIGHT FORK OF MIDDLE FORK	reference	TYVAR B350	9/8/1997	18	86	10	77	77	84	8	93	42	91	4	83	86
1	WVMTM-11-E	JENKS RUN	reference	TYVAR B296	8/26/1997	16	76	10	77	85	93	10	91	64	56	5	77	78
1	WVMTM-25-{1.5}	SCOOLCRAFT RUN	reference	TYVAR B320	8/27/1997	13	62	10	77	86	93	7	94	45	85	3	93	84
1	WVMTM-25-A	BIRCH FORK	reference	TYVAR B311	8/27/1997	17	81	13	100	96	104	1	100	65	55	4	87	87
1	WVMTM-26-B	ROCKY RUN	reference	TYVAR B364	9/9/1997	10	48	6	46	54	59	41	60	72	44	5	69	54
1	WVPNB-18	DIFFICULT CREEK	reference	NBRPO B264	8/13/1997	16	76	11	85	78	84	5	96	30	109	3	96	89
1	WVPNB-4-EE-7-{0.4}	UT OF NORTH FORK PATTERS ON CREEK	reference	NBRPO B259	8/12/1997	17	81	11	85	83	90	3	98	60	63	3	99	86
1	WVPSB-21-{33.7}	SOUTH FK /SOUTH BR POT @ FT. SEYBERT	reference	SBRPO B257	8/20/1996	22	105	11	85	52	56	3	98	54	72	4	86	83
1	WVPSB-28-D	MOYER FORK	reference	SBRPO B320	9/9/1996	14	67	12	92	96	105	1	100	37	98	2	106	93
1	WVPSB-28-EE-2-A	BACK RUN /BIG RUN	reference	SBRPO B238	8/20/1996	12	57	9	69	97	106	1	100	67	51	4	86	77
1	WVPSB-28-EE-3	TEETER CAMP RUN	reference	SBRPO B261	8/20/1996	15	71	10	77	72	79	9	92	66	53	5	72	74
1	WVPSB-28-EE-3-A	HEMLOCK RUN	reference	SBRPO B246	8/20/1996	11	52	8	62	90	97	6	95	57	67	4	82	76
1	WVPSB-28-EE-3-B	LEONARD SPRING RUN	reference	SBRPO B251	8/20/1996	11	52	10	77	49	54	0	101	58	65	3	94	74
1	WVPSB-28-EE-3-C	MIDDLE RIDGE HOLLOW	reference	SBRPO B253	8/20/1996	10	48	8	62	43	46	3	98	66	53	4	89	66
1	WVPSB-28-EE-3-D	BUD HOLLOW	reference	SBRPO B241	8/20/1996	14	67	9	69	53	58	4	97	48	82	4	88	77
1	WVPSB-28-G	ZEKE RUN	reference	SBRPO B333	9/10/1996	18	86	12	92	91	99	2	99	54	73	3	94	90
1	WVPSB-28-GG-1	VANCE RUN	reference	SBRPO B279	8/21/1996	14	67	10	77	81	88	10	91	43	89	4	88	83

Site metrics and metric scores

Stations are grouped by data set (1= 1996-1997 calibration data; 2= 1997-1998 validation data). Within each data set, stations are listed by site type (reference, unlabeled, stressed), then within type by ascending Station ID.

Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
1	WVPSB-28-GG-1-A	SAMS RUN /VANCE RUN	reference	SBRPO B277	8/21/1996	16	76	10	77	86	93	2	99	53	73	4	82	83
1	WVPSB-28-J.2	SHUCKLEFORD RUN	reference	SBRPO B330	9/10/1996	13	62	9	69	78	84	14	87	39	96	4	91	82
1	WVPSB-28-K-6-A	LOWER GULF RUN	reference	SBRPO B252	8/20/1996	16	76	11	85	91	99	1	100	59	64	4	85	85
1	WVPSB-9-{02.2}	MILL CREEK/SOUTH BR POT @ MOUTH	reference	SBRPO B300	8/27/1996	16	76	9	69	42	46	34	66	46	85	5	68	68
1	WVK-10-A	COOPER CREEK		LOKAN B13	5/13/1997	15	71	9	69	69	75	21	79	48	82	4	80	76
1	WVK-10-F	BARNETT FORK		LOKAN B26	5/14/1997	15	71	9	69	72	79	16	85	44	88	4	78	78
1	WVK-12-{20.7}	THIRTEEN MILE CREEK		LOKAN B52	5/19/1997	10	48	6	46	70	77	11	89	54	71	3	92	71
1	WVK-12-E-{2.4}	MUDLICK FORK		LOKAN B84	6/10/1997	20	95	7	54	24	26	18	82	46	84	6	59	67
1	WVK-12-E-2.5-{4.0}	U.T. OF MUDLICK FORK		LOKAN B90	6/11/1997	13	62	8	62	68	74	23	78	45	86	4	87	75
1	WVK-12-F-{5.0}	POPLAR FORK		LOKAN B100	6/16/1997	16	76	5	38	56	61	10	91	56	69	4	87	70
1	WVK-12-J	BEE RUN		LOKAN B47	5/19/1997	17	81	10	77	89	97	4	97	50	78	4	90	87
1	WVK-14-{2.2}	SIXTEENMILE CREEK		LOKAN B86	6/10/1997	10	48	4	31	70	77	21	80	77	36	3	97	61
1	WVK-14-A.5-{1.6}	U.T. OF SIXTEENMILE CREEK		LOKAN B37	5/14/1997	12	57	8	62	63	69	17	84	69	48	3	98	69
1	WVK-16-{12.8}	EIGHTEEN MILE CREEK		LOKAN B59	5/21/1997	17	81	10	77	72	78	22	79	65	54	3	96	77
1	WVK-16-{33.0}	EIGHTEEN MILE CREEK		LOKAN B97	6/16/1997	13	62	5	38	54	59	24	76	51	76	4	81	65
1	WVK-16-B	JAKES BRANCH		LOKAN B61	5/21/1997	13	62	8	62	42	46	54	46	72	44	6	62	54
1	WVK-16-J-3-{1.0}	SALTLICK CREEK		LOKAN B102	6/19/1997	11	52	3	23	23	25	66	34	82	28	6	53	36
1	WVK-16-L	SULUG CREEK		LOKAN B57	5/20/1997	16	76	9	69	93	101	3	98	61	62	3	96	83
1	WVK-16-Q-{1.0}	HARRIS BRANCH		LOKAN B88	6/11/1997	10	48	7	54	80	87	15	86	55	71	4	85	72
1	WVK-16-S	COTTRELL RUN		LOKAN B54	5/20/1997	18	86	12	92	69	75	4	97	58	66	5	70	81
1	WVK-22-{6.0}	HURRICANE CREEK		LOKAN B89	6/11/1997	12	57	4	31	29	31	47	53	69	49	6	55	46
1	WVK-22-B	POPLAR FORK		LOKAN B76	5/28/1997	15	71	6	46	34	37	48	53	65	55	5	67	55
1	WVK-29-{61.0}	POCATALICO RIVER		LOKAN B85	6/10/1997	10	48	4	31	56	61	35	66	58	66	5	75	58
1	WVK-32-0.1A	VINTROUX HOLLOW		LOKAN B43	5/15/1997	9	43	2	15	4	4	79	21	88	20	7	44	25
1	WVK-32-A	ROCKSTEP RUN		LOKAN B42	5/15/1997	8	38	3	23	1	2	67	33	93	10	7	46	25
1	WVK-36-{2.4}	FINNEY BRANCH		LOKAN B87	6/11/1997	13	62	8	62	88	95	1	100	58	65	4	92	79
1	WVK-39-{03.6}	DAVIS CREEK		LOKAN B14	5/13/1997	13	62	8	62	68	74	26	75	74	41	4	86	67
1	WVK-39-{12.2}	DAVIS CREEK		LOKAN B91	6/12/1997	12	57	8	62	79	86	13	88	62	59	4	89	73
1	WVK-39-A	WARD HOLLOW		LOKAN B25	5/13/1997	7	33	1	8	5	5	43	58	83	26	8	32	27
1	WVK-39-E-3-{0.4}	BAYS FORK		LOKAN B1	5/8/1997	17	81	10	77	68	74	10	91	48	82	4	90	82
1	WVK-39-F	RAYS BRANCH		LOKAN B3	5/11/1997	11	52	6	46	9	9	81	19	89	17	7	45	31
1	WVK-39-J	COAL HOLLOW		LOKAN B12	5/13/1997	7	33	2	15	2	2	93	7	95	8	7	44	18
1	WVK-39-O	SHREWSBURY HOLLOW		LOKAN B21	5/13/1997	17	81	12	92	73	79	19	81	51	77	4	88	83
1	WVK-41	TWOMILE CREEK		LOKAN B22	5/13/1997	4	19	1	8	3	3	85	15	93	12	7	42	16
1	WVK-41-D.5	RICH FORK/TWO MILE		LOKAN B41	5/15/1997	2	10	0	0	0	0	98	2	100	0	7	44	9
1	WVK-41-D.5-B	CRAIGS BRANCH		LOKAN B40	5/15/1997	7	33	3	23	10	11	86	14	91	14	7	47	24
1	WVK-41-D-1	U.T. OF LEFT FORK / KANAWHA TWO MILE		LOKAN B23	5/13/1997	7	33	2	15	1	1	44	57	86	21	8	27	26
1	WVK-41-E-1	EDENS FORK		LOKAN B55	5/20/1997	14	67	7	54	30	33	51	49	62	59	6	59	53
1	WVK-41-E-2-{0.1}	HOLMES BRANCH		LOKAN B31	5/14/1997	7	33	1	8	2	2	22	79	95	7	9	13	24
1	WVK-41-E-2-{1.4}	HOLMES BRANCH		LOKAN B98	6/16/1997	13	62	8	62	3	4	16	85	96	6	9	11	38
1	WVK-41-E-2-{1.7}	HOLMES BRANCH		LOKAN B44	5/16/1997	12	57	7	54	78	85	10	91	54	72	4	86	74
1	WVK-42	JOPLIN BRANCH		LOKAN B18	5/13/1997	5	24	1	8	2	2	95	5	97	5	7	43	14
1	WVK-43-{1.2}	ELK RIVER		ELK B238	8/7/1997	14	67	7	54	75	82	1	100	47	84	5	75	77
1	WVK-43-{63.0}	ELK RIVER		ELK B236	8/5/1997	19	90	13	100	88	95	3	98	46	85	4	88	93
1	WVK-43-{87.4}	ELK RIVER		ELK B237	8/5/1997	16	76	10	77	85	92	1	100	66	53	3	94	82
1	WVK-9-C-{5.4}	LOWER NINEMILE CREEK		LOKAN B80	6/9/1997	14	67	7	54	64	70	9	92	52	74	4	82	73
1	WVKE-102-{14.6}	LAUREL CREEK		ELK B173	7/15/1997	20	95	11	85	82	89	1	100	45	86	4	84	90
1	WVKE-102-{2.83}	LAUREL CREEK		ELK B157	7/9/1997	10	48	6	46	92	100	5	96	76	38	5	73	67
1	WVKE-102-C-1-{0.4}	UT OF BROOKS CREEK		ELK B161	7/9/1997	10	48	4	31	60	66	22	78	71	46	5	69	56
1	WVKE-111-{0.2}	BACK FORK		ELK B153	7/9/1997	15	71	10	77	58	63	36	65	58	66	5	71	69
1	WVKE-111-K	SUGAR CREEK		ELK B160	7/9/1997	17	81	13	100	61	67	23	78	45	85	4	80	82
1	WVKE-111-K-2	LITTLE SUGAR CREEK		ELK B158	7/9/1997	16	76	10	77	79	85	6	95	48	81	3	98	85
1	WVKE-111-Q	BIG RUN/ BACK FORK ELK		ELK B154	7/9/1997	15	71	10	77	87	95	5	96	61	61	4	87	81
1	WVKE-115	STEPS RUN		ELK B152	7/8/1997	12	57	6	46	76	83	4	97	63	58	4	81	70
1	WVKE-117	LEATHERWOOD CREEK		ELK B144	7/8/1997	15	71	11	85	83	90	10	91	42	90	4	88	86
1	WVKE-118	BERGOO CREEK		ELK B139	7/8/1997	15	71	10	77	77	84	14	87	38	97	4	87	84
1	WVKE-124	BIG RUN		ELK B140	7/8/1997	17	81	11	85	85	93	7	94	47	83	3	97	89
1	WVKE-128	HICKORYLICK RUN		ELK B130	7/7/1997	20	95	14	108	79	86	5	96	42	91	4	89	93
1	WVKE-13	NARROW BRANCH		ELK B116	6/26/1997	9	43	6	46	85	92	0	101	57	67	4	78	71
1	WVKE-138	BIG SPRING FORK		ELK B164	7/14/1997	15	71	8	62	42	46	20	81	51	76	5	72	68
1	WVKE-139	OLD FIELD FORK		ELK B134	7/7/1997	14	67	11	85	90	98	6	94	71	45	5	74	77
1	WVKE-139-B	CROOKED FORK		ELK B199	7/22/1997	17	81	12	92	72	78	15	86	57	67	4	78	80
1	WVKE-14-G-1-{0.8}	RIGHT FORK OF SLACK BRANCH		ELK B162	7/13/1997	12	57	6	46	84	92	4	97	76	38	3	102	72

Site metrics and metric scores

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Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
1	WVKE-14-G-2	WHITE OAK FORK		ELK B111	6/25/1997	5	24	3	23	94	102	0	101	92	12	2	107	60
1	WVKE-14-K	JOE'S HOLLOW		ELK B19	6/25/1997	8	38	3	23	78	85	6	95	75	39	4	81	60
1	WVKE-14-M	MORRIS FORK		ELK B121	6/27/1997	7	33	3	23	91	99	3	98	79	33	3	95	64
1	WVKE-14-M-2	MUDLICK BRANCH		ELK B110	6/25/1997	6	29	1	8	76	82	0	101	85	24	3	104	57
1	WVKE-14-O-{5.2}	MIDDLE FORK		ELK B174	7/15/1997	16	76	8	62	61	66	8	93	48	81	4	81	76
1	WVKE-14-O-0.5	MCBRIDE HOLLOW		ELK B115	6/26/1997	16	76	9	69	68	74	7	94	34	103	5	74	81
1	WVKE-19-B	TWO MILE FORK		ELK B126	7/1/1997	15	71	9	69	64	70	6	95	30	109	4	79	81
1	WVKE-19-H	PETES FORK		ELK B159	7/9/1997	12	57	6	46	59	64	4	97	49	79	5	77	70
1	WVKE-21	LEATHERWOOD CREEK		ELK B114	6/26/1997	15	71	8	62	30	33	28	73	68	50	6	59	58
1	WVKE-23-{0.43}	BIG SANDY CREEK		ELK B193	7/21/1997	13	62	6	46	57	62	4	97	51	76	4	84	71
1	WVKE-23-F-1	DOELICK RUN		ELK B195	7/21/1997	12	57	5	38	61	66	0	101	44	88	4	88	73
1	WVKE-23-P-3-A	HORSE RUN		ELK B25	7/23/1997	15	71	8	62	64	70	10	91	38	97	4	79	78
1	WVKE-2-E	GREEN BOTTOM		ELK B18	6/25/1997	11	52	4	31	7	8	65	35	79	34	7	46	34
1	WVKE-3	NEWHOUSE BRANCH		ELK B125	7/1/1997	7	33	0	0	0	0	34	66	85	23	8	25	25
1	WVKE-34	CAMP CREEK		ELK B181	7/16/1997	7	33	3	23	65	71	22	79	55	71	5	65	57
1	WVKE-37-B	LAUREL FORK		ELK B113	6/26/1997	14	67	4	31	54	58	34	67	60	62	6	61	58
1	WVKE-37-D	SUMMERS FORK		ELK B120	6/26/1997	15	71	5	38	43	47	46	54	74	40	6	58	51
1	WVKE-4	COONSKIN BRANCH		ELK B17	6/25/1997	12	57	4	31	35	38	44	56	68	50	6	61	49
1	WVKE-40	LITTLE SYCAMORE CREEK		ELK B27	7/23/1997	9	43	5	38	90	98	6	95	72	44	3	96	69
1	WVKE-41	SYCAMORE CREEK		ELK B213	7/24/1997	15	71	6	46	80	87	6	95	50	79	4	82	77
1	WVKE-41-A	CHARLEY BRANCH		ELK B170	7/15/1997	19	90	12	92	81	88	11	90	45	86	4	88	89
1	WVKE-41-B-{0.2}	ADONIJAH FORK		ELK B185	7/17/1997	13	62	5	38	86	93	2	99	58	65	5	77	72
1	WVKE-41-B-1.5	LAUREL FORK		ELK B189	7/17/1997	16	76	6	46	87	95	1	100	75	40	5	75	72
1	WVKE-41-C-1	GRASSY FORK		ELK B187	7/17/1997	9	43	4	31	57	62	33	68	56	69	5	66	56
1	WVKE-45-B	LICK BRANCH		ELK B218	7/28/1997	13	62	5	38	64	69	4	97	50	78	5	71	69
1	WVKE-46-{1.2}	LEATHERWOOD CREEK		ELK B235	7/31/1997	15	71	7	54	55	60	13	88	49	80	5	74	71
1	WVKE-49	PISGAH RUN		ELK B221	7/28/1997	20	95	11	85	75	81	4	97	54	72	3	98	88
1	WVKE-50-{0.2}	BUFFALO CREEK		ELK B234	7/31/1997	13	62	7	54	81	88	11	90	56	68	4	85	75
1	WVKE-50-B-{0.1}	LILLY FORK		ELK B230	7/30/1997	16	76	9	69	80	87	3	98	40	93	4	83	85
1	WVKE-50-B-1-{2.0}	SINNETT BRANCH		ELK B233	7/30/1997	16	76	10	77	77	84	5	96	56	68	3	102	83
1	WVKE-50-B-7-{0.1}	JIM YOUNG FORK		ELK B226	7/29/1997	7	33	2	15	50	54	9	92	64	57	5	77	55
1	WVKE-50-B-8	BEECH FORK		ELK B222	7/29/1997	13	62	8	62	87	94	3	98	49	79	4	87	80
1	WVKE-50-B-9	SYCAMORE RUN		ELK B228	7/29/1997	14	67	9	69	71	77	11	90	57	67	4	81	75
1	WVKE-50-F-{2.2}	SAND FORK		ELK B232	7/30/1997	16	76	8	62	71	77	13	88	45	86	4	86	79
1	WVKE-50-I	ROCKCAMP RUN		ELK B231	7/30/1997	13	62	7	54	78	85	1	100	30	109	3	92	82
1	WVKE-50-I-3	HICKORY FORK		ELK B224	7/29/1997	3	14	2	15	95	104	0	101	95	7	5	69	51
1	WVKE-50-O	ROBINSON FORK		ELK B227	7/29/1997	16	76	8	62	64	70	7	94	43	89	4	85	79
1	WVKE-50-P	TAYLOR CREEK		ELK B229	7/29/1997	2	10	1	8	50	54	50	50	100	0	5	77	33
1	WVKE-50-S	DILLE RUN		ELK B223	7/29/1997	6	29	3	23	99	108	0	101	99	2	3	101	59
1	WVKE-50-T	PHEASANT RUN		ELK B220	7/28/1997	6	29	3	23	44	48	3	98	91	13	4	85	49
1	WVKE-56	SPREAD RUN		ELK B212	7/24/1997	14	67	9	69	92	100	1	100	68	50	4	91	79
1	WVKE-59	TURKEY RUN		ELK B214	7/24/1997	5	24	1	8	22	24	0	101	56	69	5	74	50
1	WVKE-6-{5.6}	MILL CREEK		ELK B127	7/3/1997	14	67	6	46	39	42	3	98	49	79	4	81	69
1	WVKE-64	BIG OTTER CREEK		ELK B192	7/21/1997	13	62	6	46	89	96	7	94	74	40	4	79	70
1	WVKE-69-{5.6}	GROVES CREEK		ELK B188	7/17/1997	19	90	11	85	82	89	7	94	37	98	4	88	91
1	WVKE-70-A	ROAD FORK		ELK B183	7/16/1997	11	52	5	38	69	75	8	93	53	73	5	75	68
1	WVKE-74-{10.4}	STRANGE CREEK		ELK B23	7/22/1997	14	67	9	69	68	74	7	94	44	87	4	89	80
1	WVKE-74-F	BIG RUN		ELK B198	7/22/1997	21	100	12	92	59	65	13	88	28	113	3	92	89
1	WVKE-76-{0.9}	BIRCH RIVER		ELK B186	7/17/1997	10	48	5	38	64	70	19	82	49	79	4	81	66
1	WVKE-76-A	LEATHERWOOD RUN		ELK B26	7/23/1997	13	62	7	54	62	68	4	97	47	83	3	97	77
1	WVKE-76-C	MIDDLE RUN		ELK B197	7/21/1997	14	67	9	69	85	93	8	93	58	66	3	93	80
1	WVKE-76-D-1	BUCKEYE FORK		ELK B180	7/16/1997	15	71	9	69	65	70	13	88	37	98	5	76	79
1	WVKE-76-E-{2.6}	LITTLE BIRCH RIVER		ELK B182	7/16/1997	13	62	6	46	44	48	29	72	54	72	5	67	61
1	WVKE-76-E-5	WINDY RUN		ELK B178	7/15/1997	13	62	9	69	78	84	6	95	47	84	4	80	79
1	WVKE-76-E-6-A	SENG RUN		ELK B176	7/15/1997	12	57	7	54	90	98	2	99	75	38	4	81	71
1	WVKE-76-E-7.5	FISHER RUN		ELK B171	7/15/1997	17	81	9	69	70	76	18	83	52	74	5	70	76
1	WVKE-76-N-{2.4}	ANTHONY CREEK		ELK B24	7/23/1997	20	95	10	77	87	95	1	100	46	84	3	96	91
1	WVKE-76-N-8	RICH FORK		ELK B211	7/24/1997	20	95	12	92	75	82	5	95	45	86	4	91	90
1	WVKE-76-O	POPLAR CREEK		ELK B29	7/23/1997	17	81	10	77	92	101	2	99	63	58	3	95	85
1	WVKE-76-S.3	OTTER HOLE		ELK B28	7/23/1997	18	86	10	77	72	78	6	95	37	98	4	90	87
1	WVKE-76-W	JACKS RUN		ELK B172	7/15/1997	7	33	2	15	10	11	23	78	80	31	6	60	38
1	WVKE-7-E	KAUFMAN BRANCH		ELK B15	6/24/1997	9	43	3	23	32	35	48	53	79	33	6	53	40
1	WVKE-84.5	BEAR RUN		ELK B191	7/21/1997	10	48	4	31	33	36	48	53	65	55	6	62	47

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Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
1	WVKE-85	LITTLE BUFFALO CREEK		ELK B196	7/21/1997	16	76	8	62	63	69	27	74	72	44	5	74	67
1	WVKE-87-B	LAUREL FORK		ELK B217	7/28/1997	16	76	5	38	47	52	16	84	47	82	6	62	66
1	WVKE-88	OLD WOMAN RUN		ELK B219	7/28/1997	10	48	3	23	10	10	21	79	79	32	8	25	36
1	WVKE-9-{1.5}	LITTLE SANDY CREEK		ELK B147	7/8/1997	12	57	6	46	48	53	20	81	42	91	5	70	66
1	WVKE-9-{15.0}	LITTLE SANDY CREEK		ELK B148	7/8/1997	8	38	3	23	79	86	6	95	70	46	4	85	62
1	WVKE-91	WOLF CREEK		ELK B179	7/15/1997	15	71	6	46	64	70	15	86	36	100	4	82	76
1	WVKE-91-A-1	SPRUCE FORK		ELK B177	7/15/1997	12	57	9	69	69	75	29	72	61	61	5	67	67
1	WVKE-94	FLATWOODS RUN		ELK B216	7/28/1997	16	76	7	54	38	41	4	97	43	89	4	86	74
1	WVKE-98-A	KANAWHA RUN		ELK B131	7/7/1997	12	57	8	62	67	73	28	73	72	44	5	66	62
1	WVKE-98-B	RIGHT FORK HOLLY RIVER		ELK B168	7/14/1997	20	95	12	92	81	88	5	96	45	86	4	85	90
1	WVKE-98-B-{13.6}	RIGHT FORK/HOLLY RIVER		ELK B175	7/15/1997	19	90	9	69	69	75	19	82	45	85	4	79	80
1	WVKE-98-B-16	DESERT FORK		ELK B166	7/14/1997	16	76	10	77	85	93	6	95	41	92	3	94	88
1	WVKE-98-B-16.4	UPPER MUDLICK		ELK B169	7/14/1997	13	62	9	69	86	93	10	91	70	47	4	79	74
1	WVKE-98-B-3-{0.6}	FALL RUN		ELK B129	7/7/1997	20	95	12	92	76	82	15	86	58	66	3	92	86
1	WVKE-98-B-8	WEASE RUN		ELK B135	7/7/1997	14	67	7	54	82	89	4	97	66	53	4	80	73
1	WVKE-98-C-{10.0}	LEFT FORK/HOLLY RIVER		ELK B145	7/8/1997	15	71	9	69	74	80	21	80	45	85	5	76	77
1	WVKE-98-C-{13.8}	LEFT FORK/HOLLY RIVER		ELK B146	7/8/1997	16	76	10	77	85	92	4	97	45	85	4	85	85
1	WVKE-98-C-1	LAURELPATCH RUN		ELK B133	7/7/1997	17	81	8	62	81	88	12	89	58	66	4	80	78
1	WVKE-98-C-11	LAUREL FORK		ELK B190	7/18/1997	15	71	10	77	62	67	10	91	41	92	4	88	81
1	WVKE-98-C-11-C	RIGHT FORK/LAUREL FORK		ELK B22	7/22/1997	11	52	7	54	92	100	5	96	89	17	3	105	70
1	WVKE-98-C-2	OLDLICK RUN		ELK B150	7/8/1997	13	62	6	46	68	74	23	78	48	82	5	74	69
1	WVKE-98-C-2-D	COUGAR FORK		ELK B165	7/14/1997	13	62	10	77	76	83	5	96	39	96	4	89	84
1	WVKE-98-C-5	LONG RUN		ELK B149	7/8/1997	12	57	8	62	89	97	4	97	59	65	4	83	77
1	WVKE-98-C-6	BEAR RUN		ELK B138	7/8/1997	18	86	10	77	77	84	7	94	60	63	4	81	81
1	WVKE-9-B-1	BIG FORK		ELK B112	6/26/1997	11	52	2	15	13	14	61	40	72	44	6	54	37
1	WVKE-9-C-{0.6}	AARON'S FORK		ELK B137	7/8/1997	13	62	5	38	65	71	2	99	54	72	5	76	70
1	WVKE-9-E	BULLSKIN BRANCH		ELK B122	7/1/1997	13	62	7	54	64	70	16	85	42	90	5	77	73
1	WVKE-9-G	RUFFNER BRANCH (DOUGLAS BRANCH)		ELK B118	6/26/1997	15	71	9	69	53	57	38	63	64	56	5	68	64
1	WVKE-9-I-1-A	HARPER HOLLOW		ELK B123	7/1/1997	16	76	8	62	81	88	4	97	53	74	4	83	80
1	WVKP-16-{4.5}	GRAPEVINE CREEK		LOKAN B83	6/10/1997	16	76	9	69	55	60	12	88	44	88	4	81	77
1	WVKP-16-B	BROADTREE RUN		LOKAN B4	5/12/1997	9	43	2	15	2	2	75	25	87	21	7	41	25
1	WVKP-16-D	VANCE HOLLOW		LOKAN B11	5/12/1997	18	86	12	92	88	96	7	94	63	57	4	83	85
1	WVKP-17-B-5	FIRST CREEK / MIDDLE FORK		LOKAN B16	5/13/1997	16	76	10	77	83	91	6	95	56	69	3	93	84
1	WVKP-17-C-1-A	DAN SLATER HOLLOW		LOKAN B27	5/14/1997	13	62	9	69	76	83	18	83	64	57	4	86	73
1	WVKP-17-C-4	RAILROAD HOLLOW		LOKAN B34	5/14/1997	12	57	8	62	84	92	13	88	60	62	4	78	73
1	WVKP-17-E-{2.6}	DUDDEN FORK		LOKAN B92	6/12/1997	10	48	4	31	77	84	2	99	67	52	3	104	69
1	WVKP-17-F-1	LOOM TREE HOLLOW		LOKAN B19	5/13/1997	11	52	8	62	94	103	4	97	69	49	4	79	73
1	WVKP-17-G	FABER HOLLOW		LOKAN B15	5/13/1997	19	90	12	92	89	97	9	92	47	83	3	97	92
1	WVKP-1-B	BIGGER BRANCH		LOKAN B39	5/15/1997	14	67	11	85	68	74	31	69	63	58	5	75	71
1	WVKP-20	RACCOON CREEK		LOKAN B8	5/12/1997	15	71	9	69	39	43	57	43	74	41	6	63	55
1	WVKP-21	PERNEL BRANCH		LOKAN B7	5/12/1997	18	86	11	85	83	91	14	87	79	33	5	74	76
1	WVKP-26	CAMP CREEK		LOKAN B5	5/12/1997	6	29	1	8	4	4	92	8	96	6	7	44	16
1	WVKP-28	GREEN CREEK (REFERENCE)		LOKAN B74	5/28/1997	17	81	12	92	65	70	21	80	55	70	4	80	79
1	WVKP-28-A-1-{0.7}	HUNT FORK		LOKAN B94	6/12/1997	13	62	9	69	71	78	17	84	38	97	4	81	78
1	WVKP-28-B-1	BEAR BRANCH		LOKAN B72	5/28/1997	19	90	13	100	74	81	11	90	48	82	4	79	87
1	WVKP-28-E	ANDERSON LICK RUN		LOKAN B71	5/28/1997	10	48	5	38	30	33	61	40	72	43	6	59	44
1	WVKP-29	STRAIGHT CREEK		LOKAN B9	5/12/1997	18	86	11	85	41	45	52	49	67	51	5	69	64
1	WVKP-32-.5A	SUGAR CAMP HOLLOW		LOKAN B77	5/28/1997	18	86	12	92	87	95	8	93	56	69	4	85	87
1	WVKP-32-{1.0}	WOLF CREEK		LOKAN B96	6/12/1997	16	76	9	69	60	66	19	82	46	85	4	92	78
1	WVKP-33-{5.8}	TRACE FORK/FLAT FORK		LOKAN B81	6/9/1997	10	48	7	54	88	96	0	101	74	41	2	107	73
1	WVKP-33-D-{0.8}	COON RUN		LOKAN B79	6/9/1997	13	62	7	54	67	73	12	89	44	87	4	87	75
1	WVKP-33-G	CABBAGE FORK		LOKAN B67	5/22/1997	12	57	5	38	70	76	13	88	77	36	5	69	61
1	WVKP-36-B	BONER HOLLOW		LOKAN B66	5/22/1997	14	67	10	77	94	102	0	101	78	34	4	82	77
1	WVKP-37-A	SNAKE HOLLOW		LOKAN B70	5/22/1997	14	67	10	77	80	87	0	101	42	91	3	99	87
1	WVKP-38-.8A	GREATHOUSE HOLLOW		LOKAN B68	5/22/1997	13	62	9	69	94	102	3	98	57	68	3	93	82
1	WVKP-38-D	HOLLYWOOD FORK		LOKAN B69	5/22/1997	15	71	9	69	61	66	11	90	45	86	4	84	78
1	WVKP-4	HARMOND CREEK		LOKAN B29	5/14/1997	6	29	1	8	4	4	12	89	65	54	5	77	44
1	WVKP-40	ROUND KNOB RUN		LOKAN B62	5/21/1997	14	67	9	69	84	91	13	88	50	77	4	86	80
1	WVKP-41-A	SLAB FORK		LOKAN B63	5/21/1997	15	71	9	69	60	66	33	68	48	81	4	83	73
1	WVKP-43-A	SMITH RUN		LOKAN B64	5/21/1997	15	71	10	77	78	84	1	100	56	68	4	85	81
1	WVKP-45.5	VINEYARD RUN		LOKAN B65	5/21/1997	21	100	13	100	58	63	27	74	50	77	5	74	81
1	WVKP-5	ROCKY FORK		LOKAN B48	5/19/1997	7	33	3	23	13	14	76	24	84	26	7	48	28
1	WVKP-8	SCHOOLHOUSE BRANCH		LOKAN B49	5/19/1997	8	38	5	38	82	89	8	93	77	36	3	101	66

Appendix C

Site metrics and metric scores

Stations are grouped by data set (1= 1996-1997 calibration data; 2= 1997-1998 validation data). Within each data set, stations are listed by site type (reference, unlabeled, stressed), then within type by ascending Station ID.

Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
1	WVKP-9-A	SPRING BRANCH		LOKAN B50	5/19/1997	5	24	3	23	19	21	26	74	81	30	8	32	34
1	WVM-27-{115.0}	TYGART VALLEY RIVER		TYVAR B341	9/3/1997	19	90	8	62	30	33	10	90	49	79	5	75	72
1	WVM-27-{46.2}	TYGART VALLEY RIVER		TYVAR B381	9/11/1997	13	62	10	77	64	70	26	74	44	88	5	71	73
1	WVMC-10	BIG RUN NEAR PISGAH		CHEAT B136	7/23/1996	20	95	8	62	63	68	7	94	34	104	4	80	83
1	WVMC-11-D-{10}	LEFT FORK BULL RUN @ HEADWATERS		CHEAT B103	6/19/1996	9	43	6	46	88	96	0	101	82	29	3	103	69
1	WVMC-12-.5A-{0}	SOVERN RUN @ MOUTH		CHEAT B69	6/17/1996	3	14	1	8	79	86	18	82	97	4	3	100	49
1	WVMC-12-.7A	PARKER RUN/BIG SANDY CREEK		CHEAT B159	7/24/1996	16	76	8	62	57	62	13	87	32	106	4	86	79
1	WVMC-12-{10}	BIG SANDY CREEK @ BRUCETON MILLS FALLS		CHEAT B53	6/17/1996	16	76	8	62	61	67	24	77	58	66	5	68	69
1	WVMC-12-{14}	BIG SANDY CREEK ABOVE LITTLE SANDY CREEK		CHEAT B54	6/17/1996	8	38	4	31	53	58	29	71	47	83	5	70	58
1	WVMC-12-A-{02.5}	LAUREL RUN/BIG SANDY CK NEAR MOUTH		CHEAT B101	6/19/1996	15	71	11	85	94	102	1	100	80	32	2	106	81
1	WVMC-12-A-1	LITTLE LAUREL RUN		CHEAT B105	6/19/1996	12	57	5	38	79	86	3	98	74	41	3	96	69
1	WVMC-12-A-2	PATTERSON RUN		CHEAT B160	7/24/1996	8	38	3	23	58	63	0	101	77	36	5	64	54
1	WVMC-12-B-.5-{00}	WEBSTER RUN @ MOUTH		CHEAT B89	6/18/1996	3	14	2	15	80	87	0	101	90	16	5	77	52
1	WVMC-12-B-.5-{02}	WEBSTER RUN @ HEADWATERS		CHEAT B88	6/18/1996	13	62	8	62	70	76	2	99	36	100	4	81	80
1	WVMC-12-B-.5-A	UNNAMED TRIB/WEBSTER RUN		CHEAT B87	6/18/1996	3	14	2	15	50	54	0	101	75	39	3	102	54
1	WVMC-12-B-{01}	LITTLE SANDY CREEK NEAR MOUTH		CHEAT B83	6/18/1996	8	38	5	38	82	89	10	91	64	56	4	88	67
1	WVMC-12-B-{02}	LITTLE SANDY CREEK BELOW BEAVER CREEK		CHEAT B106	6/19/1996	11	52	7	54	87	95	8	93	61	60	4	91	74
1	WVMC-12-B-{06}	LITTLE SANDY CREEK BELOW HOGG RUN		CHEAT B107	6/19/1996	6	29	3	23	20	21	76	25	83	27	6	49	29
1	WVMC-12-B-{11}	LITTLE SANDY CREEK BELOW CHERRY RUN		CHEAT B82	6/18/1996	6	29	2	15	80	87	8	93	88	20	3	103	57
1	WVMC-12-B-1-{01}	BEAVER CREEK NEAR MOUTH		CHEAT B92	6/19/1996	6	29	2	15	84	91	3	98	87	20	2	106	59
1	WVMC-12-B-1-{04}	BEAVER CREEK NEAR HEADWATERS		CHEAT B73	6/18/1996	12	57	6	46	82	89	3	98	74	41	3	101	72
1	WVMC-12-B-3-{02}	HOGG RUN AT HEADWATERS		CHEAT B78	6/18/1996	16	76	9	69	51	56	30	71	52	75	4	78	71
1	WVMC-12-B-4-{02}	ELK RUN NEAR MOUTH		CHEAT B95	6/19/1996	11	52	7	54	84	91	0	101	59	65	3	100	77
1	WVMC-12-B-4-{03}	ELK RUN ABOVE UNNAMED TRIBS		CHEAT B94	6/19/1996	11	52	7	54	65	71	20	81	75	40	3	96	66
1	WVMC-12-B-5-C	THIRD UNNAMED TRIB/CHERRY RUN NEAR HEAD		CHEAT B85	6/18/1996	9	43	3	23	97	105	1	100	96	6	2	110	62
1	WVMC-12-B-6	MILL RUN /LITTLE LAUREL RUN NEAR MOUTH		CHEAT B108	6/19/1996	8	38	4	31	85	93	3	98	82	28	3	96	64
1	WVMC-12-C-{01}	HAZEL RUN NEAR MOUTH		CHEAT B98	6/19/1996	11	52	4	31	65	71	4	97	73	42	3	94	64
1	WVMC-12-D	GLADE RUN WEST OF BRUCETON MILLS		CHEAT B96	6/19/1996	13	62	10	77	71	77	25	76	60	63	4	87	74
1	WVMC-12-E	GLADE RUN NORTH OF BRANDONVILLE		CHEAT B62	6/17/1996	11	52	7	54	90	98	6	95	81	29	3	96	71
1	WVMC-12-E.1	U.T./BIG SANDY CK NEAR CLIFTON MILLS		CHEAT B70	6/17/1996	14	67	8	62	64	69	30	71	77	36	5	69	62
1	WVMC-12-F-{00.0}	LITTLE SANDY CREEK @ MOUTH		CHEAT B64	6/17/1996	18	86	10	77	49	53	12	89	35	102	4	82	81
1	WVMC-12-F-{01.0}	LITTLE SANDY CREEK NEAR CLIFTON MILLS		CHEAT B156	7/24/1996	16	76	10	77	63	68	4	97	39	96	4	84	83
1	WVMC-15-{01}	LAUREL RUN/CHEAT RIV. ABOVE HOGBACK RUN		CHEAT B102	6/19/1996	13	62	8	62	90	97	3	98	49	80	3	94	82
1	WVMC-15-A	LONG HOLLOW		CHEAT B183	7/29/1996	16	76	9	69	77	83	1	100	37	99	4	80	85
1	WVMC-16-A-{0.8}	SOUTH FORK GREENS RUN ABOVE MIDDLE FORK		CHEAT B68	6/17/1996	4	19	2	15	40	44	40	61	60	63	6	59	43
1	WVMC-17-.6A	2ND UNNAMED TRIB /MUDDY CREEK		CHEAT B52	6/17/1996	10	48	7	54	94	102	2	99	88	19	2	106	70
1	WVMC-17-.7	CRAB ORCHARD CREEK @ MOUTH		CHEAT B57	6/17/1996	9	43	4	31	3	3	5	96	96	6	4	82	43
1	WVMC-17-{10.2}	MUDDY CREEK ABOVE SUGARCAMP RUN		CHEAT B109	6/19/1996	20	95	14	108	81	88	7	94	48	81	4	82	90
1	WVMC-17-{14.4}	MUDDY CREEK NEAR HEADWATERS		CHEAT B110	6/19/1996	18	86	9	69	68	74	23	78	76	37	5	68	69
1	WVMC-17-{3.2}	MUDDY CREEK ABOVE MARTIN CREEK		CHEAT B66	6/17/1996	11	52	7	54	64	70	29	72	71	46	5	71	61
1	WVMC-17-{6.8}	MUDDY CREEK @ BRANDONVILLE TURNPIKE		CHEAT B84	6/18/1996	6	29	4	31	84	91	3	98	84	25	2	109	62
1	WVMC-17-A.1	UNNAMED TRIB/MUDDY CREEK @ MOUTH		CHEAT B86	6/18/1996	13	62	7	54	72	79	19	82	58	65	5	76	70
1	WVMC-17-B	JUMP ROCK RUN AT MOUTH		CHEAT B99	6/19/1996	9	43	4	31	87	94	2	99	83	27	2	106	66
1	WVMC-17-C	SUGARCAMP RUN/MUDDY CREEK		CHEAT B163	7/24/1996	15	71	7	54	87	95	5	96	69	49	3	97	77
1	WVMC-18-.1A	1ST UNNAMED TRIB /ROARING CREEK @ MOUTH		CHEAT B91	6/19/1996	15	71	7	54	74	81	14	86	67	52	5	77	70
1	WVMC-18-{0.0}	ROARING CREEK @ MOUTH		CHEAT B112	6/19/1996	12	57	7	54	58	63	4	97	46	85	4	84	73
1	WVMC-18-{6.0}	ROARING CREEK @ HEADWATERS		CHEAT B111	6/19/1996	24	114	17	131	84	91	5	96	51	77	4	89	92
1	WVMC-19	DAUGHERTY RUN		CHEAT B75	6/18/1996	17	81	10	77	82	89	7	94	54	72	4	78	82
1	WVMC-19-A	DORITY RUN @ MOUTH		CHEAT B93	6/19/1996	18	86	12	92	68	74	6	95	30	110	3	94	90
1	WVMC-2	MORGAN RUN		CHEAT B145	7/23/1996	19	90	10	77	61	66	15	86	41	93	5	77	82
1	WVMC-2.5	COLES RUN		CHEAT B139	7/23/1996	11	52	3	23	42	46	8	93	68	49	5	68	55
1	WVMC-2.5-A	BIRCH HOLLOW		CHEAT B137	7/23/1996	18	86	7	54	32	35	23	78	36	100	5	68	70
1	WVMC-2.7	KELLY RUN		CHEAT B142	7/23/1996	7	33	2	15	54	59	1	100	96	7	5	64	47
1	WVMC-20-{0.0}	ELSEY RUN		CHEAT B76	6/18/1996	16	76	13	100	88	96	6	94	53	74	4	88	88
1	WVMC-20-{6.0}	ELSEY RUN NEAR HEADWATERS		CHEAT B58	6/17/1996	17	81	9	69	46	50	33	67	59	65	4	78	68
1	WVMC-21	ASHPOLE RUN		CHEAT B72	6/18/1996	14	67	8	62	67	73	10	91	46	84	5	72	75
1	WVMC-22-{1.5}	BUFFALO RUN BELOW 1ST UNNAMED TRIB		CHEAT B56	6/17/1996	12	57	8	62	84	92	9	92	72	44	3	103	74
1	WVMC-22-{2.0}	BUFFALO RUN ABOVE 2ND UNNAMED TRIB		CHEAT B55	6/17/1996	12	57	8	62	88	95	2	99	72	44	2	109	76
1	WVMC-22-B	2ND UNNAMED TRIB /BUFFALO RUN		CHEAT B71	6/18/1996	17	81	8	62	21	23	68	32	75	40	6	60	50
1	WVMC-26-{0.0}	JOES RUN NEAR MOUTH		CHEAT B80	6/18/1996	8	38	6	46	61	66	34	66	78	34	4	83	56
1	WVMC-28	STAMPING GROUND RUN		CHEAT B162	7/24/1996	11	52	7	54	63	69	2	99	56	69	5	72	69
1	WVMC-31.7	FILL HOLLOW		CHEAT B152	7/24/1996	14	67	10	77	61	66	6	95	49	80	5	69	76
1	WVMC-31-{0.0}	BUCKHORN RUN		CHEAT B166	7/25/1996	8	38	1	8	31	34	13	88	56	68	4	78	52

Appendix C

Site metrics and metric scores

Stations are grouped by data set (1= 1996-1997 calibration data; 2= 1997-1998 validation data). Within each data set, stations are listed by site type (reference, unlabeled, stressed), then within type by ascending Station ID.

Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
1	WVMC-32	SALTLICK CREEK		CHEAT B214	8/7/1996	11	52	9	69	85	92	14	87	54	72	4	84	76
1	WVMC-32-B	SPRUCE RUN/SALTLICK RUN		CHEAT B173	7/25/1996	18	86	11	85	83	91	5	96	47	83	4	86	88
1	WVMC-32-C-1	CABBAGE RUN		CHEAT B169	7/25/1996	16	76	10	77	75	81	3	98	33	104	3	102	89
1	WVMC-32-D	WOLF RUN /SALTLICK CREEK		CHEAT B174	7/25/1996	18	86	11	85	87	95	6	95	44	88	4	88	89
1	WVMC-32-E	BUCKLICK RUN/SALTLICK CREEK		CHEAT B167	7/25/1996	15	71	10	77	78	85	10	91	57	67	5	74	78
1	WVMC-32-F	LITTLE BUCKLICK RUN		CHEAT B172	7/25/1996	18	86	12	92	67	73	26	74	42	90	4	82	83
1	WVMC-32-G	IRISH RUN		CHEAT B154	7/24/1996	14	67	9	69	83	90	4	97	48	81	3	103	84
1	WVMC-33-{0.0}	BUFFALO CREEK @ MOUTH		CHEAT B168	7/25/1996	20	95	12	92	66	72	25	76	50	78	5	73	81
1	WVMC-33-A	FLAGG RUN		CHEAT B153	7/24/1996	20	95	13	100	74	80	13	87	43	89	4	81	89
1	WVMC-33-A.5	BELL HOLLOW		CHEAT B150	7/24/1996	15	71	11	85	83	91	10	91	34	103	3	92	88
1	WVMC-33-B.5	DOG RUN		CHEAT B140	7/23/1996	16	76	11	85	72	78	20	81	49	79	3	97	83
1	WVMC-33-C	BIRCHROOT RUN		CHEAT B151	7/24/1996	17	81	12	92	78	85	6	95	36	101	4	85	90
1	WVMC-33-D	LITTLE BUFFALO CREEK		CHEAT B143	7/23/1996	15	71	10	77	77	83	12	89	44	88	4	86	82
1	WVMC-33-E	BUCKLICK RUN/BUFFALO CREEK		CHEAT B138	7/23/1996	13	62	7	54	82	89	12	89	42	91	4	84	78
1	WVMC-33-F	SUGARCAMP RUN/BUFFALO CREEK		CHEAT B148	7/23/1996	17	81	10	77	72	79	15	86	41	92	4	81	83
1	WVMC-34-{0.0}	SCOTT RUN/CHEAT RIVER NEAR MACOMBER		CHEAT B161	7/24/1996	15	71	9	69	67	73	8	93	54	72	4	82	77
1	WVMC-35	MADISON RUN		CHEAT B158	7/24/1996	20	95	15	115	66	72	19	81	36	100	4	87	89
1	WVMC-35.5-{0.0}	KEYSER RUN		CHEAT B155	7/24/1996	16	76	9	69	71	78	14	87	35	101	4	91	83
1	WVMC-36-{0.0}	WOLF CREEK		CHEAT B164	7/24/1996	17	81	10	77	85	93	8	93	51	76	4	90	85
1	WVMC-36-A	LITTLE WOLF CREEK		CHEAT B157	7/24/1996	15	71	10	77	75	82	14	87	53	73	5	73	77
1	WVMC-39	MUDDY RUN		CHEAT B146	7/23/1996	15	71	11	85	90	97	5	96	41	93	3	100	90
1	WVMC-4	WHITES RUN		CHEAT B149	7/23/1996	9	43	3	23	13	15	10	90	69	49	5	65	47
1	WVMC-40	FORD RUN		CHEAT B141	7/23/1996	12	57	9	69	77	83	12	89	50	77	5	74	75
1	WVMC-42	LOUSE CAMP RUN		CHEAT B144	7/23/1996	14	67	11	85	88	95	8	93	48	81	4	87	85
1	WVMC-43-{0.0}	LICKING CREEK		CHEAT B171	7/25/1996	15	71	10	77	89	97	4	97	49	80	4	84	84
1	WVMC-43-A	BEARPEN HOLLOW		CHEAT B165	7/25/1996	14	67	11	85	79	85	9	92	41	92	4	91	85
1	WVMC-43-B	JACOBS RUN		CHEAT B170	7/25/1996	11	52	8	62	88	96	4	97	65	54	4	80	74
1	WVMC-44-{0.0}	BEARWALLOW RUN		CHEAT B175	7/26/1996	13	62	9	69	68	74	9	92	38	97	5	77	79
1	WVMC-46	BULL RUN		CHEAT B190	7/30/1996	18	86	11	85	71	77	17	84	33	104	4	87	86
1	WVMC-46-A	LEFT FORK BULL RUN		CHEAT B176	7/26/1996	15	71	12	92	91	99	4	97	52	75	3	97	89
1	WVMC-46-B	RIGHT FORK BULL RUN		CHEAT B177	7/26/1996	16	76	11	85	90	98	4	97	37	98	3	93	91
1	WVMC-47	JOHNATHAN RUN		CHEAT B198	7/30/1996	15	71	11	85	75	82	5	96	46	84	4	83	83
1	WVMC-49	CLAY LICK RUN		CHEAT B191	7/30/1996	10	48	5	38	51	55	29	72	52	74	5	66	59
1	WVMC-50	UPPER JOHNATHAN RUN		CHEAT B209	7/30/1996	16	76	11	85	71	77	15	86	31	108	4	86	85
1	WVMC-51	CLOVER RUN		CHEAT B192	7/30/1996	18	86	11	85	78	85	5	96	47	83	4	82	86
1	WVMC-51-A	RIGHT FORK CLOVER RUN		CHEAT B206	7/30/1996	18	86	12	92	81	89	11	90	30	110	3	95	92
1	WVMC-51-B	LEFT FORK/CLOVER RUN		CHEAT B202	7/30/1996	14	67	9	69	84	92	9	92	63	57	4	78	76
1	WVMC-51-B-2	MILL RUN /LEFT FORK		CHEAT B205	7/30/1996	15	71	10	77	79	86	7	94	38	98	3	97	87
1	WVMC-51-B-3	BEAR RUN		CHEAT B188	7/30/1996	16	76	12	92	71	78	9	92	35	102	4	89	88
1	WVMC-51-B-4	VALLEY FORK		CHEAT B210	7/30/1996	12	57	9	69	91	99	3	98	45	86	3	105	85
1	WVMC-52	MINEAR RUN		CHEAT B184	7/29/1996	14	67	9	69	95	103	2	99	63	58	4	83	79
1	WVMC-52-.7A	BRIDGE RUN		CHEAT B178	7/29/1996	18	86	13	100	85	92	4	96	30	109	3	99	96
1	WVMC-53	DRY RUN NEAR ST. GEORGE		CHEAT B193	7/30/1996	14	67	10	77	84	91	10	91	57	68	4	81	79
1	WVMC-54	HORSESHOE RUN		CHEAT B195	7/30/1996	14	67	9	69	82	90	3	98	55	71	4	82	79
1	WVMC-54-D	HYLE RUN		CHEAT B196	7/30/1996	23	110	13	100	71	77	12	89	26	116	4	84	92
1	WVMC-54-F	LAUREL RUN/HORSE SHOE RUN		CHEAT B200	7/30/1996	18	86	12	92	81	88	10	91	47	82	4	87	88
1	WVMC-54-H	THUNDERS TRUCK RUN		CHEAT B217	8/7/1996	18	86	12	92	90	97	5	96	44	87	3	101	93
1	WVMC-54-H-1	WALNUT HOLLOW RUN		CHEAT B219	8/7/1996	12	57	10	77	80	87	19	82	48	82	4	86	78
1	WVMC-54-I	LEADMINE RUN		CHEAT B201	7/30/1996	16	76	12	92	84	91	8	92	48	81	4	90	87
1	WVMC-54-I-1	LIME HOLLOW RUN		CHEAT B203	7/30/1996	15	71	12	92	86	94	10	90	31	107	3	92	90
1	WVMC-54-J	WOLF RUN /HORSESHOE RUN		CHEAT B211	7/30/1996	13	62	10	77	84	91	12	89	51	76	4	78	79
1	WVMC-54-K	TWELVEMILE RUN		CHEAT B208	7/30/1996	14	67	9	69	88	96	7	94	38	96	3	101	87
1	WVMC-56	MILL RUN /CHEAT RIVER		CHEAT B221	8/8/1996	18	86	12	92	86	94	4	97	40	94	3	93	93
1	WVMC-57	WOLF RUN /CHEAT RIVER		CHEAT B222	8/8/1996	12	57	8	62	81	88	15	85	85	24	5	68	64
1	WVMC-59-{00.0}	SHAVERS FORK @ PARSONS		CHEAT B45	6/12/1996	17	81	13	100	51	56	43	58	54	71	5	70	73
1	WVMC-59-{20.4}	SHAVERS FORK @ STEWART PARK		CHEAT B30	6/11/1996	19	90	12	92	73	79	16	85	36	100	4	82	88
1	WVMC-60-{11.6}	DRY FORK NEAR CANAAN VALLEY		CHEAT B5	6/10/1996	17	81	12	92	87	94	8	93	41	92	3	97	92
1	WVMC-60-{25.1}	DRY FORK ABOVE JOB		CHEAT B4	6/10/1996	15	71	10	77	50	55	13	88	56	69	4	83	74
1	WVMC-60-A	ROARING FORK		CHEAT B29	6/11/1996	14	67	11	85	87	95	5	96	56	68	4	90	83
1	WVMC-60-D-11	YOOKUM RUN		CHEAT B128	7/16/1996	12	57	8	62	55	59	40	61	60	62	5	67	61
1	WVMC-60-D-12	FREELAND RUN		CHEAT B124	7/16/1996	14	67	8	62	26	29	66	35	81	30	6	55	46
1	WVMC-60-D-14	MILL RUN /BLACKWATER RIVER		CHEAT B126	7/16/1996	24	114	12	92	45	49	35	66	58	65	6	61	72
1	WVMC-60-D-3-B	MIDDLE RUN		CHEAT B125	7/16/1996	11	52	4	31	72	78	5	96	69	48	4	85	65

Appendix C

Site metrics and metric scores

Stations are grouped by data set (1= 1996-1997 calibration data; 2= 1997-1998 validation data). Within each data set, stations are listed by site type (reference, unlabeled, stressed), then within type by ascending Station ID.

Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
1	WVMC-60-D-3-C	SNYDER RUN		CHEAT B127	7/16/1996	8	38	4	31	77	83	14	87	78	35	3	95	62
1	WVMC-60-D-3-E	SAND RUN		CHEAT B134	7/17/1996	9	43	5	38	84	92	7	93	75	39	4	80	64
1	WVMC-60-G	RED RUN/ DRY FORK		CHEAT B28	6/11/1996	10	48	7	54	83	90	5	96	60	63	4	82	72
1	WVMC-60-J	ELKLICK RUN NEAR ELK		CHEAT B18	6/11/1996	18	86	13	100	71	77	1	100	30	109	3	97	93
1	WVMC-60-K-16	WEST FORK OF GLADY CREEK		CHEAT B90	6/18/1996	23	110	14	108	90	98	2	99	52	75	4	90	94
1	WVMC-60-K-17	EAST FORK OF GLADY FORK		CHEAT B38	6/12/1996	14	67	10	77	84	91	8	92	42	91	3	97	86
1	WVMC-60-K-17-A	LOUK RUN		CHEAT B42	6/12/1996	22	105	15	115	88	96	0	101	41	92	3	93	97
1	WVMC-60-K-5	WOODFORD RUN		CHEAT B187	7/29/1996	18	86	13	100	56	61	1	100	59	65	4	88	83
1	WVMC-60-K-8	FLANNIGAN RUN		CHEAT B39	6/12/1996	14	67	11	85	92	101	5	96	54	72	3	96	86
1	WVMC-60-L	BIG RUN/ DRY FORK		CHEAT B1	6/10/1996	14	67	12	92	78	85	5	96	47	83	4	90	85
1	WVMC-60-N-{01}	LAUREL FK/DRY FK NEAR MOUTH		CHEAT B51	6/13/1996	17	81	13	100	71	77	23	78	42	91	4	81	85
1	WVMC-60-N-{20}	LAUREL FK/DRY FK @ LAUREL FK CAMPGROUND		CHEAT B24	6/11/1996	22	105	14	108	93	101	1	100	36	100	3	100	100
1	WVMC-60-N-4	BEAVERDAM RUN		CHEAT B34	6/12/1996	17	81	10	77	61	66	18	82	46	85	4	79	78
1	WVMC-60-N-8	FIVE LICK RUN/LAUREL FK/ DRY FK		CHEAT B20	6/11/1996	18	86	13	100	86	93	4	97	43	88	3	99	94
1	WVMC-60-O-{01.0}	RED CREEK NEAR MOUTH		CHEAT B133	7/17/1996	14	67	9	69	83	90	10	91	58	66	4	80	77
1	WVMC-60-O-{07.0}	RED CREEK NEAR LANEVILLE		CHEAT B132	7/17/1996	13	62	8	62	44	47	19	82	57	67	5	66	64
1	WVMC-60-O-1	BIG RUN/ RED CREEK		CHEAT B130	7/17/1996	13	62	8	62	67	73	26	75	46	84	5	71	71
1	WVMC-60-P	SPRUCE RUN/DRY FORK		CHEAT B13	6/10/1996	15	71	11	85	88	96	9	92	50	78	4	85	84
1	WVMC-60-Q	HORSE CAMP RUN		CHEAT B7	6/10/1996	10	48	7	54	79	86	15	86	55	71	4	82	71
1	WVMC-60-R	TORY CAMP RUN		CHEAT B218	8/7/1996	14	67	7	54	6	7	1	100	92	12	4	84	54
1	WVMC-60-T-{02.5}	GANDY CREEK @ WHITMER		CHEAT B6	6/10/1996	16	76	10	77	86	94	2	99	47	82	3	94	87
1	WVMC-60-T-{13.0}	GANDY CREEK/BELOW SINKS GANDY		CHEAT B21	6/11/1996	15	71	10	77	81	88	7	94	52	76	4	85	82
1	WVMC-60-T-10	NARROW RIDGE RUN		CHEAT B9	6/10/1996	16	76	11	85	83	90	1	100	61	61	4	90	84
1	WVMC-60-T-11	WARNER RUN		CHEAT B32	6/11/1996	16	76	10	77	89	97	1	100	51	76	4	88	86
1	WVMC-60-T-13	BIG RUN NEAR GANDY SINKS		CHEAT B16	6/11/1996	20	95	14	108	80	87	6	95	36	100	4	88	94
1	WVMC-60-T-9	GRANTS BRANCH		CHEAT B194	7/30/1996	16	76	11	85	82	90	14	87	46	84	3	104	87
1	WVMCS-13	LITTLE BLACK FORK		CHEAT B181	7/29/1996	18	86	13	100	92	100	3	98	35	102	3	95	96
1	WVMCS-15	RATTLESNAKE RUN		CHEAT B44	6/12/1996	16	76	13	100	86	93	11	90	29	112	4	90	91
1	WVMCS-16	JOHNS RUN		CHEAT B199	7/30/1996	14	67	10	77	82	89	14	87	48	82	4	90	82
1	WVMCS-18	WOLF RUN /SHAVERS FORK		CHEAT B33	6/11/1996	18	86	14	108	97	105	0	101	62	59	3	92	90
1	WVMCS-2	HAWK RUN		CHEAT B41	6/12/1996	18	86	13	100	80	87	1	100	45	86	4	87	91
1	WVMCS-22	TAYLOR RUN		CHEAT B31	6/11/1996	18	86	14	108	93	101	4	97	37	99	3	99	97
1	WVMCS-25	COLLETT GAP RUN		CHEAT B37	6/12/1996	19	90	15	115	58	64	0	101	57	67	3	100	87
1	WVMCS-3	HADDIX RUN		CHEAT B40	6/12/1996	16	76	11	85	81	89	8	93	42	91	4	86	87
1	WVMCS-33	FISHING HAWK CREEK		CHEAT B19	6/11/1996	10	48	8	62	89	96	0	101	66	54	2	112	77
1	WVMCS-3-A	SOUTH BRANCH/HADDIX RUN		CHEAT B216	8/7/1996	16	76	11	85	86	93	3	98	40	94	3	101	91
1	WVMCS-46	RED RUN/ SHAVERS FORK		CHEAT B10	6/10/1996	9	43	6	46	92	100	1	100	82	28	2	107	69
1	WVMCS-47	BLISTER RUN		CHEAT B3	6/10/1996	17	81	12	92	89	97	4	97	46	85	3	98	92
1	WVMCS-5	LAUREL RUN/SHAVERS FK @ MOUTH		CHEAT B212	8/7/1996	17	81	11	85	90	98	4	96	44	88	3	98	91
1	WVMCS-6	PLEASANT RUN		CHEAT B43	6/12/1996	13	62	8	62	89	97	4	97	42	91	3	93	83
1	WVMCS-6-B	AARONS RUN/PLEASANT RUN		CHEAT B48	6/13/1996	17	81	12	92	92	100	2	99	64	57	3	97	88
1	WVMCS-6-E	CHOKE TRAP RUN		CHEAT B49	6/13/1996	20	95	12	92	87	94	1	99	41	91	3	92	94
1	WVMCS-7	STONELICK RUN		CHEAT B46	6/12/1996	22	105	16	123	80	87	3	98	23	121	3	96	97
1	WVMCS-7.5	CANOE RUN		CHEAT B35	6/12/1996	18	86	14	108	86	93	10	91	31	108	4	88	93
1	WVMT-11-{6.6}	BERKELY RUN		TYVAR B310	8/27/1997	8	38	3	23	51	56	3	98	54	72	4	78	61
1	WVMT-11-B	LONG RUN		TYVAR B300	8/26/1997	11	52	3	23	21	22	9	92	47	83	7	42	52
1	WVMT-12-{10.2}	THREE FORK CREEK		TYVAR B327	9/2/1997	6	29	1	8	8	9	42	59	67	52	5	68	37
1	WVMT-18-E-3-A-{1.2}	U.T. OF LEFT FORK/LITTLE SANDY CREEK		TYVAR B342	9/3/1997	18	86	10	77	50	55	16	85	39	96	4	80	80
1	WVMT-18-E-4-A	TIBBS RUN		TYVAR B340	9/3/1997	15	71	9	69	46	50	25	76	46	85	5	68	70
1	WVMT-18-G-2	U.T. OF LEFT FORK/LITTLE SANDY CREEK		TYVAR B343	9/3/1997	14	67	6	46	63	69	2	99	51	77	5	71	71
1	WVMT-22	CUNNINGHAM RUN		TYVAR B356	9/9/1997	13	62	7	54	63	68	10	91	33	105	4	88	77
1	WVMT-23	TETER CREEK		TYVAR B366	9/9/1997	16	76	9	69	59	65	1	100	44	87	4	80	80
1	WVMT-23-B-1	STONY RUN/RACOON CREEK/TETER CREEK		TYVAR B347	9/4/1997	12	57	5	38	34	37	1	100	60	62	5	77	62
1	WVMT-23-C-{5.6}	BRUSHY FORK		TYVAR B344	9/4/1997	13	62	9	69	88	96	9	92	54	71	3	95	81
1	WVMT-23-F	MILL RUN /TETER CREEK		TYVAR B359	9/9/1997	12	57	6	46	77	84	15	85	40	93	5	77	74
1	WVMT-24-{0.03}	LAUREL CREEK		TYVAR B374	9/10/1997	14	67	7	54	73	80	8	93	46	85	5	76	76
1	WVMT-24-A	FROST RUN		TYVAR B370	9/10/1997	10	48	2	15	60	65	31	69	89	17	6	63	46
1	WVMT-24-C	SUGAR CREEK		TYVAR B365	9/9/1997	17	81	6	46	57	62	7	94	49	80	6	63	71
1	WVMT-24-C-3.5	HUNTER FORK		TYVAR B373	9/10/1997	11	52	5	38	63	68	7	94	51	76	4	82	69
1	WVMT-26-{0.4}	HACKERS CREEK		TYVAR B313	8/27/1997	14	67	3	23	55	60	27	74	75	38	6	62	54
1	WVMT-26-B	FOXGRAPE RUN		TYVAR B390	9/16/1997	9	43	2	15	25	27	57	43	82	29	6	54	35
1	WVMT-29	ANGLINS RUN		TYVAR B379	9/11/1997	11	52	3	23	40	43	47	54	76	38	6	53	44
1	WVMT-33-{11.8}	MIDDLE FORK RIVER		TYVAR B317	8/27/1997	10	48	6	46	57	62	2	99	60	63	5	74	65

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Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
1	WVMT-36	ISLAND RUN		TYVAR B385	9/15/1997	10	48	2	15	50	54	24	77	71	45	6	63	51
1	WVMT-37-{2.8}	BEAVER CREEK		TYVAR B383	9/15/1997	10	48	4	31	60	65	8	93	50	79	4	89	68
1	WVMT-39	LAUREL RUN		TYVAR B386	9/15/1997	12	57	5	38	57	62	21	80	61	61	5	71	61
1	WVMT-4	GOOSE CREEK		TYVAR B286	8/25/1997	2	10	1	8	67	73	0	101	100	0	5	70	43
1	WVMT-40	BIG LAUREL RUN		TYVAR B384	9/15/1997	12	57	6	46	63	69	20	81	47	82	5	72	68
1	WVMT-40-A	LITTLE LAUREL RUN		TYVAR B387	9/15/1997	13	62	7	54	41	45	24	77	46	84	5	74	66
1	WVMT-43-{13.2}	LEADING CREEK		TYVAR B323	9/2/1997	13	62	5	38	54	59	11	90	59	63	5	73	64
1	WVMT-43-{15.6}	LEADING CREEK		TYVAR B316	8/27/1997	17	81	7	54	54	58	4	97	47	82	5	75	75
1	WVMT-43-F-1	LOGLICK RUN		TYVAR B289	8/25/1997	18	86	12	92	90	97	7	94	53	74	4	81	87
1	WVMT-43-H	DAVIS LICK		TYVAR B380	9/11/1997	8	38	2	15	12	13	51	50	67	52	7	41	35
1	WVMT-43-M	CAMPFIELD RUN		TYVAR B312	8/27/1997	19	90	11	85	77	84	11	90	53	74	5	75	83
1	WVMT-43-O	LAUREL RUN		TYVAR B315	8/27/1997	15	71	6	46	40	43	40	61	73	43	5	64	55
1	WVMT-45	CHENOWETH CREEK		TYVAR B293	8/26/1997	19	90	9	69	65	71	7	94	56	68	5	76	78
1	WVMT-48	KINGS RUN		TYVAR B297	8/26/1997	16	76	5	38	42	46	21	79	55	71	5	69	63
1	WVMT-5	LOST RUN		TYVAR B290	8/25/1997	16	76	8	62	50	54	7	94	42	91	4	78	76
1	WVMT-50-A-1	LIMEKILN RUN		TYVAR B299	8/26/1997	15	71	12	92	82	89	14	86	49	80	4	82	83
1	WVMT-50-B-3	HILL RUN		TYVAR B295	8/26/1997	15	71	10	77	88	96	3	98	55	71	4	84	83
1	WVMT-57-{0.4}	JONES RUN		TYVAR B314	8/27/1997	16	76	8	62	63	68	18	83	38	96	4	79	77
1	WVMT-61-{2.0}	SHAVERS RUN		TYVAR B339	9/3/1997	15	71	8	62	84	91	12	89	57	67	4	81	77
1	WVMT-64-A.5	BUCK RUN		TYVAR B331	9/3/1997	13	62	8	62	61	66	22	78	49	80	5	72	70
1	WVMT-64-E	MEATBOX RUN		TYVAR B376	9/10/1997	13	62	9	69	73	79	20	81	44	87	3	95	79
1	WVMT-64-F	POTATOHOLE FORK		TYVAR B378	9/10/1997	13	62	9	69	88	96	10	91	66	53	2	116	79
1	WVMT-66	RIFFLE CREEK		TYVAR B325	9/2/1997	16	76	7	54	41	44	42	59	77	36	6	58	55
1	WVMT-68	BECKY CREEK		TYVAR B329	9/3/1997	19	90	11	85	73	79	24	77	57	67	5	76	79
1	WVMT-68-D	WAMSLEY RUN		TYVAR B367	9/9/1997	16	76	10	77	72	79	15	86	59	64	4	81	77
1	WVMT-69	POUNDMILL RUN		TYVAR B361	9/9/1997	12	57	7	54	28	31	67	34	78	35	6	55	44
1	WVMT-7	PLUM RUN		TYVAR B303	8/26/1997	14	67	6	46	40	44	12	89	49	80	5	73	66
1	WVMT-74	ELKWATER FORK		TYVAR B357	9/9/1997	20	95	10	77	75	81	7	94	56	68	4	91	84
1	WVMT-74-B-1	FORTLICK RUN		TYVAR B358	9/9/1997	20	95	11	85	64	70	4	97	46	84	4	86	86
1	WVMT-78	RALSTON RUN		TYVAR B362	9/9/1997	15	71	8	62	60	65	18	83	47	83	4	79	74
1	WVMT-8	WICKWIRE RUN		TYVAR B308	8/26/1997	13	62	6	46	24	26	14	87	64	56	5	71	58
1	WVMTB-10-A	SUGAR RUN		TYVAR B326	9/2/1997	8	38	2	15	14	15	74	26	87	20	7	49	27
1	WVMTB-11	FINK RUN		TYVAR B322	9/2/1997	10	48	2	15	35	38	38	63	71	45	7	48	43
1	WVMTB-11-B	MUDLICK RUN		TYVAR B324	9/2/1997	4	19	0	0	0	0	19	82	93	12	9	12	21
1	WVMTB-18-B	BULL RUN		TYVAR B332	9/3/1997	11	52	3	23	70	76	12	89	81	29	5	66	56
1	WVMTB-18-B-3	MUDLICK RUN		TYVAR B336	9/3/1997	17	81	2	15	4	4	59	42	66	53	7	46	40
1	WVMTB-18-D-{3.9}	LAUREL FORK/FRENCH CREEK		TYVAR B375	9/10/1997	19	90	9	69	72	78	10	91	59	64	5	76	78
1	WVMTB-19-{0.9}	TRUBIE RUN		TYVAR B348	9/4/1997	21	100	8	62	41	44	9	92	41	92	5	74	77
1	WVMTB-20	SAWMILL RUN		TYVAR B346	9/4/1997	5	24	3	23	82	89	7	94	91	15	5	67	52
1	WVMTB-24	LAUREL RUN		TYVAR B345	9/4/1997	6	29	3	23	86	94	6	95	85	24	5	73	56
1	WVMTB-25	TENMILE CREEK		TYVAR B394	9/17/1997	8	38	2	15	70	76	21	80	88	19	5	67	49
1	WVMTB-25-A	RIGHT FORK OF TENMILE CREEK		TYVAR B393	9/17/1997	16	76	9	69	58	63	26	74	45	86	4	83	75
1	WVMTB-27	PANTHER FORK		TYVAR B391	9/16/1997	13	62	6	46	58	63	36	65	71	45	5	70	59
1	WVMTB-3	BIG RUN		TYVAR B392	9/17/1997	11	52	5	38	57	62	4	97	57	67	4	81	66
1	WVMTB-30	HEROLDS RUN		TYVAR B372	9/10/1997	14	67	5	38	74	80	13	88	63	58	4	79	68
1	WVMTB-31-C	ALEC RUN		TYVAR B354	9/9/1997	14	67	8	62	92	100	3	98	67	52	4	87	78
1	WVMTB-31-D	MILLSITE RUN		TYVAR B360	9/9/1997	14	67	11	85	77	83	21	80	55	70	5	76	77
1	WVMTB-31-F-1	TROUT RUN		TYVAR B352	9/8/1997	15	71	9	69	64	69	24	76	63	58	5	72	69
1	WVMTB-31-F-2-{0.8}	UPPER TROUT RUN		TYVAR B353	9/8/1997	18	86	11	85	79	86	14	87	58	65	4	82	82
1	WVMTB-31-F-5	SALT BLOCK RUN		TYVAR B351	9/8/1997	15	71	11	85	85	93	9	91	63	58	4	80	80
1	WVMTB-32-H	BEECH RU N		TYVAR B355	9/9/1997	14	67	9	69	61	66	24	77	44	88	5	70	73
1	WVMTB-32-I-1	PHILLIPS CAMP RUN		TYVAR B388	9/15/1997	11	52	8	62	77	84	15	86	41	92	2	107	79
1	WVMTB-7-{1.0}	SAND RUN		TYVAR B337	9/3/1997	17	81	9	69	72	78	5	96	44	87	4	80	82
1	WVMTB-7-A-{0.5}	LAUREL FORK/SAND RUN		TYVAR B333	9/3/1997	14	67	9	69	64	70	33	67	68	50	5	65	65
1	WVMTB-7-A-{2.9}	LAUREL FORK/SAND RUN		TYVAR B334	9/3/1997	16	76	6	46	45	49	31	69	44	87	5	69	66
1	WVMTB-7-C-{0.32}	UT OF SAND RUN		TYVAR B395	9/22/1997	15	71	8	62	67	73	7	94	42	91	4	83	79
1	WVMTB-8	BIG RUN		TYVAR B330	9/3/1997	10	48	4	31	56	61	17	84	58	66	5	66	59
1	WVMTM-0.5-{0.6}	SWAMP RUN		TYVAR B291	8/25/1997	18	86	7	54	33	36	12	89	34	103	4	86	75
1	WVMTM-11-{0.3}	RIGHT FORK MIDDLE FORK		TYVAR B304	8/26/1997	19	90	10	77	45	49	12	89	59	64	5	72	73
1	WVMTM-13	LONG RUN		TYVAR B349	9/8/1997	18	86	10	77	85	93	5	96	74	41	4	78	78
1	WVMTM-17	THREE FORKS RUN		TYVAR B321	8/27/1997	15	71	6	46	9	10	55	45	70	46	6	60	46
1	WVMTM-2	LAUREL RUN		TYVAR B298	8/26/1997	22	105	13	100	46	50	16	85	37	98	4	80	86
1	WVMTM-21	PLEASANT RUN		TYVAR B319	8/27/1997	16	76	5	38	44	48	24	76	62	59	5	69	61

Site metrics and metric scores

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Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
1	WVMTM-27	MITCHELL LICK FORK		TYVAR B396	9/29/1997	15	71	9	69	64	69	29	72	52	75	4	79	73
1	WVMTM-3	HOOPPOLE RUN		TYVAR B288	8/25/1997	3	14	2	15	67	73	33	67	78	35	5	70	46
1	WVMTM-5	SERVICE RUN		TYVAR B305	8/26/1997	13	62	7	54	73	79	14	87	51	76	3	94	75
1	WVMTM-7	SHORT RUN		TYVAR B307	8/26/1997	18	86	9	69	79	86	11	90	59	64	4	81	79
1	WVMY-11	SOUTH BRANCH LAUREL RUN		YOUGH B117	7/8/1996	17	81	8	62	36	39	11	90	46	84	4	82	73
1	WVMY-2	SNOWY CREEK		YOUGH B116	7/8/1996	9	43	3	23	63	68	5	95	75	40	6	60	55
1	WVMY-2-A	NORTH BRANCH		YOUGH B115	7/8/1996	13	62	7	54	89	97	2	99	73	42	5	77	72
1	WVMY-2-A-1	WARDWELL RUN		YOUGH B118	7/8/1996	13	62	5	38	39	42	36	64	67	51	6	60	53
1	WVMY-2-B-1	PINE RUN		YOUGH B121	7/9/1996	18	86	13	100	85	92	4	97	51	76	3	98	92
1	WVMY-3-A	LITTLE LAUREL RUN		YOUGH B114	7/8/1996	8	38	3	23	73	79	7	94	83	27	3	95	59
1	WVMY-4	RHINE CREEK		YOUGH B122	7/9/1996	14	67	9	69	64	69	25	76	47	83	5	71	72
1	WVMY-9	BUFFALO RUN		YOUGH B113	7/8/1996	9	43	4	31	72	78	1	100	78	34	4	88	62
1	WVP-20-{52.0}	NORTH BRANCH POTOMAC RIVER		NBRPO B318	8/27/1997	7	33	1	8	16	18	74	26	91	15	7	49	25
1	WVP-20-{81.6}	NORTH BRANCH POTOMAC RIVER		NBRPO B301	8/26/1997	11	52	6	46	85	93	11	90	72	45	4	80	68
1	WVP-20-{82.6}	NORTH BRANCH POTOMAC RIVER		NBRPO B302	8/26/1997	10	48	5	38	84	92	11	90	73	43	4	81	65
1	WVP-20-{88.9}	NORTH BRANCH POTOMAC RIVER		NBRPO B244	8/11/1997	10	48	5	38	68	74	24	77	88	18	5	68	54
1	WVP-20-{97.9}	NORTH BRANCH POTOMAC RIVER		NBRPO B268	8/13/1997	14	67	7	54	81	88	8	93	56	69	5	76	74
1	WVPNB-1-{4.2}	GREEN SPRING RUN		NBRPO B279	8/19/1997	22	105	10	77	52	57	24	77	39	95	5	74	80
1	WVPNB-15	DEEP RUN		NBRPO B263	8/13/1997	11	52	8	62	93	101	4	97	57	67	4	84	77
1	WVPNB-16-.5A-{0.4}	U.T. OF ABRAMS CREEK		NBRPO B275	8/14/1997	9	43	4	31	58	63	0	101	83	27	5	75	57
1	WVPNB-16-{05.4}	ABRAM CREEK		NBRPO B273	8/14/1997	3	14	1	8	71	77	25	76	96	7	5	65	41
1	WVPNB-16-{16.8}	ABRAM CREEK		NBRPO B309	8/27/1997	6	29	3	23	83	91	6	95	78	35	5	71	57
1	WVPNB-16-A-{0.8}	EMORY CREEK		NBRPO B274	8/14/1997	6	29	3	23	79	86	9	92	81	29	5	74	55
1	WVPNB-16-B.5	LAUREL RUN		NBRPO B282	8/19/1997	7	33	3	23	78	85	11	90	86	22	5	69	54
1	WVPNB-17-{15.6}	STONY RIVER		NBRPO B284	8/19/1997	10	48	5	38	47	52	47	53	83	26	6	61	46
1	WVPNB-17-B	MILL RUN		NBRPO B266	8/13/1997	16	76	10	77	75	81	8	93	42	91	4	85	84
1	WVPNB-17-C	FOURMILE RUN		NBRPO B278	8/19/1997	5	24	1	8	17	18	33	67	50	78	6	63	43
1	WVPNB-17-E	HEMLICK RUN		NBRPO B280	8/19/1997	9	43	3	23	15	17	33	68	78	35	6	60	41
1	WVPNB-19-{1.4}	BUFFALO CREEK		NBRPO B239	8/11/1997	20	95	13	100	78	85	9	92	39	96	4	87	92
1	WVPNB-19-A	LITTLE BUFFALO CREEK		NBRPO B241	8/11/1997	4	19	2	15	88	95	0	101	88	20	5	73	54
1	WVPNB-22	DEAKIN RUN		NBRPO B262	8/13/1997	9	43	3	23	49	53	23	78	57	67	5	73	56
1	WVPNB-4-{04.6}	PATTERSON CREEK		NBRPO B269	8/13/1997	26	124	13	100	30	33	38	63	58	66	6	61	70
1	WVPNB-4-{20.2}	PATTERSON CREEK		NBRPO B255	8/12/1997	21	100	10	77	67	73	1	100	32	107	4	84	89
1	WVPNB-4-{29.7}	PATTERSON CREEK		NBRPO B245	8/11/1997	23	110	11	85	77	84	10	91	48	81	5	77	86
1	WVPNB-4-{33.0}	PATTERSON CREEK		NBRPO B270	8/13/1997	23	110	12	92	70	77	7	94	35	101	4	83	91
1	WVPNB-4-{39.4}	PATTERSON CREEK		NBRPO B246	8/11/1997	23	110	13	100	82	89	7	94	57	67	4	87	90
1	WVPNB-4-C.5	HORSESHOE CREEK		NBRPO B281	8/19/1997	22	105	11	85	88	96	5	96	66	54	5	71	84
1	WVPNB-4-CC	ROSSER RUN		NBRPO B248	8/11/1997	20	95	9	69	60	65	19	82	53	73	5	76	77
1	WVPNB-4-DD-{2.0}	THORN CREEK		NBRPO B257	8/12/1997	17	81	9	69	82	89	9	92	56	68	3	97	83
1	WVPNB-4-FF	MIDDLE FORK/PATTERSON CREEK		NBRPO B242	8/11/1997	18	86	8	62	36	39	21	80	46	85	5	71	70
1	WVPNB-4-FF-5-A-{0.6}	UT OF UT OF MIDDLE FORK / PATTERSON		NBRPO B260	8/12/1997	12	57	3	23	18	20	8	93	68	49	4	90	55
1	WVPNB-4-J-{1.6}	CABIN RUN		NBRPO B251	8/12/1997	14	67	6	46	46	50	23	77	55	70	5	71	64
1	WVPNB-4-J-1	PARGUT RUN		NBRPO B254	8/12/1997	13	62	6	46	29	31	55	46	68	51	6	59	49
1	WVPNB-4-S-{04.7}	MILLL CREEK		NBRPO B243	8/11/1997	14	67	4	31	46	50	15	86	73	42	5	72	58
1	WVPNB-4-S-{5.6}	MILL CREEK		NBRPO B277	8/18/1997	19	90	10	77	81	88	15	86	59	64	4	84	82
1	WVPNB-4-V	ELLIBER RUN		NBRPO B240	8/11/1997	15	71	6	46	95	104	2	99	83	26	3	99	74
1	WVPNB-4-W-3	WHIP RUN		NBRPO B272	8/13/1997	15	71	9	69	85	93	13	88	46	84	4	88	82
1	WVPNB-7-{03.8}	NEW CREEK		NBRPO B267	8/13/1997	14	67	8	62	66	72	13	88	35	101	4	87	79
1	WVPNB-7-{08.4}	NEW CREEK		NBRPO B252	8/12/1997	15	71	9	69	85	93	12	89	75	39	3	95	76
1	WVPNB-7-{10.4}	NEW CREEK		NBRPO B253	8/12/1997	16	76	7	54	75	82	13	88	63	57	4	80	73
1	WVPNB-7-F-{0.6}	ASH SPRING RUN		NBRPO B250	8/12/1997	17	81	10	77	82	89	9	92	47	83	4	86	85
1	WVPNB-7-H	LINTON CREEK		NBRPO B265	8/13/1997	21	100	12	92	86	94	2	99	59	64	3	99	91
1	WVPSB-0.5	IST UNNAMED TRIB /SOUTH BR POTOMAC		SBRPO B296	8/27/1996	11	52	6	46	58	63	15	86	58	65	4	79	65
1	WVPSB-1	STONEY RUN/SOUTH BR POTOMAC		SBRPO B285	8/26/1996	14	67	7	54	79	86	12	88	47	83	4	84	77
1	WVPSB-1.8	ABERNATHY RUN		SBRPO B280	8/26/1996	13	62	5	38	35	38	4	97	77	36	4	81	59
1	WVPSB-1.9	2ND UNNAMED TRIB /SOUTH BR POTOMAC		SBRPO B288	8/27/1996	14	67	6	46	46	50	33	68	56	69	5	66	61
1	WVPSB-11	MCDOWELL RUN		SBRPO B298	8/27/1996	11	52	6	46	18	19	61	40	79	33	6	54	41
1	WVPSB-13	MILL RUN		SBRPO B301	8/27/1996	15	71	9	69	70	76	22	78	54	71	4	82	75
1	WVPSB-14	BUFFALO RUN		SBRPO B309	8/28/1996	12	57	6	46	71	77	4	97	58	66	5	70	69
1	WVPSB-16	DEVIL HOLE RUN		SBRPO B311	8/28/1996	11	52	8	62	73	79	20	81	44	87	4	83	74
1	WVPSB-16-A	SAWMILL RUN		SBRPO B315	8/28/1996	14	67	7	54	58	63	14	87	27	114	4	80	75
1	WVPSB-17-A	CLIFFORD HOLLOW		SBRPO B310	8/28/1996	9	43	6	46	78	85	20	81	68	50	4	89	66
1	WVPSB-18	ANDERSON RUN		SBRPO B281	8/26/1996	9	43	4	31	43	47	37	64	59	64	6	59	51

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Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
1	WVPSB-18.2	UNNAMED TRIB/S BR POT SOUTH OF MCNEIL		SBRPO B332	9/10/1996	11	52	8	62	92	100	4	97	67	52	3	103	77
1	WVPSB-18-A-{1.0}	MUDLICK RUN AT MOUTH		SBRPO B284	8/26/1996	13	62	8	62	45	49	28	72	45	85	5	67	66
1	WVPSB-18-A-0.5	UNNAMED TRIB/MUDLICK RUN		SBRPO B287	8/26/1996	10	48	5	38	49	53	31	69	51	76	5	63	58
1	WVPSB-18-A-1	TURNMILL RUN/MUD LICK RUN		SBRPO B286	8/26/1996	14	67	8	62	59	65	18	83	56	69	4	84	71
1	WVPSB-18-B	WALNUT BOTTOM RUN		SBRPO B317	8/28/1996	14	67	9	69	68	74	17	84	45	86	5	73	75
1	WVPSB-19	WILLIAMS HOLLOW/ GLEBE RUN		SBRPO B318	8/28/1996	14	67	6	46	63	69	23	78	51	76	4	86	70
1	WVPSB-2	JOHN'S RUN		SBRPO B297	8/27/1996	12	57	8	62	44	48	18	83	53	73	5	72	66
1	WVPSB-21-{01.0}	SOUTH FK /SOUTH BR POT NEAR MOUTH		SBRPO B235	8/19/1996	14	67	9	69	61	66	8	93	52	75	5	73	74
1	WVPSB-21-AA	MILLER RUN		SBRPO B271	8/21/1996	8	38	2	15	33	36	11	90	66	54	6	60	49
1	WVPSB-21-F	DUMPLING RUN/MOOREFIELD RUN		SBRPO B228	8/19/1996	16	76	6	46	12	13	1	100	85	23	4	82	57
1	WVPSB-21-F	DUMPLING RUN/MOOREFIELD RUN		SBRPO B335	9/19/1996	1	5	1	8	100	109	0	101	100	0	5	70	47
1	WVPSB-21-GG	LITTLE FORK		SBRPO B269	8/21/1996	13	62	7	54	65	70	4	97	63	58	5	64	68
1	WVPSB-21-HH	STONY RUN/MOOREFIELD RUN		SBRPO B278	8/21/1996	13	62	7	54	85	93	1	100	67	52	5	76	73
1	WVPSB-21-I	KETTLE CREEK		SBRPO B248	8/20/1996	19	90	11	85	60	65	21	79	44	88	5	75	80
1	WVPSB-21-II	BRUSHY FORK		SBRPO B265	8/21/1996	11	52	6	46	80	88	14	87	68	50	4	87	68
1	WVPSB-21-K	ROUGH RUN/MOOREFIELD RUN		SBRPO B233	8/19/1996	14	67	8	62	64	69	22	79	43	89	4	78	74
1	WVPSB-21-K-1	LITTLE ROUGH RUN		SBRPO B229	8/19/1996	13	62	7	54	55	60	30	71	50	79	4	79	67
1	WVPSB-21-N	DICE RUN /SOUTH FK/SOUTH BR POT		SBRPO B244	8/20/1996	12	57	8	62	63	69	12	89	53	73	6	61	68
1	WVPSB-21-O	WAGNER RUN		SBRPO B262	8/20/1996	13	62	8	62	66	72	13	88	50	78	5	69	72
1	WVPSB-21-Q	DEAN GAP		SBRPO B243	8/20/1996	18	86	10	77	57	62	29	71	41	92	5	73	77
1	WVPSB-21-R	STONY RUN		SBRPO B258	8/20/1996	8	38	2	15	43	47	18	82	70	48	6	59	48
1	WVPSB-21-T	HIVELY GAP		SBRPO B267	8/21/1996	16	76	5	38	26	28	44	56	57	67	5	63	55
1	WVPSB-23-A	DURGEON RUN		SBRPO B323	9/10/1996	9	43	4	31	57	62	5	96	65	55	5	66	59
1	WVPSB-23-A-1	MITCHELL RUN/DURGEON RUN		SBRPO B327	9/10/1996	12	57	6	46	59	64	7	94	64	56	5	66	64
1	WVPSB-26	LUNICE CREEK		SBRPO B231	8/19/1996	11	52	5	38	81	88	3	98	57	67	4	88	72
1	WVPSB-26-A	ROBINSON RUN		SBRPO B329	9/10/1996	10	48	6	46	72	78	8	92	38	97	5	77	73
1	WVPSB-26-B	NORMAN RUN		SBRPO B328	9/10/1996	13	62	8	62	85	92	7	94	55	70	4	79	77
1	WVPSB-26-C	BRUSHY RUN/LUNICE CK		SBRPO B227	8/19/1996	14	67	8	62	42	46	7	94	61	61	5	74	67
1	WVPSB-26-D	SOUTH FORK/LUNICE CREEK		SBRPO B236	8/19/1996	10	48	4	31	49	53	5	96	76	37	5	65	55
1	WVPSB-26-D-2	BIG STAR RUN		SBRPO B223	8/19/1996	16	76	11	85	86	93	9	92	30	109	4	90	89
1	WVPSB-26-D-3	LITTLE STAR RUN		SBRPO B230	8/19/1996	15	71	13	100	78	85	11	89	27	114	4	91	89
1	WVPSB-26-E	NORTH FK /LUNICE CREEK		SBRPO B232	8/19/1996	15	71	8	62	75	81	4	97	42	91	5	74	79
1	WVPSB-26-E-2	SALT BLOCK RUN		SBRPO B234	8/19/1996	16	76	6	46	66	72	2	99	53	74	4	82	75
1	WVPSB-28-.5A	POWERS HOLLOW		SBRPO B274	8/21/1996	11	52	6	46	27	29	31	70	63	57	7	42	49
1	WVPSB-28-{00.5}	NORTH FK /SOUTH BR POT NEAR PETERSBURG		SBRPO B273	8/21/1996	14	67	8	62	73	79	17	84	52	75	4	78	74
1	WVPSB-28-{18.8}	NORTH FK /SOUTH BR POT NEAR SENECA ROCKS		SBRPO B254	8/20/1996	13	62	7	54	86	94	10	91	69	48	5	75	71
1	WVPSB-28-A-1	BIG RUN/ JORDAN RUN		SBRPO B239	8/20/1996	18	86	11	85	75	82	13	88	37	99	4	82	87
1	WVPSB-28-A-2	LAUREL RUN/JORDAN RUN		SBRPO B250	8/20/1996	16	76	12	92	83	91	10	91	39	95	4	86	89
1	WVPSB-28-B	SAMUEL RUN		SBRPO B321	9/9/1996	15	71	10	77	56	60	6	95	52	75	5	64	74
1	WVPSB-28-CC	TETER GAP		SBRPO B237	8/19/1996	15	71	7	54	47	51	37	63	56	69	6	61	62
1	WVPSB-28-E	HIGH RIDGE RUN		SBRPO B319	9/9/1996	13	62	12	92	98	107	0	101	73	42	3	96	82
1	WVPSB-28-EE	BIG RUN/ NORTH FORK		SBRPO B264	8/21/1996	10	48	7	54	96	104	3	98	72	44	4	78	70
1	WVPSB-28-EE-1	COLD SPRING RUN		SBRPO B242	8/20/1996	14	67	9	69	72	78	13	88	32	106	4	82	81
1	WVPSB-28-EE-2	SAWMILL BRANCH/BIG RUN		SBRPO B255	8/20/1996	13	62	11	85	97	105	2	99	73	42	4	78	77
1	WVPSB-28-GG	LAUREL FORK/NORTH FK/SOUTH BR POTOMAC		SBRPO B249	8/20/1996	13	62	7	54	79	86	9	92	55	70	5	73	73
1	WVPSB-28-HH	STRAIGHT FORK/NORTH FK/SOUTH BR POT		SBRPO B260	8/20/1996	14	67	8	62	50	55	34	67	51	76	5	67	66
1	WVPSB-28-K	SENECA CREEK		SBRPO B256	8/20/1996	12	57	7	54	60	66	25	76	66	53	5	68	62
1	WVPSB-28-K-1	BRUSHY RUN/SENECA CREEK		SBRPO B240	8/20/1996	12	57	10	77	59	65	35	66	53	73	5	73	68
1	WVPSB-28-K-2	ROARING CREEK		SBRPO B275	8/21/1996	13	62	7	54	91	99	4	97	66	53	4	84	75
1	WVPSB-28-K-3	HORSECAMP RUN		SBRPO B247	8/20/1996	14	67	11	85	71	78	26	75	66	53	5	70	71
1	WVPSB-28-K-4	STRADER RUN		SBRPO B259	8/20/1996	16	76	10	77	86	94	5	96	53	73	4	85	83
1	WVPSB-28-K-5	GULF RUN		SBRPO B245	8/20/1996	17	81	11	85	87	95	4	97	42	91	3	96	91
1	WVPSB-28-K-6	WHITES RUN		SBRPO B263	8/20/1996	15	71	11	85	91	99	4	97	74	41	5	76	78
1	WVPSB-28-P	ROOT RUN		SBRPO B276	8/21/1996	9	43	5	38	56	61	10	90	65	55	5	63	58
1	WVPSB-28-Q	DICE RUN /NORTH FK/SOUTH BR POTOMAC		SBRPO B322	9/10/1996	17	81	13	100	93	101	3	98	51	77	4	89	91
1	WVPSB-28-R	BLIZZARD RUN		SBRPO B224	8/19/1996	13	62	10	77	96	104	1	100	69	48	4	81	78
1	WVPSB-28-S	BRIERY GAP RUN		SBRPO B226	8/19/1996	9	43	6	46	79	86	3	98	61	61	5	75	68
1	WVPSB-28-U	JUDY RUN		SBRPO B268	8/21/1996	11	52	4	31	31	33	9	92	74	41	8	34	47
1	WVPSB-28-V	NELSON RUN		SBRPO B272	8/21/1996	13	62	8	62	89	97	7	94	85	23	5	69	68
1	WVPSB-28-Z	BOUSES RUN		SBRPO B225	8/19/1996	10	48	6	46	94	102	2	99	88	19	5	72	64
1	WVPSB-30	LONG RUN /SOUTH BR POTOMAC		SBRPO B312	8/28/1996	19	90	12	92	63	68	9	92	32	106	4	86	88
1	WVPSB-30.5	UNNAMED TRIB/SOUTH BR POTOMAC		SBRPO B316	8/28/1996	13	62	7	54	58	64	25	76	60	63	6	61	63
1	WVPSB-32	BRIGGS RUN		SBRPO B308	8/28/1996	13	62	9	69	93	101	3	98	79	33	5	76	73

Site metrics and metric scores

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Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
1	WVPSB-33	REEDS CREEK		SBRPO B314	8/28/1996	14	67	7	54	62	68	28	73	80	31	5	65	60
1	WVPSB-34	MILL RUN /SOUTH BR POTOMAC		SBRPO B313	8/28/1996	10	48	5	38	32	35	56	44	69	48	6	51	44
1	WVPSB-4	FOX RUN		SBRPO B293	8/27/1996	12	57	6	46	56	61	23	78	40	95	4	78	69
1	WVPSB-40	PETERS RUN		SBRPO B302	8/27/1996	19	90	11	85	75	82	7	94	49	79	4	82	85
1	WVPSB-41	TROUT RUN		SBRPO B305	8/27/1996	16	76	9	69	81	88	10	91	56	69	4	86	80
1	WVPSB-46	SMITH CREEK		SBRPO B303	8/27/1996	12	57	8	62	26	28	71	29	84	25	6	55	43
1	WVPSB-46-A	LITTLE CREEK		SBRPO B326	9/10/1996	19	90	13	100	86	94	7	94	63	59	4	79	86
1	WVPSB-46-B	TWIN RUN /SMITH CREEK		SBRPO B331	9/10/1996	16	76	11	85	89	97	6	95	63	57	4	79	81
1	WVPSB-47	THORN CREEK		SBRPO B304	8/27/1996	16	76	9	69	51	56	18	82	51	76	5	76	73
1	WVPSB-47-B	BLACKTHORN CREEK		SBRPO B289	8/27/1996	13	62	7	54	71	78	14	87	40	94	5	71	74
1	WVPSB-47-C	WHITETHORN CREEK		SBRPO B307	8/27/1996	19	90	11	85	64	70	19	81	37	98	5	73	83
1	WVPSB-5	BUFFALO CREEK		SBRPO B282	8/26/1996	9	43	4	31	16	18	58	43	80	31	6	57	37
1	WVPSB-50	HAMMER RUN/SOUTH BR POTOMAC		SBRPO B325	9/10/1996	15	71	11	85	90	98	3	98	57	67	4	84	84
1	WVPSB-53	EAST DRY RUN		SBRPO B324	9/10/1996	5	24	3	23	98	107	1	100	97	4	5	71	54
1	WVPSB-9-{10.7}	MILL CREEK/SOUTH BR POT @ HEADWATERS		SBRPO B299	8/27/1996	18	86	9	69	76	83	4	97	39	95	4	84	86
1	WVPSB-9-B	DUMPLING RUN/MILL CREEK		SBRPO B291	8/27/1996	10	48	2	15	71	77	13	88	82	28	5	64	53
1	WVPSB-9-B-2	MAYHEW RUN		SBRPO B334	9/11/1996	11	52	5	38	27	29	61	39	67	51	6	59	45
1	WVPSB-9-F	CAMP RUN /MILL CREEK		SBRPO B290	8/27/1996	14	67	8	62	76	83	8	93	44	87	4	84	79
1	WVPSB-9-F.5	UNNAMED TRIB/MILL CREEK		SBRPO B306	8/27/1996	16	76	8	62	80	87	8	93	47	83	4	84	81
1	WVPSB-9-G	ELKLICK RUN		SBRPO B292	8/27/1996	19	90	10	77	73	80	11	90	45	86	4	78	83
1	WVK-11	POND BRANCH	stressed	LOKAN B20	5/13/1997	14	67	8	62	38	42	52	49	68	50	5	65	56
1	WVK-12-{12.0}	THIRTEEN MILE CREEK	stressed	LOKAN B51	5/19/1997	14	67	8	62	71	77	16	85	55	70	3	92	75
1	WVK-12-A	ROCKY FORK	stressed	LOKAN B35	5/14/1997	17	81	9	69	61	67	27	74	53	73	5	74	73
1	WVK-12-F	POPLAR FORK	stressed	LOKAN B33	5/14/1997	14	67	9	69	36	39	56	45	78	34	5	69	54
1	WVK-12-H	BAKER BRANCH	stressed	LOKAN B46	5/19/1997	17	81	10	77	83	91	9	92	45	85	3	93	86
1	WVK-14	SIXTEENMILE CREEK	stressed	LOKAN B36	5/14/1997	14	67	8	62	55	59	35	66	54	72	5	77	67
1	WVK-16-{25.0}	EIGHTEEN MILE CREEK	stressed	LOKAN B60	5/21/1997	14	67	8	62	75	81	18	83	57	67	3	98	76
1	WVK-16-G-1-{0.4}	LEFT FORK TURKEY BRANCH	stressed	LOKAN B99	6/16/1997	15	71	9	69	55	60	37	64	57	67	5	73	67
1	WVK-19-C	LEFT FORK FIVE AND TWENTY MILE CREEK	stressed	LOKAN B56	5/20/1997	12	57	8	62	64	70	34	67	72	43	5	67	61
1	WVK-22-{10.6}	HURRICANE CREEK	stressed	LOKAN B103	6/24/1997	10	48	1	8	48	53	34	66	83	27	6	59	43
1	WVK-22-{14.4}	HURRICANE CREEK	stressed	LOKAN B104	6/24/1997	6	29	1	8	5	6	39	62	93	12	6	51	28
1	WVK-22-B-2	COW CREEK	stressed	LOKAN B73	5/28/1997	11	52	5	38	23	25	65	36	79	33	6	56	40
1	WVK-22-B-3	LONG BRANCH	stressed	LOKAN B75	5/28/1997	12	57	7	54	6	7	88	12	91	15	7	47	32
1	WVK-22-B-5-B	U.T. OF CROOKED CREEK	stressed	LOKAN B78	5/28/1997	8	38	3	23	4	4	45	56	72	44	7	36	33
1	WVK-22-J-{1.3}	RIDER CREEK	stressed	LOKAN B101	6/19/1997	10	48	5	38	57	62	20	80	61	61	6	61	59
1	WVK-30	ARMOUR CREEK	stressed	LOKAN B38	5/15/1997	3	14	0	0	0	0	88	12	99	1	7	37	11
1	WVK-33	GALLATIN BRANCH	stressed	LOKAN B28	5/14/1997	4	19	2	15	2	2	89	11	98	3	7	40	15
1	WVK-41-A	WOODWARD BRANCH	stressed	LOKAN B45	5/16/1997	2	10	0	0	0	0	10	90	100	0	10	4	17
1	WVK-6	FIVE MILE CREEK	stressed	LOKAN B17	5/13/1997	9	43	6	46	89	97	9	92	76	37	3	99	69
1	WVKE-14-G-2-A	SCHOOLHOUSE FORK	stressed	ELK B119	6/26/1997	7	33	4	31	87	95	6	95	86	22	2	107	63
1	WVKE-23-{12.6}	BIG SANDY CREEK	stressed	ELK B163	7/14/1997	11	52	5	38	33	36	27	74	59	63	5	65	55
1	WVKE-23-D-6	COLEMAN RUN	stressed	ELK B194	7/21/1997	8	38	4	31	65	71	0	101	63	58	4	85	64
1	WVKE-23-P-3-B	SIMONS FORK	stressed	ELK B210	7/23/1997	13	62	5	38	53	58	14	87	44	88	5	74	68
1	WVKE-26-A-{0.16}	LEFT FORK OF MORRIS CREEK	stressed	ELK B167	7/14/1997	5	24	1	8	54	59	23	78	77	36	4	89	49
1	WVKE-78	UPPER MILL RUN	stressed	ELK B184	7/16/1997	13	62	5	38	39	42	30	71	51	77	5	64	59
1	WVKE-87-C	U.T./GRANNY CREEK	stressed	ELK B215	7/24/1997	6	29	1	8	20	22	10	91	50	78	7	44	45
1	WVKE-9-J	JAKES RUN	stressed	ELK B124	7/1/1997	11	52	4	31	71	77	11	90	71	45	5	68	61
1	WVKP-1	HEIZER CREEK	stressed	LOKAN B30	5/14/1997	11	52	6	46	49	53	16	85	41	92	4	88	69
1	WVKP-13-{1.3}	TUPPERS CREEK	stressed	LOKAN B53	5/19/1997	7	33	3	23	17	18	54	46	67	52	7	46	37
1	WVKP-13-{3.0}	TUPPER CREEK	stressed	LOKAN B106	6/24/1997	5	24	0	0	0	0	29	72	81	30	6	59	31
1	WVKP-13-A-1-A	TURKEYPEN BRANCH	stressed	LOKAN B58	5/20/1997	14	67	9	69	51	56	43	58	57	68	5	68	64
1	WVKP-1-A	MANILA CREEK	stressed	LOKAN B32	5/14/1997	9	43	4	31	74	80	0	101	68	51	1	121	67
1	WVKP-43-{1.6}	LAUREL FORK	stressed	LOKAN B95	6/12/1997	10	48	7	54	66	71	24	77	55	70	4	85	67
1	WVMC-11-D-{00}	LEFT FORK BULL RUN @ MOUTH	stressed	CHEAT B81	6/18/1996	9	43	3	23	89	96	2	99	87	20	2	109	63
1	WVMC-12-C-{04}	HAZEL RUN AT HEADWATERS	stressed	CHEAT B97	6/19/1996	12	57	8	62	93	101	0	101	62	60	2	110	80
1	WVMC-13-{01}	GIBSON RUN	stressed	CHEAT B60	6/17/1996	18	86	10	77	69	75	5	96	46	84	4	90	85
1	WVMC-14-{02}	HACKELBARNEY RUN NEAR HEADWATERS	stressed	CHEAT B63	6/17/1996	15	71	9	69	71	77	0	101	56	69	4	85	79
1	WVMC-17-{2.6}	MUDDY CREEK BELOW MARTIN CREEK	stressed	CHEAT B67	6/17/1996	6	29	2	15	18	20	18	83	55	71	5	70	48
1	WVMC-17-A-.5-{0}	FICKY RUN AT MOUTH	stressed	CHEAT B59	6/17/1996	7	33	0	0	0	0	40	61	72	44	6	55	32
1	WVMC-17-A-.5-{3}	FICKY RUN NEAR HEADWATERS	stressed	CHEAT B77	6/18/1996	4	19	4	31	100	109	0	101	78	35	3	99	64
1	WVMC-17-A-{0.0}	MARTIN CREEK @ MOUTH	stressed	CHEAT B65	6/17/1996	2	10	0	0	0	0	50	50	100	0	5	77	23
1	WVMC-17-A-1-{0.0}	GLADE RUN AT MOUTH	stressed	CHEAT B61	6/17/1996	5	24	0	0	0	0	84	16	91	15	7	44	17
1	WVMC-18-A	LICK RUN /ROARING CK ABOVE LITTLE LICK RUN	stressed	CHEAT B104	6/19/1996	12	57	5	38	67	73	11	90	74	41	3	92	65

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1	WVMC-23-A-{2.9}	CHURCH RUN NEAR HEADWATERS	stressed	CHEAT B74	6/18/1996	6	29	1	8	61	67	27	73	89	18	4	91	48
1	WVMC-26-{1.5}	JOES RUN ABOVE 1ST UNNAMED TRIB	stressed	CHEAT B79	6/18/1996	7	33	1	8	39	43	3	98	90	16	2	110	50
1	WVMC-51-B-5	INDIAN RUN	stressed	CHEAT B197	7/30/1996	18	86	10	77	77	84	5	96	53	73	4	80	83
1	WVMC-60-D-1	BIG RUN/ BLACKWATER RIVER	stressed	CHEAT B129	7/17/1996	10	48	7	54	92	100	5	96	73	43	2	108	73
1	WVMC-60-D-4.5	SHAYS RUN	stressed	CHEAT B135	7/18/1996	10	48	7	54	76	83	7	94	57	67	4	85	72
1	WVMC-60-D-4.7	ENGINE RUN NEAR ELK	stressed	CHEAT B131	7/17/1996	11	52	6	46	93	101	4	97	72	44	3	94	72
1	WVMCS-.5	SMOKY HOLLOW	stressed	CHEAT B12	6/10/1996	8	38	3	23	62	67	19	82	58	66	5	73	58
1	WVMCS-6-C	SLABCAMP RUN	stressed	CHEAT B215	8/7/1996	19	90	12	92	78	85	1	100	36	99	3	100	94
1	WVMT-11-A	SHELBY RUN	stressed	TYVAR B306	8/26/1997	12	57	4	31	50	54	3	98	74	41	5	71	59
1	WVMT-18-{9.6}	SANDY CREEK	stressed	TYVAR B338	9/3/1997	13	62	4	31	6	7	63	38	87	21	7	49	35
1	WVMT-24-C-2	BILLS CREEK	stressed	TYVAR B369	9/10/1997	11	52	5	38	34	37	23	77	47	83	5	71	60
1	WVMT-37-{0.0}	BEAVER CREEK	stressed	TYVAR B382	9/15/1997	6	29	0	0	0	0	61	40	82	28	5	66	27
1	WVMT-42-B-3-{1.0}	U.T. OF FLATBUSH FORK	stressed	TYVAR B292	8/25/1997	6	29	3	23	18	19	59	41	77	36	6	62	35
1	WVMT-43-A	CRAVEN RUN	stressed	TYVAR B285	8/25/1997	10	48	3	23	15	16	36	65	57	67	7	46	44
1	WVMT-66-B	MCGEE RUN	stressed	TYVAR B335	9/3/1997	7	33	4	31	18	20	78	22	88	19	6	49	29
1	WVMTB-11-B.5	WASH RUN	stressed	TYVAR B328	9/2/1997	10	48	2	15	4	4	66	34	85	24	7	37	27
1	WVMY-1-A	WHITE OAK SPRING RUN	stressed	YOUGH B119	7/8/1996	12	57	7	54	57	62	3	98	44	87	3	94	75
1	WVMY-2-B	SOUTH BRANCH	stressed	YOUGH B123	7/9/1996	14	67	9	69	74	81	9	91	45	86	4	89	81
1	WVMY-5	MAPLE RUN	stressed	YOUGH B120	7/9/1996	15	71	7	54	29	31	40	61	56	69	6	63	58
1	WVPNB-10	SLAUGHTERHOUSE RUN	stressed	NBRPO B249	8/11/1997	11	52	6	46	45	49	21	79	46	85	5	65	63
1	WVPNB-16-{18.1}	ABRAM CREEK	stressed	NBRPO B276	8/18/1997	5	24	1	8	20	22	20	81	40	94	7	48	46
1	WVPNB-17-D	LAUREL RUN	stressed	NBRPO B283	8/19/1997	11	52	3	23	24	27	41	60	61	61	6	58	47
1	WVPNB-4-{45.2}	PATTERSON CREEK	stressed	NBRPO B247	8/11/1997	16	76	10	77	74	81	10	91	48	82	4	81	81
1	WVPNB-7-C.4-1-{0.2}	U.T OF U .T. OF NEW CREEK	stressed	NBRPO B271	8/13/1997	12	57	2	15	3	3	2	99	95	8	4	84	45
1	WVPNB-7-H-2-{1.0}	U.T. OF LINTON CREEK	stressed	NBRPO B258	8/12/1997	16	76	11	85	83	90	2	99	55	70	4	90	85
1	WVPSB-18-A-{6.7}	MUDLICK RUN AT HEADWATERS	stressed	SBRPO B283	8/26/1996	8	38	4	31	8	8	71	30	85	23	7	49	30

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2	WVBST-27-C	MILL FORK	reference	TUG98 B60	7/7/1998	20	95	10	77	39	42	16	85	46	84	5	75	76
2	WVBST-60-E	GEORGE BRANCH	reference	TUG98 B88	7/7/1998	19	90	11	85	90	98	1	100	69	48	4	87	85
2	WVBST-60-F	CRANE CREEK	reference	TUG98 B89	7/7/1998	19	90	11	85	88	95	2	99	54	73	4	83	87
2	WVBST-60-G-{0.9}	HURRICANE BRANCH	reference	TUG98 B90	6/17/1998	19	90	13	100	90	98	4	97	66	53	3	99	90
2	WVBST-60-I-2	WHITE OAK BRANCH	reference	TUG98 B91	7/8/1998	21	100	14	108	87	94	3	98	64	56	3	103	91
2	WVBST-70-Z-{2.3}	VALL CREEK	reference	TUG98 B110	7/1/1998	18	86	13	100	81	88	8	93	63	58	3	97	87
2	WVBST-76-E	DAYCAMP BRANCH	reference	TUG98 B116	6/24/1998	15	71	9	69	90	98	5	96	63	58	3	96	81
2	WVK-14-B-1-98	U.T. OF FIVEFORK BRANCH	reference	LOK98 B1	5/26/1998	17	81	9	69	71	77	15	86	35	102	4	90	84
2	WVK-39-E-3-{0.6}98	BAYS FORK	reference	LOK98 B2	6/4/1998	24	114	14	108	53	58	21	80	38	98	4	83	86
2	WVK-39-M-1-A-{1.0}98	HOFFMAN HOLLOW	reference	LOK98 B3	6/4/1998	25	119	11	85	71	77	8	93	42	91	4	91	89
2	WVKG-19-V-5	LAUREL CREEK/LITTLE CLEAR CREEK	reference	GAU98 B43R	7/29/1998	17	81	13	100	92	100	1	100	34	104	3	96	96
2	WVKG-34-H-14	BEAR RUN	reference	GAU98 B97	8/3/1998	15	71	12	92	86	94	7	94	60	63	3	102	86
2	WVKG-34-H-4	HUNTERS RUN	reference	GAU98 B98	8/4/1998	13	62	8	62	91	99	5	96	51	77	3	92	81
2	WVKG-34-H-9	ARMSTRONG RUN	reference	GAU98 B100	8/3/1998	15	71	11	85	90	98	8	93	51	77	3	102	87
2	WVKG-5-F-3	BEARPEN FORK	reference	GAU98 B119	7/22/1998	23	110	15	115	82	90	9	92	60	63	3	98	90
2	WVKG-5-H	ASH FORK	reference	GAU98 B120	7/21/1998	19	90	13	100	80	87	14	87	30	110	3	96	93
2	WVKG-5-J	NEIL BRANCH	reference	GAU98 B121	7/21/1998	22	105	13	100	63	69	26	75	39	95	4	81	87
2	WVKGC-23-{2.3}	SOUTH FORK CRANBERRY RIVER	reference	GAU98 B152	8/5/1998	23	110	14	108	78	85	10	91	31	107	4	87	94
2	WVKGW-22-{0.4}	LITTLE LAUREL CREEK	reference	GAU98 B180	8/6/1998	21	100	13	100	83	91	7	94	47	83	3	92	93
2	WVKGW-27	MOUNTAIN LICK RUN	reference	GAU98 B181	8/11/1998	20	95	15	115	92	100	4	97	47	83	4	91	94
2	WVO-2-P-23	ARKANSAS BRANCH	reference	TUG98 B138	7/7/1998	19	90	8	62	63	68	16	85	46	84	4	85	79
2	WVO-2-P-26	LONG BRANCH	reference	TUG98 B1	7/7/1998	17	81	9	69	80	87	9	91	60	62	3	95	81
2	WVO-2-Q-17	ALUM FORK	reference	TPO98 B7	5/28/1998	16	76	10	77	83	90	8	93	63	58	4	90	81
2	WVO-2-Q-18-A	LITTLE LAUREL CREEK	reference	TPO98 B8	5/28/1998	23	110	14	108	57	62	8	93	46	84	3	92	88
2	WVOG-29-C	HORSESHOE BRANCH	reference	LGU98 B24	5/13/1998	24	114	13	100	84	91	5	96	50	78	4	88	92
2	WVOG-32-F	PLUM BRANCH	reference	LGU98 B28	5/27/1998	18	86	12	92	74	81	7	93	52	74	4	91	86
2	WVOG-34-E-1-{0.8}	NELSON FORK	reference	LGU98 B33	5/11/1998	15	71	9	69	48	52	6	95	34	104	4	83	79
2	WVOG-37	LITTLE UGLY CREEK	reference	LGU98 B36	5/11/1998	19	90	13	100	89	97	4	97	62	59	4	89	89
2	WVOG-38-{11.6}	BIG UGLY CREEK	reference	LGU98 B45	5/19/1998	19	90	10	77	79	86	6	95	69	48	5	74	78
2	WVOG-38-A	PIGEONROOST CREEK	reference	LGU98 B37	5/19/1998	13	62	8	62	80	87	4	97	62	59	4	81	75
2	WVOG-38-D-{3.9}	LAUREL CREEK	reference	LGU98 B38	5/18/1998	24	114	15	115	80	87	1	100	39	96	3	93	96
2	WVOGM-8-B	LEFT FORK/MILL CREEK	reference	LGU98 B135	5/3/1998	12	57	8	62	69	76	4	97	50	78	4	86	76
2	WVP-16-{0.1}	ROCKWELL RUN	reference	POT98 B68	6/3/1998	24	114	15	115	69	75	13	88	35	102	4	89	92
2	WVP-6-A.5-{0.2}	U.T. OF BACK CREEK	reference	POT98 B42	6/3/1998	17	81	8	62	63	69	28	72	69	49	4	85	69
2	WVP-6-G-1-{0.0}	LITTLE BRUSH CREEK	reference	POT98 B64	6/2/1998	18	86	10	77	61	66	17	84	44	88	4	86	81
2	WVP-9-B-{0.0}	MEADOW BRANCH	reference	POT98 B21	6/1/1998	16	76	11	85	57	61	38	63	53	73	5	75	72
2	WVP-9-B-{12.8}	MEADOW BRANCH	reference	POT98 B65	6/3/1998	18	86	7	54	40	43	30	70	62	59	4	80	65
2	WVP-9-G-2-{0.0}	SOUTH FORK/INDIAN CREEK	reference	POT98 B66	6/3/1998	18	86	14	108	66	72	16	84	35	102	4	88	88
2	WVPC-0.9A-{0.2}	CONNOR HOLLOW	reference	CAP98 B70	6/3/1998	25	119	15	115	64	70	20	81	31	107	4	86	90
2	WVPC-1-{0.2}	CONSTANT RUN	reference	CAP98 B69	6/4/1998	17	81	12	92	81	88	16	85	48	81	3	93	87
2	WVBS-{47.4}	TUG FORK RIVER		TUG98 B6	7/8/1998	15	71	7	54	64	69	13	88	49	79	5	72	72
2	WVBS-{51.6}	TUG FORK RIVER		TUG98 B7	7/8/1998	17	81	6	46	73	79	4	97	54	72	5	77	76
2	WVBS-{76.4}	TUG FORK RIVER		TUG98 B9	7/7/1998	9	43	3	23	29	32	29	72	52	76	5	64	51
2	WVBST-100	LITTLE INDIAN CREEK		TUG98 B11	6/17/1998	15	71	4	31	38	41	46	54	76	38	6	55	48
2	WVBST-103	ROCK NARROWS BRANCH		TUG98 B13	6/23/1998	10	48	5	38	41	45	53	48	77	36	6	60	46
2	WVBST-104	HARRIS BRANCH		TUG98 B14	6/18/1998	15	71	7	54	70	76	2	99	63	58	5	75	72
2	WVBST-105	MITCHELL BRANCH		TUG98 B15	7/1/1998	13	62	8	62	62	67	30	71	80	31	5	66	60
2	WVBST-109-{0.0}	SANDLICK CREEK		TUG98 B20	6/17/1998	4	19	2	15	50	54	0	101	67	52	5	77	53
2	WVBST-109-{1.7}	SANDLICK CREEK		TUG98 B21	7/1/1998	5	24	2	15	71	77	10	91	73	42	5	68	53
2	WVBST-109-A	RIGHT FORK / SANDLICK CREEK		TUG98 B18	7/1/1998	11	52	4	31	27	29	57	44	77	36	6	56	41
2	WVBST-109-B	LEFT FORK / SANDLICK CREEK		TUG98 B19	7/1/1998	4	19	2	15	69	75	8	93	69	48	5	68	53
2	WVBST-110	ADKIN BRANCH		TUG98 B22	6/17/1998	11	52	3	23	30	33	13	88	56	69	5	75	57
2	WVBST-111	BELCHER BRANCH		TUG98 B23	6/16/1998	10	48	4	31	68	74	10	91	65	54	6	63	60
2	WVBST-112	TURNHOLE BRANCH		TUG98 B24	6/30/1998	13	62	4	31	63	68	11	90	55	71	5	71	66
2	WVBST-113	HARMON BRANCH		TUG98 B25R	6/30/1998	7	33	2	15	38	41	12	89	58	66	5	71	52
2	WVBST-115	SOUTH FORK		TUG98 B27	7/6/1998	15	71	6	46	44	48	18	83	48	81	5	72	67
2	WVBST-115-A	TEA BRANCH		TUG98 B28	7/1/1998	17	81	9	69	74	80	12	89	50	79	4	79	80
2	WVBST-115-B	MCCLURE BRANCH		TUG98 B29	6/25/1998	19	90	10	77	85	92	2	99	53	74	3	96	88
2	WVBST-115-D	JUMP BRANCH		TUG98 B30	6/25/1998	21	100	11	85	52	57	31	70	51	76	5	74	77
2	WVBST-115-E	SPICE CREEK		TUG98 B31	6/24/1998	15	71	8	62	75	82	11	89	47	82	4	86	79
2	WVBST-115-F	LAUREL BRANCH		TUG98 B32	7/6/1998	15	71	8	62	81	88	4	97	47	82	4	84	81
2	WVBST-115-G	ROAD FORK		TUG98 B33	6/25/1998	15	71	6	46	71	77	6	95	65	55	3	94	73
2	WVBST-117	LOOP BRANCH		TUG98 B35	6/24/1998	12	57	5	38	30	33	13	88	64	57	5	71	57

Site metrics and metric scores

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Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
2	WVBST-118	MILL BRANCH		TUG98 B36	6/24/1998	18	86	9	69	61	66	4	97	54	72	4	82	79
2	WVBST-119	DRY BRANCH		TUG98 B37	6/24/1998	23	110	12	92	84	91	5	96	52	76	3	93	91
2	WVBST-120-{0.0}	LITTLE CREEK		TUG98 B40	6/23/1998	12	57	3	23	20	21	62	39	75	39	6	54	39
2	WVBST-120-{2.0}	LITTLE CREEK		TUG98 B41	6/23/1998	23	110	12	92	63	68	6	95	53	73	4	89	86
2	WVBST-120-A	INDIAN GRAVE BRANCH		TUG98 B38	6/23/1998	17	81	9	69	27	29	33	67	61	61	5	67	62
2	WVBST-121	MILLSEAT BRANCH		TUG98 B42	6/24/1998	20	95	10	77	76	82	7	94	34	103	4	86	89
2	WVBST-14-B	RIGHT FORK/BULL CREEK		TUG98 B44	6/24/1998	15	71	6	46	80	87	3	98	65	54	4	79	73
2	WVBST-17-{2.7}	JENNIE CREEK		TUG98 B46	6/30/1998	13	62	5	38	30	33	43	57	59	64	6	63	53
2	WVBST-24	PIGEON CREEK		TUG98 B49	7/6/1998	12	57	5	38	25	27	27	74	56	69	6	49	53
2	WVBST-24-{29.3}	PIGEON CREEK		TUG98 B57	6/23/1998	7	33	2	15	38	41	55	45	91	14	6	55	34
2	WVBST-24-{31.8}	PIGEON CREEK		TUG98 B58	6/3/1998	16	76	11	85	86	94	3	97	42	91	4	90	89
2	WVBST-24-N	ELK CREEK		TUG98 B139	6/16/1998	9	43	4	31	19	21	3	97	86	23	5	71	48
2	WVBST-24-O	MILLSTONE BRANCH		TUG98 B54	6/16/1998	15	71	6	46	48	52	13	87	38	96	5	76	71
2	WVBST-24-P	PIGEONROOST CREEK		TUG98 B55	6/16/1998	18	86	10	77	62	67	7	94	38	97	5	75	83
2	WVBST-24-Q-7	SPRING BRANCH		TUG98 B56	6/16/1998	11	52	4	31	63	69	17	83	63	57	6	63	59
2	WVBST-27-{2.5}	MILLER CREEK		TUG98 B61	6/17/1998	12	57	7	54	46	51	9	92	54	73	5	74	67
2	WVBST-31-B	SOUTH FORK / BUFFALO CREEK		TUG98 B63	6/15/1998	18	86	8	62	44	48	19	81	47	83	5	69	71
2	WVBST-32	SUGARTREE CREEK		TUG98 B65	6/15/1998	7	33	3	23	55	59	9	92	55	71	4	81	60
2	WVBST-34	SYCAMORE CREEK		TUG98 B67	6/22/1998	16	76	6	46	47	51	2	99	64	56	5	71	67
2	WVBST-35	LICK CREEK		TUG98 B68	6/15/1998	9	43	3	23	63	69	17	84	77	36	6	61	53
2	WVBST-40	MATE CREEK		TUG98 B71	6/15/1998	9	43	3	23	7	7	50	51	74	40	7	45	35
2	WVBST-40-C	MITCHELL BRANCH		TUG98 B73	6/16/1998	8	38	1	8	10	11	8	93	81	30	9	17	33
2	WVBST-40-H	DOUBLE CAMP FORK		TUG98 B75	6/15/1998	16	76	6	46	65	70	26	75	65	55	5	64	64
2	WVBST-41	SULPHUR CREEK		TUG98 B76	6/16/1998	4	19	0	0	0	0	40	61	60	63	6	59	34
2	WVBST-42	THACKER CREEK		TUG98 B77	6/16/1998	7	33	1	8	13	15	40	61	63	57	6	59	39
2	WVBST-42-A	SCISSORSVILLE BRANCH		TUG98 B78	6/16/1998	6	29	2	15	63	68	13	88	66	54	3	96	58
2	WVBST-42-B	MAUCHINVILLE BRANCH		TUG98 B79	6/16/1998	4	19	1	8	54	59	4	97	92	13	4	85	47
2	WVBST-43	GRAPEVINE CREEK		TUG98 B80	6/16/1998	7	33	2	15	75	82	2	99	92	13	5	70	52
2	WVBST-60	PANTHER CREEK		TUG98 B84R	7/7/1998	10	48	4	31	51	55	40	61	77	36	6	62	49
2	WVBST-60-A-{2.0}	GREENBRIER FORK		TUG98 B86	7/7/1998	14	67	3	23	2	2	79	21	86	23	7	44	30
2	WVBST-60-D	CUB BRANCH		TUG98 B87	6/17/1998	21	100	12	92	77	84	13	88	46	85	5	77	88
2	WVBST-63-{1.2}	HORSE CREEK		TUG98 B92	7/7/1998	19	90	8	62	59	64	17	83	41	92	5	71	77
2	WVBST-70-{1.3}	DRY FORK		TUG98 B111	7/7/1998	13	62	6	46	59	64	5	96	69	49	5	72	65
2	WVBST-70-{18.4}	DRY FORK		TUG98 B112	7/6/1998	16	76	7	54	30	32	50	50	63	57	6	59	55
2	WVBST-70-{7.4}	DRY FORK		TUG98 B113	7/7/1998	14	67	8	62	44	47	31	69	51	77	5	64	64
2	WVBST-70-C	MILE BRANCH		TUG98 B93	7/2/1998	16	76	10	77	73	80	17	84	44	88	5	71	79
2	WVBST-70-F	GRAPEVINE BRANCH		TUG98 B94	7/2/1998	14	67	6	46	53	58	41	60	88	19	6	61	52
2	WVBST-70-I	BEARTOWN BRANCH		TUG98 B95	7/2/1998	12	57	7	54	88	96	3	98	76	38	5	76	70
2	WVBST-70-M-{1.8}	BRADSHAW CREEK		TUG98 B98	7/9/1998	17	81	6	46	35	38	50	50	68	49	6	62	54
2	WVBST-70-M-1	GROUNDHOG BRANCH		TUG98 B96	7/9/1998	11	52	3	23	8	9	61	40	84	25	7	38	31
2	WVBST-70-M-3	WOLFPEN BRANCH		TUG98 B97	7/8/1998	18	86	7	54	41	45	41	60	65	55	6	58	59
2	WVBST-70-N-{2.7}	LITTLE SLATE CREEK		TUG98 B101	7/8/1998	19	90	11	85	84	91	2	99	49	79	4	83	88
2	WVBST-70-N-{4.5}	LITTLE SLATE CREEK		TUG98 B99	7/6/1998	19	90	13	100	74	80	14	87	44	87	4	88	89
2	WVBST-70-Q	BARTLEY CREEK		TUG98 B103	7/9/1998	17	81	7	54	48	52	33	68	60	63	5	74	65
2	WVBST-70-T-2	CLEAR FORK		TUG98 B104	7/1/1998	8	38	2	15	4	5	66	35	87	20	6	54	28
2	WVBST-70-U-1	BIG BRANCH / WAR CREEK		TUG98 B105	7/6/1998	19	90	12	92	84	91	5	96	70	48	3	103	86
2	WVBST-70-W-{0.8}	JACOB FORK		TUG98 B107	6/30/1998	14	67	5	38	66	72	22	79	49	80	5	71	68
2	WVBST-70-W-{7.8}	JACOB FORK		TUG98 B108	7/1/1998	15	71	6	46	39	43	32	69	65	54	5	68	59
2	WVBST-70-W-1-A-{0.8}	MOUNTAIN FORK		TUG98 B106	7/2/1998	10	48	5	38	63	68	25	76	72	44	6	62	56
2	WVBST-70-Z-{0.0}	VALL CREEK		TUG98 B109	7/1/1998	17	81	9	69	67	73	21	79	47	83	4	78	77
2	WVBST-71	LICK BRANCH		TUG98 B114	6/25/1998	10	48	3	23	5	6	63	38	84	25	7	40	30
2	WVBST-72	HARMAN BRANCH		TUG98 B115	6/25/1998	16	76	9	69	89	97	4	97	58	65	4	79	81
2	WVBST-76-{0.0}	CLEAR FORK		TUG98 B117R	7/7/1998	13	62	7	54	81	88	2	99	54	72	4	80	76
2	WVBST-76-{10.2}	CLEAR FORK		TUG98 B119	6/30/1998	14	67	5	38	10	10	62	38	82	28	6	63	41
2	WVBST-76-{5.6}	CLEAR FORK		TUG98 B120	6/24/1998	13	62	4	31	46	50	17	83	48	82	5	71	63
2	WVBST-78-D	HONEYCAMP BRANCH		TUG98 B122	7/9/1998	18	86	5	38	70	76	12	89	61	61	3	92	74
2	WVBST-78-E	COONTREE BRANCH		TUG98 B123	7/9/1998	14	67	5	38	25	27	42	59	63	58	6	55	51
2	WVBST-78-F	STONECOAL BRANCH		TUG98 B124	6/30/1998	19	90	8	62	76	82	13	88	64	57	5	72	75
2	WVBST-78-H	NEWSON BRANCH		TUG98 B126	6/24/1998	11	52	2	15	1	1	89	11	93	11	7	43	22
2	WVBST-78-I	MOORECAMP BRANCH		TUG98 B127	6/24/1998	14	67	5	38	60	65	9	92	56	69	5	67	66
2	WVBST-85-A	LEFT FORK / DAVY BRANCH		TUG98 B128	6/23/1998	10	48	5	38	48	52	23	78	44	87	5	70	62
2	WVBST-85-A-{0.8}	LEFT FORK / DAVY BRANCH		TUG98 B129	6/23/1998	21	100	11	85	75	82	0	101	61	61	4	89	86
2	WVBST-94	SHANNON BRANCH		TUG98 B130	6/12/1998	15	71	9	69	80	87	5	96	59	64	4	88	79

Site metrics and metric scores

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Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
2	WVBST-95	UPPER SHANNON BRANCH		TUG98 B131	6/17/1998	8	38	2	15	16	18	74	27	89	17	7	49	27
2	WVBST-98-A	PUNCHEON CAMP BRANCH		TUG98 B132	6/17/1998	11	52	4	31	94	102	3	98	93	11	5	70	60
2	WVBST-99-{0.0}	ELKHORN CREEK		TUG98 B136	6/22/1998	11	52	2	15	34	37	36	64	62	60	6	59	48
2	WVBST-99-{16.4}	ELKHORN CREEK		TUG98 B137	6/22/1998	8	38	4	31	46	50	5	96	51	76	6	57	58
2	WVBST-99-L-{0.0}	NORTH FORK / ELKHORN CREEK		TUG98 B134	6/22/1998	6	29	3	23	68	74	25	75	83	26	5	65	49
2	WVBST-99-L-{6.2}	NORTH FORK / ELKHORN CREEK		TUG98 B135	6/16/1998	10	48	2	15	24	26	64	36	80	31	7	49	34
2	WVBST-99-L-1	BUZZARD BRANCH		TUG98 B133	6/22/1998	10	48	6	46	75	82	4	97	82	29	5	72	62
2	WVK-34-{23.8}	BIG COAL RIVER		COAL97 B15	10/8/1997	18	86	10	77	82	89	2	99	68	50	4	79	80
2	WVK-34-{58.4}	COAL RIVER		COAL97 B16R	10/7/1997	16	76	9	69	78	85	5	96	51	77	4	82	81
2	WVK-82-{18.6}	GAULEY RIVER		GAU98 B2	7/15/1998	10	48	4	31	20	21	61	40	72	43	6	56	40
2	WVK-82-{55.2}	GAULEY RIVER		GAU98 B4	7/29/1998	15	71	10	77	69	75	15	86	47	83	5	73	78
2	WVK-82-{61.6}	GAULEY RIVER		GAU98 B5	7/30/1998	14	67	9	69	75	81	11	90	55	70	5	75	75
2	WVK-82-{80.2}	GAULEY RIVER		GAU98 B6	8/5/1998	16	76	10	77	87	94	5	96	44	87	4	82	86
2	WVKC-10-I-6-C	RATTLESNAKE HOLLOW		COAL97 B65	9/22/1997	13	62	5	38	28	31	20	81	42	90	5	70	62
2	WVKC-10-L	CAMP CREEK		COAL97 B11	9/23/1997	16	76	8	62	71	77	8	93	56	69	4	83	77
2	WVKC-10-N-{3.0}	ROCK CREEK		COAL97 B68	9/25/1997	16	76	6	46	25	28	32	68	65	55	5	64	56
2	WVKC-10-P-.5	LONG BRANCH		COAL97 B46	9/24/1997	16	76	5	38	27	29	17	84	46	85	5	76	65
2	WVKC-10-T-{17.4}	SPRUCE FORK		COAL97 B75	9/25/1997	12	57	5	38	52	57	10	91	45	86	5	74	67
2	WVKC-10-T-{18.5}	SPRUCE FORK		COAL97 B76	9/25/1997	10	48	5	38	27	29	10	90	74	40	5	71	53
2	WVKC-10-T-11-{15.3}	SPRUCE LAUREL FORK		COAL97 B79	9/15/1997	12	57	7	54	88	96	4	97	79	33	5	72	68
2	WVKC-10-T-11-H.5-{0.3}	TICKLE BRITCHES FORK		COAL97 B86	9/15/1997	6	29	5	38	36	39	0	101	76	38	4	86	55
2	WVKC-10-T-2	LAUREL BRANCH		COAL97 B38	9/24/1997	17	81	7	54	60	66	13	88	64	57	4	81	71
2	WVKC-10-T-9	HEWITT CREEK		COAL97 B30R	9/24/1997	11	52	4	31	72	79	11	90	62	60	4	79	65
2	WVKC-10-T-9-B	MISSOURI FORK/HEWITT		COAL97 B58	9/23/1997	13	62	3	23	8	9	8	93	56	69	5	74	55
2	WVKC-10-T-9-B.5	ISOM BRANCH		COAL97 B34	9/24/1997	15	71	4	31	48	52	13	88	48	82	5	76	67
2	WVKC-10-T-9-C-2	SYCAMORE BRANCH		COAL97 B85	9/24/1997	16	76	4	31	26	28	3	98	52	74	5	76	64
2	WVKC-10-U-13	GRAPEVINE BRANCH		COAL97 B28	9/23/1997	16	76	8	62	62	67	24	77	62	59	5	68	68
2	WVKC-10-U-17	JASPER WORKMAN BRANCH		COAL97 B35	9/22/1997	18	86	9	69	65	70	18	83	64	56	5	67	72
2	WVKC-10-U-21	LACEY BRANCH		COAL97 B37	9/22/1997	14	67	7	54	43	47	34	66	62	59	5	64	59
2	WVKC-10-U-3-B	BENNETT FORK		COAL97 B4	9/23/1997	14	67	7	54	60	65	15	86	44	88	5	74	72
2	WVKC-10-U-7-A	ROACH BRANCH		COAL97 B67	9/22/1997	14	67	7	54	46	50	16	85	66	54	4	82	65
2	WVKC-11-{5.6}	ALUM CREEK		COAL97 B2	9/18/1997	16	76	6	46	31	34	31	69	50	78	6	63	61
2	WVKC-14	FORK CREEK		COAL97 B27	10/6/1997	19	90	9	69	73	80	12	89	56	69	5	77	79
2	WVKC-16-A	LEFT FORK/BULL CREEK		COAL97 B40	9/26/1997	11	52	4	31	84	92	4	97	64	57	4	81	68
2	WVKC-21	BRUSH CREEK		COAL97 B9	9/26/1997	14	67	4	31	9	10	54	46	73	42	6	54	41
2	WVKC-21-C	RIDGEVIEW HOLLOW		COAL97 B66	10/8/1997	14	67	3	23	3	3	58	43	67	52	7	45	39
2	WVKC-29	JOES CREEK		COAL97 B36	9/17/1997	12	57	5	38	38	41	30	71	57	68	6	57	55
2	WVKC-29-A	LEFT FORK JOES CREEK		COAL97 B42	10/7/1997	16	76	7	54	56	61	12	89	59	64	5	71	69
2	WVKC-29-A-3	SPICELICK FORK		COAL97 B73	9/17/1997	22	105	8	62	50	54	10	91	42	91	4	78	79
2	WVKC-31-{0.4}	LAUREL CREEK		COAL97 B39	10/7/1997	12	57	7	54	61	67	7	94	71	46	5	72	65
2	WVKC-31-B-{0.2}	HOPKINS FORK		COAL97 B32	10/7/1997	14	67	6	46	72	78	4	97	41	93	5	77	76
2	WVKC-31-B-{10.9}	HOPKINS FORK		COAL97 B33	10/6/1997	19	90	12	92	73	79	6	95	54	71	4	85	85
2	WVKC-31-C	COLD FORK		COAL97 B18	10/7/1997	14	67	9	69	85	93	9	92	79	33	5	75	71
2	WVKC-35-{3.0}	WHITE OAK CREEK		COAL97 B92	10/8/1997	8	38	4	31	43	47	29	72	68	50	5	64	50
2	WVKC-35-F	LEFT FORK OF WHITE OAK CREEK		COAL97 B41	10/8/1997	16	76	8	62	67	73	19	82	63	58	5	70	70
2	WVKC-43-{0.0}	ELK RUN		COAL97 B24	10/7/1997	20	95	7	54	38	41	35	66	55	70	6	62	65
2	WVKC-43-{2.8}	ELK RUN		COAL97 B25	10/7/1997	19	90	9	69	41	44	34	67	65	54	6	63	65
2	WVKC-46-{0.0}	MARSH FORK		COAL97 B50	10/6/1997	13	62	5	38	80	87	4	97	62	59	4	88	72
2	WVKC-46-{15.3}	MARSH FORK		COAL97 B51	10/6/1997	14	67	6	46	70	76	6	95	55	71	5	77	72
2	WVKC-46-{20.2}	MARSH FORK		COAL97 B52	9/29/1997	15	71	7	54	72	78	4	97	52	74	4	80	76
2	WVKC-46-{5.8}	MARSH FORK		COAL97 B54	10/6/1997	15	71	6	46	80	87	5	96	47	83	4	82	78
2	WVKC-46-C	HAZY CREEK		COAL97 B29	10/6/1997	14	67	7	54	85	92	9	92	73	42	5	72	70
2	WVKC-46-E	STINK RUN		COAL97 B81	10/6/1997	17	81	6	46	52	57	10	91	50	79	5	69	70
2	WVKC-46-G	PEACHTREE CREEK		COAL97 B60	9/25/1997	17	81	8	62	79	86	5	96	66	53	4	78	76
2	WVKC-46-G-1	DREWS CREEK		COAL97 B22	9/25/1997	16	76	9	69	90	98	7	94	81	29	5	74	73
2	WVKC-46-G-1-.5A	CANTERBURY BRANCH		COAL97 B12	9/25/1997	2	10	1	8	50	54	0	101	100	0	3	99	45
2	WVKC-46-G-2	MARTIN FORK		COAL97 B55	9/25/1997	19	90	8	62	84	92	4	97	69	49	4	82	79
2	WVKC-46-H	DRY CREEK		COAL97 B23	10/6/1997	13	62	7	54	66	72	7	94	62	60	5	76	70
2	WVKC-46-I	ROCK CREEK		COAL97 B69	10/7/1997	18	86	9	69	60	66	9	92	43	88	4	80	80
2	WVKC-46-J-2	BEE BRANCH		COAL97 B3	9/29/1997	8	38	3	23	24	26	21	80	64	57	5	77	50
2	WVKC-46-K	COVE CREEK		COAL97 B19	9/29/1997	20	95	10	77	59	65	21	80	37	99	4	82	83
2	WVKC-46-L.5	SHILOH FORK		COAL97 B71	9/29/1997	10	48	4	31	81	88	7	93	74	40	3	95	66
2	WVKC-46-P	SURVEYOR CREEK		COAL97 B84	10/7/1997	14	67	7	54	29	31	48	52	66	53	6	58	53

Appendix C

Site metrics and metric scores

Stations are grouped by data set (1= 1996-1997 calibration data; 2= 1997-1998 validation data). Within each data set, stations are listed by site type (reference, unlabeled, stressed), then within type by ascending Station ID.

Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
2	WVKC-46-Q	MILLERS CAMP BRANCH		COAL97 B57	10/7/1997	11	52	4	31	5	5	34	66	90	16	5	77	41
2	WVKC-47	CLEAR FORK		COAL97 B13R	9/23/1997	8	38	5	38	87	95	6	95	60	62	4	80	68
2	WVKC-47-A-{1.3}	ROCKHOUSE CREEK		COAL97 B70	9/23/1997	20	95	11	85	66	72	2	99	51	76	4	79	84
2	WVKC-47-C	PANTHER BRANCH		COAL97 B59	9/24/1997	18	86	8	62	48	53	27	74	49	79	5	69	70
2	WVKC-47-F	STONECOAL BRANCH		COAL97 B83	9/24/1997	6	29	2	15	49	53	20	81	67	52	5	75	51
2	WVKC-47-G	LONG FORK		COAL97 B47	9/24/1997	12	57	8	62	78	85	7	94	72	43	5	76	70
2	WVKC-47-G-1	DOW FORK		COAL97 B21	9/24/1997	13	62	5	38	66	72	13	88	73	43	5	74	63
2	WVKC-47-H	MARE BRANCH		COAL97 B49	9/24/1997	15	71	10	77	73	79	12	89	62	59	5	77	75
2	WVKC-47-N-{1.4}	MCDOWELL BRANCH		COAL97 B56	9/22/1997	11	52	7	54	89	97	4	97	58	65	4	91	76
2	WVKC-47-O-{0.0}	WORKMAN CREEK		COAL97 B93	9/22/1997	14	67	6	46	52	56	27	73	53	73	5	66	64
2	WVKC-47-O-{2.4}	WORKMAN CREEK		COAL97 B94	9/22/1997	15	71	8	62	84	91	10	91	63	58	5	76	75
2	WVKC-5	FALLS CREEK		COAL97 B26	9/17/1997	19	90	8	62	38	41	29	71	48	82	5	71	70
2	WVKC-9	CROOKED CREEK		COAL97 B20	9/17/1997	11	52	5	38	29	32	43	58	62	59	6	62	50
2	WVKG-13-{0.0}	PETERS CREEK		GAU98 B18	7/14/1998	15	71	6	46	46	50	8	93	45	86	5	68	69
2	WVKG-13-{7.9}	PETERS CREEK		GAU98 B20R	8/4/1998	14	67	5	38	63	69	5	96	41	92	4	82	74
2	WVKG-13-B	OTTER CREEK		GAU98 B12	7/14/1998	16	76	8	62	65	71	11	90	40	94	5	75	78
2	WVKG-13-F	JERRY FORK		GAU98 B14	8/4/1998	16	76	7	54	76	83	15	86	69	49	5	68	69
2	WVKG-13-K	BUCK GARDEN CREEK		GAU98 B15	8/4/1998	13	62	9	69	84	91	3	98	54	72	4	81	79
2	WVKG-19-{14.4}	MEADOW RIVER		GAU98 B48	7/29/1998	11	52	8	62	95	103	2	99	82	28	5	74	69
2	WVKG-19-{18.0}	MEADOW RIVER		GAU98 B49	7/22/1998	26	124	12	92	43	46	13	88	32	106	5	67	82
2	WVKG-19-{40.4}	MEADOW RIVER		GAU98 B51	7/27/1998	15	71	6	46	55	60	0	101	55	70	5	69	69
2	WVKG-19-E-{2.0}	GLADE CREEK		GAU98 B22	7/30/1998	11	52	4	31	59	64	10	91	55	71	5	75	64
2	WVKG-19-G-{2.8}	ANGLINS CREEK		GAU98 B25	7/30/1998	22	105	13	100	64	70	17	84	45	86	5	77	86
2	WVKG-19-G-{9.6}	ANGLINS CREEK		GAU98 B26	8/13/1998	22	105	13	100	71	78	4	97	45	86	4	81	90
2	WVKG-19-G-3-{1.0}	SUGARGROVE CREEK		GAU98 B23	7/30/1998	12	57	8	62	80	87	3	98	50	79	4	89	79
2	WVKG-19-G-9-{7.5}	U.T. OF ANGLINS CREEK		GAU98 B24	8/3/1998	18	86	12	92	79	86	8	93	38	96	4	85	90
2	WVKG-19-H-{0.8}	YOUNGS CREEK		GAU98 B28	7/27/1998	15	71	11	85	85	93	11	89	52	75	4	86	83
2	WVKG-19-H-1-A-{1.2}	NORTH PRONG CREEK		GAU98 B27	7/27/1998	9	43	5	38	56	61	2	99	47	84	4	79	67
2	WVKG-19-J-1	HAYNES BRANCH		GAU98 B29	7/29/1998	14	67	9	69	84	91	6	95	61	61	4	82	77
2	WVKG-19-J-2	ROAD FORK		GAU98 B30	7/29/1998	19	90	11	85	78	85	14	87	38	97	4	88	89
2	WVKG-19-P	MEADOW CREEK		GAU98 B31	7/29/1998	15	71	10	77	76	83	13	88	42	91	4	84	82
2	WVKG-19-P-{5.4}	MEADOW CREEK		GAU98 B32	7/21/1998	21	100	9	69	55	60	22	79	43	89	5	74	79
2	WVKG-19-Q	SEWELL CREEK		GAU98 B33	7/28/1998	13	62	5	38	36	39	11	90	39	95	5	64	65
2	WVKG-19-Q-1-A-{1.4}	BOGGS CREEK		GAU98 B34	7/28/1998	25	119	13	100	63	69	16	84	42	91	5	77	87
2	WVKG-19-Q-5	GOULD HOLLOW		GAU98 B35	7/27/1998	17	81	7	54	38	41	42	59	73	43	6	56	55
2	WVKG-19-U-{3.8}	BIG CLEAR CREEK		GAU98 B39	8/10/1998	18	86	10	77	69	75	7	94	47	83	4	80	82
2	WVKG-19-U-{7.8}	BIG CLEAR CREEK		GAU98 B40	7/21/1998	18	86	12	92	86	94	9	92	51	77	4	81	87
2	WVKG-19-U-2-C	OLD FIELD BRANCH		GAU98 B36	7/21/1998	19	90	13	100	90	98	3	98	65	54	4	81	87
2	WVKG-19-U-2-D	JOB KNOB BRANCH		GAU98 B37	7/21/1998	17	81	11	85	95	104	2	99	67	51	4	82	83
2	WVKG-19-U-4	ELIJAH BRANCH		GAU98 B38	7/21/1998	20	95	12	92	83	90	6	95	50	78	4	84	89
2	WVKG-19-V-{4.4}	LITTLE CLEAR CREEK		GAU98 B46	7/30/1998	12	57	5	38	79	86	7	94	77	36	4	81	65
2	WVKG-24-{4.0}	HOMINY CREEK		GAU98 B59	7/15/1998	20	95	11	85	53	57	10	91	32	106	5	77	84
2	WVKG-24-{6.2}	HOMINY CREEK		GAU98 B60	7/16/1998	19	90	11	85	72	78	5	96	31	108	4	86	89
2	WVKG-24-E-{1.0}	GRASSY CREEK		GAU98 B54	7/20/1998	20	95	11	85	68	74	7	94	62	60	5	75	81
2	WVKG-24-E-2	BRUSHY MEADOW CREEK		GAU98 B52	7/16/1998	19	90	7	54	74	80	9	92	57	67	5	73	76
2	WVKG-24-G	ROARING CREEK		GAU98 B55	7/20/1998	17	81	9	69	72	79	14	87	57	67	4	80	77
2	WVKG-26-{1.6}	MUDDLETY CREEK		GAU98 B71	7/20/1998	14	67	8	62	49	54	22	79	43	89	4	83	72
2	WVKG-26-{8.8}	MUDDLETY CREEK		GAU98 B72	7/14/1998	16	76	6	46	27	29	7	94	66	53	5	72	62
2	WVKG-26-O	CLEAR FORK		GAU98 B68	7/20/1998	15	71	7	54	77	83	9	92	67	52	5	73	71
2	WVKG-26-O-2	FALLS RUN		GAU98 B69	7/22/1998	24	114	12	92	55	60	20	81	45	86	4	85	84
2	WVKG-26-P	LAUREL FORK		GAU98 B70	7/22/1998	13	62	8	62	89	97	8	92	57	67	4	78	76
2	WVKG-27	PERSINGER CREEK		GAU98 B73	7/29/1998	22	105	11	85	73	79	7	94	53	74	4	82	86
2	WVKG-3	BIG CREEK		GAU98 B74	7/15/1998	18	86	7	54	56	61	3	98	48	81	5	64	74
2	WVKG-30-{0.4}	BIG BEAVER CREEK		GAU98 B83	7/29/1998	14	67	8	62	75	81	12	88	40	93	4	80	79
2	WVKG-30-{3.8}	BIG BEAVER CREEK		GAU98 B84	7/28/1998	21	100	12	92	69	76	2	99	45	85	4	85	90
2	WVKG-30-{4.3}	BIG BEAVER CREEK		GAU98 B85	7/28/1998	19	90	10	77	67	73	9	91	39	95	4	83	85
2	WVKG-30-D-{0.8}	WYATT RU N		GAU98 B76	7/30/1998	18	86	10	77	92	100	3	98	70	46	5	76	80
2	WVKG-30-E	LITTLE BEAVER CREEK		GAU98 B77	7/28/1998	13	62	2	15	61	66	7	94	79	33	5	66	56
2	WVKG-30-H	LEFT FORK/BEAVER CREEK		GAU98 B78	7/28/1998	17	81	5	38	23	25	36	64	49	80	6	52	57
2	WVKG-30-L	BEARPEN FORK/BEAVER CREEK		GAU98 B80	7/27/1998	8	38	2	15	52	56	6	95	64	57	6	61	54
2	WVKG-30-N	LOWER LAUREL RUN		GAU98 B81	7/27/1998	10	48	2	15	36	40	9	92	85	24	6	60	46
2	WVKG-30-P	UPPER LAUREL RUN		GAU98 B82	7/27/1998	22	105	5	38	9	10	25	75	41	92	6	52	61
2	WVKG-32	PANTHER CREEK		GAU98 B87	8/5/1998	14	67	7	54	85	93	2	99	77	37	5	74	70

Site metrics and metric scores

Stations are grouped by data set (1= 1996-1997 calibration data; 2= 1997-1998 validation data). Within each data set, stations are listed by site type (reference, unlabeled, stressed), then within type by ascending Station ID.

Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
2	WVKG-34-{0.0}	CHERRY RIVER		GAU98 B103	7/30/1998	15	71	11	85	85	92	2	99	56	68	4	79	82
2	WVKG-34-{8.8}	CHERRY RIVER		GAU98 B104	8/4/1998	17	81	8	62	52	57	36	65	57	66	5	67	66
2	WVKG-34-B	COAL SIDING RUN		GAU98 B89	8/5/1998	17	81	12	92	88	96	5	96	45	86	3	92	91
2	WVKG-34-E	LAUREL CREEK		GAU98 B90	8/5/1998	20	95	14	108	81	88	7	94	32	106	4	89	94
2	WVKG-34-E-3	SPRING RUN		GAU98 B91	8/5/1998	19	90	11	85	66	72	11	89	38	97	4	89	87
2	WVKG-34-F-{1.8}	LITTLE LAUREL CREEK		GAU98 B92	8/4/1998	18	86	11	85	79	86	11	90	30	109	4	85	89
2	WVKG-34-G-{1.0}	SOUTH FORK/ CHERRY RIVER		GAU98 B95	8/4/1998	20	95	12	92	86	93	10	91	62	60	4	80	85
2	WVKG-34-G-{9.6}	SOUTH FORK/CHERRY RIVER		GAU98 B96	8/4/1998	18	86	13	100	91	99	4	97	57	68	4	83	89
2	WVKG-34-G-8	BECKY RUN		GAU98 B94	8/4/1998	15	71	12	92	95	104	3	98	65	55	4	84	83
2	WVKG-34-H-{0.3}	NORTH FORK/CHERRY RIVER		GAU98 B101	8/4/1998	18	86	11	85	73	80	10	91	46	84	5	77	84
2	WVKG-34-H-{9.5}	NORTH FORK/CHERRY RIVER		GAU98 B102	8/4/1998	14	67	12	92	94	102	6	95	56	68	4	81	84
2	WVKG-34-H-11.5	CARPENTER RUN		GAU98 B93	8/5/1998	10	48	7	54	88	96	11	90	48	82	4	88	76
2	WVKG-34-H-8	WINDY RUN		GAU98 B99	8/3/1998	10	48	8	62	92	100	0	101	59	64	3	92	78
2	WVKG-35-{0.0}	CRANBERRY RIVER		GAU98 B105	7/15/1998	17	81	11	85	81	88	8	93	44	87	4	84	86
2	WVKG-35-{17.5}	CRANBERRY RIVER		GAU98 B106	7/16/1998	17	81	12	92	92	101	2	99	55	70	4	86	88
2	WVKG-35-{19.7}	CRANBERRY RIVER		GAU98 B107	7/16/1998	19	90	13	100	91	99	4	97	54	71	4	90	91
2	WVKG-35-{23.7}	CRANBERRY RIVER		GAU98 B108	7/16/1998	21	100	14	108	78	85	15	86	52	75	4	78	87
2	WVKG-5-{0.0}	TWENTYMILE CREEK		GAU98 B126	7/16/1998	14	67	8	62	49	53	19	82	59	64	5	63	65
2	WVKG-5-{15.6}	TWENTYMILE CREEK		GAU98 B127	7/20/1998	14	67	7	54	79	86	3	98	81	30	5	74	68
2	WVKG-51-{0.2}	WILLIAMS RIVER		GAU98 B128	8/5/1998	18	86	11	85	69	75	8	93	42	90	4	78	84
2	WVKG-51-{1.2}	WILLIAMS RIVER		GAU98 B129	8/4/1998	13	62	7	54	63	69	7	94	42	91	5	76	74
2	WVKG-51-{10.0}	WILLIAMS RIVER		GAU98 B130	8/4/1998	20	95	11	85	71	77	13	88	46	84	4	80	85
2	WVKG-51-{20.0}	WILLIAMS RIVER		GAU98 B131	8/4/1998	21	100	15	115	74	81	20	81	49	80	5	72	86
2	WVKG-5-A	BUCKLES BRANCH		GAU98 B110	7/16/1998	22	105	11	85	65	71	20	81	67	52	4	89	80
2	WVKG-5-B-{1.3}	BELLS CREEK		GAU98 B115	7/22/1998	13	62	7	54	77	84	8	93	67	52	5	73	70
2	WVKG-5-B-1	OPEN FORK		GAU98 B111	7/22/1998	13	62	6	46	32	35	39	61	60	63	6	58	54
2	WVKG-5-B-2	SMITH BRANCH		GAU98 B113	7/16/1998	13	62	7	54	84	91	11	90	68	51	5	75	70
2	WVKG-5-B-7	CAMPBELL FORK		GAU98 B114	7/16/1998	9	43	2	15	11	12	81	19	91	14	7	47	25
2	WVKG-5-F	ROCKCAMP FORK		GAU98 B117	7/22/1998	7	33	2	15	70	76	15	86	70	47	4	89	58
2	WVKG-5-L	PEACH ORCHARD BRANCH		GAU98 B122	8/4/1998	13	62	7	54	77	84	4	97	63	57	5	74	71
2	WVKG-6-{0.6}	RICH CREEK		GAU98 B135	8/5/1998	17	81	7	54	39	42	32	68	50	78	5	66	65
2	WVKG-6-{4.8}	RICH CREEK		GAU98 B136	8/5/1998	15	71	8	62	82	90	5	96	68	50	5	75	74
2	WVKG-60	TURKEY CREEK		GAU98 B137	8/5/1998	17	81	10	77	62	67	24	77	50	78	4	84	77
2	WVKG-60-A	RIGHT FORK/TURKEY CREEK		GAU98 B138	8/5/1998	20	95	11	85	94	102	2	99	53	74	4	89	90
2	WVKG-65	WILLIAMS CAMP RUN		GAU98 B139	8/5/1998	22	105	15	115	83	90	4	97	48	81	4	89	93
2	WVKG-6-B-{1.6}	BRIDGE FORK		GAU98 B133	7/15/1998	20	95	12	92	80	87	10	91	58	66	3	93	87
2	WVKG-6-D-{1.8}	KELLY FORK		GAU98 B134	7/15/1998	17	81	9	69	81	88	2	99	61	61	4	89	81
2	WVKGC-14	LICK BRANCH		GAU98 B145	8/4/1998	16	76	11	85	76	82	10	91	24	119	3	95	88
2	WVKGC-15	HANGING ROCK BRANCH		GAU98 B7	8/4/1998	18	86	12	92	90	98	3	98	32	106	3	101	96
2	WVKGC-17.3	LITTLE ROUGH RUN		GAU98 B147	8/4/1998	15	71	10	77	24	26	2	99	68	50	4	90	69
2	WVKGC-17.6	PHEASANT HOLLOW		GAU98 B148	8/6/1998	22	105	14	108	65	71	9	92	37	99	3	92	92
2	WVKGC-18	COLD RUN		GAU98 B149	8/6/1998	18	86	10	77	43	47	26	75	52	74	4	84	74
2	WVKGC-21	BIRCHLOG RUN		GAU98 B9	7/16/1998	15	71	10	77	85	92	10	90	40	93	3	99	87
2	WVKGC-23-{3.6}	NORTH FORK / CRANBERRY RIVER		GAU98 B153	7/14/1998	13	62	8	62	62	67	4	97	51	77	4	83	75
2	WVKGC-23-C	LEFT FORK/NORTH FORK/CRANBERRY RIVER		GAU98 B10	7/14/1998	13	62	10	77	81	88	3	98	60	62	3	103	81
2	WVKGC-4-{0.4}	BARRENSHE RUN		GAU98 B161	7/15/1998	19	90	12	92	87	95	4	97	44	87	4	86	91
2	WVKGC-4-A	LITTLE BARRENSHE RUN		GAU98 B160	7/15/1998	21	100	13	100	82	89	6	95	38	97	4	88	95
2	WVKGW-10	MIDDLE FORK WILLIAMS RIVER		GAU98 B166	8/12/1998	13	62	9	69	77	83	7	94	40	94	3	103	84
2	WVKGW-10-C	BEECHY RUN		GAU98 B169	8/12/1998	16	76	12	92	91	99	4	97	49	79	2	111	91
2	WVKGW-10-E	HELL-FOR-CERTAIN BRANCH		GAU98 B171	8/12/1998	19	90	12	92	92	100	2	99	51	76	3	100	93
2	WVKGW-16.5	BRIDGE CREEK		GAU98 B176	8/4/1998	15	71	10	77	95	103	3	98	77	37	4	90	79
2	WVKGW-19	UPPER BANNOCK SHOALS RUN		GAU98 B177	8/13/1998	21	100	12	92	90	98	4	97	52	75	3	94	93
2	WVKGW-20	TEA CREEK		GAU98 B178R	8/13/1998	17	81	12	92	74	80	20	80	53	74	4	80	81
2	WVKGW-8	WHITE OAK RUN		GAU98 B182	8/4/1998	15	71	9	69	95	104	2	99	52	74	3	96	85
2	WVO-2-H-2-B.5	U.T. OF MILLERS FORK		TPO98 B4	5/7/1998	14	67	7	54	75	82	5	96	59	65	5	72	72
2	WVO-2-H-3	RUBENS BRANCH		TPO98 B5	5/27/1998	12	57	4	31	31	33	1	100	87	20	7	49	48
2	WVOG-10	MERRITT CREEK		LGU98 B10	5/21/1998	8	38	4	31	11	12	75	26	86	21	7	49	29
2	WVOG-10-A	RIGHT FORK OF MERRITT CREEK		LGU98 B11	5/21/1998	13	62	7	54	11	12	87	13	93	11	7	47	33
2	WVOG-11	SMITH CREEK		LGU98 B12	5/12/1998	11	52	4	31	14	15	57	43	70	47	6	55	41
2	WVOG-14-D-{0.4}	U.T. OF TRACE CREEK		LGU98 B13	5/12/1998	15	71	1	8	26	29	41	60	67	52	7	41	43
2	WVOG-2-{3.6}	MUD RIVER		LGU98 B16	5/29/1998	10	48	5	38	19	21	46	54	71	45	6	51	43
2	WVOG-2-{47.0}	MUD RIVER		LGU98 B17	5/28/1998	11	52	6	46	55	60	20	80	56	68	5	67	62
2	WVOG-2-{48.7}	MUD RIVER		LGU98 B18	5/28/1998	17	81	9	69	49	53	26	74	47	82	5	67	71

Site metrics and metric scores

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Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
2	WVOG-23.5	STALEY BRANCH		LGU98 B20	5/22/1998	8	38	3	23	5	6	63	37	83	27	7	43	29
2	WVOG-27-A	LOWGAP BRANCH		LGU98 B22	5/22/1998	20	95	9	69	55	60	27	74	48	82	5	70	75
2	WVOG-27-H-{1.8}	FALLS BRANCH		LGU98 B23	5/27/1998	13	62	8	62	93	101	3	98	58	66	4	91	80
2	WVOG-3-0.5A	EDENS BRANCH		LGU98 B26	5/18/1998	10	48	5	38	35	38	7	94	87	21	6	51	48
2	WVOG-30-{1.2}	STOUT CREEK		LGU98 B27	5/13/1998	16	76	8	62	87	95	3	98	64	56	4	84	78
2	WVOG-34	FOURTEEN MILE CREEK		LGU98 B29	5/6/1998	13	62	7	54	78	85	12	89	53	73	5	75	73
2	WVOG-34-A	LICK BRANCH		LGU98 B30	5/6/1998	7	33	3	23	83	90	15	86	84	25	5	72	55
2	WVOG-34-B	EAST FORK/FOURTEENMILE CREEK		LGU98 B31	5/6/1998	19	90	9	69	31	34	34	67	59	63	6	63	64
2	WVOG-34-E-1	NELSON FORK		LGU98 B32	5/6/1998	20	95	12	92	77	83	6	95	51	77	3	93	89
2	WVOG-35	AARONS CREEK		LGU98 B34	5/11/1998	10	48	5	38	44	48	35	66	65	54	5	64	53
2	WVOG-36	HAMILTON CREEK		LGU98 B35	5/11/1998	8	38	4	31	94	102	4	97	87	20	5	75	60
2	WVOG-38-D-{4.5}	LAUREL CREEK		LGU98 B39	5/18/1998	21	100	13	100	71	77	7	94	34	103	4	87	93
2	WVOG-38-G	SULPHUR CREEK		LGU98 B40	5/19/1998	16	76	11	85	92	100	3	98	69	48	4	86	82
2	WVOG-38-K	LEFTHAND CREEK		LGU98 B41	5/19/1998	16	76	10	77	88	96	4	97	71	45	4	79	78
2	WVOG-38-K.7	LITTLE DEADENING CREEK		LGU98 B43	5/19/1998	11	52	7	54	82	89	17	84	80	31	5	72	64
2	WVOG-38-K-5	PIGEONROOST FORK		LGU98 B42	5/19/1998	19	90	8	62	67	73	1	100	35	102	4	90	86
2	WVOG-40	SAND CREEK		LGU98 B46	5/11/1998	10	48	7	54	77	84	15	86	76	37	5	71	63
2	WVOG-41	DRY BRANCH		LGU98 B47	5/11/1998	8	38	3	23	7	7	90	10	93	11	7	46	23
2	WVOG-42-A	SHORT BEND		LGU98 B48	5/11/1998	8	38	4	31	63	68	34	66	68	49	5	71	54
2	WVOG-42-C-{0.2}	LAUREL FORK		LGU98 B49	5/11/1998	13	62	7	54	43	47	50	51	70	47	6	57	53
2	WVOG-42-D	MUDLICK BRANCH		LGU98 B50	5/11/1998	19	90	10	77	59	65	13	88	48	82	4	78	80
2	WVOG-42-E	GARTIN FORK		LGU98 B51	5/11/1998	16	76	11	85	60	65	16	84	40	94	5	73	79
2	WVOG-44-A.5	WORKMAN FORK		LGU98 B53	5/20/1998	16	76	10	77	74	81	13	88	52	75	4	80	79
2	WVOG-44-A-2-{2.8}	MARSH FORK		LGU98 B52	5/20/1998	13	62	8	62	78	85	14	87	74	41	5	72	68
2	WVOG-44-C.3	CANEY BRANCH		LGU98 B54	5/14/1998	20	95	9	69	68	74	16	84	55	70	5	77	78
2	WVOG-44-C.7	THOMPSON BRANCH		LGU98 B55	5/14/1998	18	86	11	85	85	92	3	97	48	81	4	88	88
2	WVOG-44-E	SMOKEHOUSE FORK		LGU98 B56	5/14/1998	15	71	9	69	47	51	28	72	51	76	6	62	67
2	WVOG-44-E-.5	WOLFPEN BRANCH		LGU98 B57	5/4/1998	18	86	13	100	87	95	1	100	50	79	3	92	92
2	WVOG-44-F-1	ADAMS BR ANCH		LGU98 B58	5/4/1998	19	90	10	77	91	99	4	97	66	54	3	98	86
2	WVOG-44-G-{1.9}	BUCK FORK		LGU98 B59	5/14/1998	16	76	10	77	54	59	16	85	41	92	4	79	78
2	WVOG-44-H	HOOVER FORK		LGU98 B60	5/4/1998	24	114	15	115	74	80	9	92	35	101	4	89	94
2	WVOG-44-I	HENDERSON BRANCH		LGU98 B61	5/4/1998	20	95	12	92	73	79	9	92	32	106	4	91	92
2	WVOG-44-K	BULWORK BRANCH		LGU98 B62	5/4/1998	18	86	10	77	82	90	7	94	58	66	4	90	84
2	WVOG-48	LIMESTONE BRANCH		LGU98 B63	5/6/1998	13	62	5	38	42	45	15	86	31	107	4	86	70
2	WVOG-49-{3.3}	BIG CREEK		LGU98 B73	5/20/1998	15	71	8	62	30	33	19	82	62	59	5	67	62
2	WVOG-49-A	ED STONE BRANCH		LGU98 B66	5/5/1998	6	29	2	15	21	23	29	72	57	67	5	69	46
2	WVOG-49-A-1	NORTH BRANCH/ED STONE BRANCH		LGU98 B67	5/5/1998	9	43	4	31	67	73	5	96	64	56	5	73	62
2	WVOG-49-B-1	CHAPMAN BRANCH		LGU98 B68	5/5/1998	12	57	7	54	85	92	8	93	44	88	4	88	79
2	WVOG-49-C	VICKERS BRANCH		LGU98 B69	5/5/1998	6	29	2	15	47	51	13	88	77	36	4	78	50
2	WVOG-49-D-2	DOG FORK		LGU98 B71	5/5/1998	17	81	9	69	83	90	11	89	48	82	4	88	83
2	WVOG-49-E-1	PERRYS BRANCH		LGU98 B72	5/6/1998	6	29	1	8	1	1	97	3	98	3	7	43	14
2	WVOG-50	LILY BRANCH		LGU98 B74	5/6/1998	13	62	8	62	85	92	3	98	63	58	4	83	76
2	WVOG-51.5	FOWLER BRANCH		LGU98 B77	5/13/1998	8	38	1	8	39	42	43	57	82	28	5	74	41
2	WVOG-51-B	CANOE FORK		LGU98 B75	5/6/1998	13	62	8	62	66	72	30	70	56	69	4	79	69
2	WVOG-53	GODBY BRANCH		LGU98 B78	5/13/1998	12	57	4	31	11	12	82	18	87	20	6	52	32
2	WVOG-59	MILL CREEK		LGU98 B82	5/13/1998	18	86	7	54	28	31	49	51	64	56	6	55	56
2	WVOG-60	BIG BRANCH		LGU98 B84	5/13/1998	17	81	11	85	88	96	6	95	38	97	4	90	91
2	WVOG-61	BUFFALO CREEK		LGU98 B85	5/13/1998	13	62	7	54	91	99	1	100	58	66	3	99	80
2	WVOG-9-A-{0.3}	UPPER HEATH CREEK		LGU98 B86	5/21/1998	14	67	8	62	45	48	38	63	61	61	6	61	60
2	WVOGM-13	BRUSH CREEK		LGU98 B89	5/15/1998	18	86	9	69	27	29	6	95	71	45	6	51	62
2	WVOGM-16-A	FALLEN FORK		LGU98 B91	5/4/1998	23	110	15	115	80	87	11	90	51	77	4	82	89
2	WVOGM-19	TRACE CREEK		LGU98 B92	5/4/1998	16	76	10	77	67	72	10	91	54	72	4	79	78
2	WVOGM-20-A	COON CREEK		LGU98 B93	5/4/1998	7	33	4	31	39	43	30	70	55	71	5	69	53
2	WVOGM-20-K-1	LEFTHAND FORK		LGU98 B99	5/7/1998	17	81	10	77	88	96	3	97	57	66	4	84	84
2	WVOGM-20-M-{1.8}	BRIDGE CREEK		LGU98 B102	5/27/1998	17	81	8	62	50	55	5	96	56	69	4	79	73
2	WVOGM-20-M-1	FLINT HOLLOW		LGU98 B101	5/6/1998	18	86	12	92	97	106	0	101	52	74	3	94	91
2	WVOGM-20-R-2	DONLEY FORK/HAYZLETT FORK		LGU98 B103	5/27/1998	21	100	9	69	56	61	21	80	41	93	4	80	81
2	WVOGM-20-V	ROCKHOUSE BRANCH		LGU98 B105	5/7/1998	14	67	9	69	96	104	0	101	78	35	4	78	75
2	WVOGM-22-A-{0.7}	STRAIGHT FORK		LGU98 B108	5/4/1998	18	86	9	69	31	34	54	46	63	59	6	59	59
2	WVOGM-25-A	MEADOW BRANCH		LGU98 B109	5/6/1998	13	62	5	38	9	10	64	36	79	33	6	58	40
2	WVOGM-25-B-{2.3}	TRACE CREEK		LGU98 B111	5/28/1998	16	76	7	54	36	39	24	77	45	86	4	78	68
2	WVOGM-25-B-1	TINCTURE FORK		LGU98 B110	5/6/1998	15	71	9	69	79	86	14	87	53	73	4	86	79
2	WVOGM-25-I	SUGARTREE FORK		LGU98 B113	5/26/1998	9	43	5	38	63	68	5	96	79	33	5	73	59

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Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
2	WVOGM-25-I-4	SAND FORK		LGU98 B114	5/26/1998	16	76	10	77	70	76	4	97	48	82	4	83	82
2	WVOGM-31	SANDLICK BRANCH		LGU98 B117	5/21/1998	17	81	10	77	52	56	9	92	51	76	4	86	78
2	WVOGM-33-B	DRY FORK		LGU98 B118	5/21/1998	20	95	11	85	88	95	3	98	40	93	3	96	94
2	WVOGM-33-C	BIG BRANCH		LGU98 B119	5/28/1998	21	100	11	85	62	68	17	84	39	95	4	81	85
2	WVOGM-35-E	LAUREL FORK		LGU98 B120	5/28/1998	19	90	12	92	41	45	13	88	52	75	4	81	79
2	WVOGM-39	LEFT FORK/MUD RIVER		LGU98 B123	5/27/1998	20	95	10	77	60	65	12	89	39	96	4	80	84
2	WVOGM-39-{10.2}	LEFT FORK/MUD RIVER		LGU98 B125	5/27/1998	11	52	6	46	40	43	15	86	61	61	5	70	60
2	WVOGM-39-G	FLAT CREEK		LGU98 B124	5/27/1998	15	71	9	69	49	53	32	69	55	70	5	69	67
2	WVOGM-4-{2.0}	BIG CABELL CREEK		LGU98 B127	5/26/1998	18	86	8	62	70	76	17	84	58	66	5	70	74
2	WVOGM-40.3-{0.0}	UPTON BRANCH		LGU98 B128	5/19/1998	21	100	10	77	72	78	6	95	53	73	4	80	84
2	WVOGM-43	STONECOAL BRANCH		LGU98 B130	5/18/1998	14	67	8	62	91	99	3	98	64	57	4	87	78
2	WVOGM-44-{0.2}	BERRY BRANCH		LGU98 B131	5/19/1998	17	81	9	69	79	86	4	97	55	71	4	85	81
2	WVOGM-50	LUKEY FORK		LGU98 B132	5/18/1998	23	110	14	108	84	92	3	98	46	85	3	98	95
2	WVOGM-7-B-1	TONY BRANCH		LGU98 B133	5/3/1998	20	95	11	85	70	76	14	87	51	77	4	83	84
2	WVOGM-8-{4.0}	MILL CREEK		LGU98 B137	5/3/1998	16	76	10	77	43	46	15	86	44	88	4	84	76
2	WVOGM-8-C	RIGHT FORK/MILL CREEK		LGU98 B136	5/26/1998	13	62	6	46	43	46	33	67	67	52	5	66	57
2	WVP-12-{5.2}	SIR JOHNS RUN		POT98 B63	6/1/1998	15	71	8	62	66	72	13	88	45	86	4	83	77
2	WVP-15-{0.4}	WILLET RUN		POT98 B67	6/4/1998	19	90	12	92	89	96	6	95	50	78	3	94	91
2	WVP-2.2-{0.3}	UT POTOMAC RV (TEAGUE'S RUN)		POT98 B29	6/2/1998	11	52	4	31	15	16	20	80	63	58	5	67	51
2	WVP-4.5	JORDAN RUN		POT98 B14	6/25/1998	14	67	5	38	38	42	17	84	55	70	4	81	64
2	WVP-4-{1.3}	OPEQUON CREEK		POT98 B27	6/2/1998	12	57	2	15	5	6	10	91	75	40	5	74	47
2	WVP-4-{17.8}	OPEQUON CREEK		POT98 B28	6/9/1998	11	52	5	38	14	15	81	19	88	18	6	50	32
2	WVP-4-{29.2}	OPEQUON CREEK		POT98 B31	6/9/1998	14	67	7	54	33	36	29	72	56	68	5	67	61
2	WVP-4-B	EAGLE RUN		POT98 B1	6/10/1998	5	24	1	8	1	1	94	6	97	4	7	42	14
2	WVP-4-C-{0.2}	TUSCARORA CREEK		POT98 B2	6/10/1998	4	19	1	8	4	4	68	33	93	12	6	53	21
2	WVP-4-C-{1.5}	TUSCARORA CREEK		POT98 B32	6/2/1998	7	33	1	8	4	4	77	23	89	17	7	39	21
2	WVP-4-C-{6.0}	TUSCARORA CREEK		POT98 B62	6/1/1998	13	62	5	38	31	33	48	52	69	48	6	57	49
2	WVP-4-D	EVANS RUN		POT98 B4	6/10/1998	13	62	6	46	24	26	61	40	73	43	6	56	45
2	WVP-4-I	HOPEWELL RUN		POT98 B5R	6/9/1998	11	52	6	46	25	27	66	34	80	32	6	54	41
2	WVP-4-J	MIDDLE CREEK		POT98 B7	6/9/1998	14	67	6	46	32	35	44	56	61	60	5	65	55
2	WVP-4-K-{1.2}	GOOSE CREEK		POT98 B33	6/8/1998	17	81	6	46	20	22	56	44	69	48	6	57	50
2	WVP-4-M-{7.8}	MILL CREEK		POT98 B34R	6/10/1998	9	43	3	23	9	10	60	40	88	19	6	50	31
2	WVP-4-M-1	SYLVAN RUN		POT98 B11	6/8/1998	16	76	8	62	27	29	67	33	86	21	6	54	46
2	WVP-4-M-2	TORYTOWN RUN		POT98 B9R	6/3/1998	7	33	2	15	1	1	61	40	79	33	7	47	28
2	WVP-4-P	SILVER SPRING RUN		POT98 B12R	6/4/1998	13	62	3	23	14	16	59	41	79	32	6	54	38
2	WVP-5	HARLAN RUN		POT98 B15	6/23/1998	12	57	5	38	34	37	19	82	60	62	6	63	57
2	WVP-5-A-{1.4}	TULLIS BRANCH (TULISUS)		POT98 B35	6/24/1998	15	71	6	46	40	43	11	90	52	75	5	70	66
2	WVP-6-{1.2}	BACK CREEK		POT98 B36	6/2/1998	16	76	9	69	51	56	9	92	40	93	4	78	77
2	WVP-6-{17.3}	BACK CREEK		POT98 B44	6/3/1998	18	86	9	69	76	83	5	95	57	67	3	94	82
2	WVP-6-{18.4}	BACK CREEK		POT98 B45	6/3/1998	15	71	9	69	85	93	5	96	65	54	3	94	80
2	WVP-6-{33.8}	BACK CREEK		POT98 B46	6/8/1998	20	95	11	85	63	69	16	85	43	89	4	80	84
2	WVP-6-A.1	UT OF BACK CREEK #2		POT98 B16	6/2/1998	15	71	9	69	72	79	23	78	76	38	4	91	71
2	WVP-6-A.2	KATES RUN		POT98 B17	6/2/1998	15	71	8	62	32	34	10	91	48	81	4	82	70
2	WVP-6-A-{0.5}	TILHANCE CREEK		POT98 B38	6/9/1998	17	81	9	69	53	58	31	70	50	78	5	72	71
2	WVP-6-A-{1.3}	TILHANCE CREEK		POT98 B39	6/9/1998	20	95	10	77	55	60	29	72	56	69	5	70	74
2	WVP-6-A-{9.4}	TILHANCE CREEK		POT98 B40	6/9/1998	17	81	10	77	77	83	5	96	38	98	3	94	88
2	WVP-6-A-1-{1.6}	HIGGINS RUN		POT98 B41	6/2/1998	15	71	9	69	80	87	15	86	81	30	3	98	74
2	WVP-6-C.8-{0.6}	U.T. OF BACK CREEK @ GANOTOWN		POT98 B43	6/3/1998	18	86	12	92	89	96	5	96	65	55	3	96	87
2	WVP-6-D	SAWMILL RUN		POT98 B18R	6/3/1998	15	71	9	69	53	58	40	60	74	41	5	77	63
2	WVP-8	BIG RUN		POT98 B20	6/2/1998	18	86	10	77	51	55	32	68	48	82	5	74	74
2	WVP-9-{1.0}	SLEEPY CREEK		POT98 B47	6/1/1998	20	95	10	77	63	68	28	73	52	75	4	81	78
2	WVP-9-{10.0}	SLEEPY CREEK		POT98 B48	6/1/1998	15	71	8	62	63	69	8	93	52	76	3	96	78
2	WVP-9-{12.2}	SLEEPY CREEK		POT98 B49	6/2/1998	20	95	10	77	51	56	25	75	45	87	4	83	79
2	WVP-9-{15.2}	SLEEPY CREEK		POT98 B50	6/2/1998	18	86	10	77	76	83	7	93	50	78	3	100	86
2	WVP-9-{18.2}	SLEEPY CREEK		POT98 B51	6/3/1998	18	86	9	69	47	51	33	68	49	80	6	62	69
2	WVP-9-{21.6}	SLEEPY CREEK		POT98 B52	6/3/1998	19	90	10	77	67	73	20	81	48	81	4	82	81
2	WVP-9-{23.6}	SLEEPY CREEK		POT98 B53	6/3/1998	16	76	10	77	88	96	6	95	45	86	3	97	88
2	WVP-9-{33.2}	SLEEPY CREEK		POT98 B57	6/10/1998	19	90	11	85	54	59	38	62	50	77	5	75	75
2	WVP-9-{35.6}	SLEEPY CREEK		POT98 B59	6/10/1998	20	95	12	92	53	58	33	68	47	84	5	77	79
2	WVP-9-{36.8}	SLEEPY CREEK		POT98 B60	6/10/1998	19	90	12	92	64	69	17	84	56	69	5	76	80
2	WVP-9-B-1-A-{0.1}	ROARING RUN		POT98 B71	6/3/1998	16	76	7	54	79	86	10	91	67	52	3	98	76
2	WVP-9-D.8-{0.5}	LICK RUN		POT98 B54	6/3/1998	15	71	9	69	62	68	9	92	43	89	4	85	79
2	WVP-9-E-{1.5}	MIDDLE FORK/SLEEPY CREEK		POT98 B55	6/3/1998	15	71	10	77	43	47	6	95	68	49	4	88	71

Site metrics and metric scores

Stations are grouped by data set (1= 1996-1997 calibration data; 2= 1997-1998 validation data). Within each data set, stations are listed by site type (reference, unlabeled, stressed), then within type by ascending Station ID.

Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
2	WVP-9-E-1	SOUTH FORK/SLEEPY CREEK		POT98 B22	6/4/1998	18	86	10	77	68	74	9	92	29	110	4	88	86
2	WVP-9-F	ROCK GAP RUN		POT98 B24	6/2/1998	19	90	11	85	70	76	7	94	54	72	4	81	83
2	WVP-9-G-{0.25}	INDIAN RUN		POT98 B58	6/10/1998	17	81	10	77	87	94	8	93	62	59	3	92	83
2	WVP-9-G-1	NORTH FORK RUN		POT98 B73R	6/1/1998	18	86	11	85	83	90	13	88	81	30	3	100	80
2	WVP-9-G-3	MIDDLE FORK / INDIAN RUN		POT98 B75	6/2/1998	18	86	10	77	67	73	21	80	72	44	4	91	75
2	WVP-9-I	HANDS RUN		POT98 B74	6/10/1998	22	105	13	100	75	82	15	86	50	78	3	101	91
2	WVBS-{104.2}	TUG FORK RIVER	stressed	TUG98 B3	7/6/1998	12	57	4	31	17	19	60	41	74	41	6	57	41
2	WVBST-10	DRAG CREEK	stressed	TUG98 B10	6/30/1998	18	86	9	69	71	78	12	89	70	47	3	98	78
2	WVBST-107	GRAPEVINE BRANCH	stressed	TUG98 B17	6/17/1998	4	19	0	0	0	0	0	101	50	78	4	85	47
2	WVBST-116	BELCHER BRANCH	stressed	TUG98 B34	6/25/1998	6	29	1	8	4	5	67	34	83	26	7	43	24
2	WVBST-120-B	PUNCHEON CAMP BRANCH	stressed	TUG98 B39	6/16/1998	16	76	9	69	57	62	8	93	63	57	5	74	72
2	WVBST-14	BULL CREEK	stressed	TUG98 B43	7/7/1998	9	43	4	31	74	81	9	92	45	86	4	81	69
2	WVBST-16	SILVER CREEK	stressed	TUG98 B45	6/30/1998	12	57	4	31	51	56	16	85	68	50	5	76	59
2	WVBST-19-{0.0}	MARROWBONE CREEK	stressed	TUG98 B47	7/7/1998	10	48	4	31	54	59	21	80	51	76	5	67	60
2	WVBST-19-{8.0}	MARROWBONE CREEK	stressed	TUG98 B48	7/6/1998	20	95	9	69	62	67	2	99	60	62	5	72	77
2	WVBST-24-{9.0}	PIGEON CREEK	stressed	TUG98 B59	6/22/1998	13	62	4	31	16	18	4	97	83	26	5	72	51
2	WVBST-24-E-2-{0.1}	SPRUCE FORK	stressed	TUG98 B51	6/24/1998	8	38	2	15	34	37	3	98	78	34	5	71	49
2	WVBST-24-K-8	SIMMONS FORK	stressed	TUG98 B52	6/22/1998	11	52	2	15	12	13	62	38	76	38	7	46	34
2	WVBST-3	POWDERMILL BRANCH	stressed	TUG98 B62	6/25/1998	14	67	3	23	7	8	69	32	74	40	6	54	37
2	WVBST-31-{1.0}	BUFFALO CREEK	stressed	TUG98 B64	6/23/1998	15	71	6	46	30	33	11	90	59	64	5	65	61
2	WVBST-33	WILLIAMSON CREEK	stressed	TUG98 B66	6/17/1998	7	33	2	15	18	19	18	83	53	74	7	40	44
2	WVBST-36	DICK WILLIAMSON BRANCH	stressed	TUG98 B69	6/22/1998	6	29	2	15	9	10	19	82	78	34	8	25	33
2	WVBST-38	SPROUSE CREEK	stressed	TUG98 B70	7/1/1998	12	57	3	23	46	50	25	75	70	47	6	57	52
2	WVBST-40-B	RUTHERFORD BRANCH	stressed	TUG98 B72	7/1/1998	6	29	1	8	68	73	8	93	85	23	5	70	49
2	WVBST-40-D	CHAFIN BRANCH	stressed	TUG98 B74	6/15/1998	9	43	2	15	49	53	26	74	74	40	6	55	47
2	WVBST-43-A	LICK FORK/GRAPEVINE	stressed	TUG98 B81	6/16/1998	7	33	1	8	56	61	17	84	80	31	5	77	49
2	WVBST-57-{0.6}	BULL CREEK	stressed	TUG98 B83	7/7/1998	13	62	5	38	72	78	17	84	68	50	5	68	63
2	WVBST-57-B	LEFT FORK BULL CREEK	stressed	TUG98 B82	7/7/1998	12	57	3	23	14	15	61	39	78	34	6	52	37
2	WVBST-70-N-{0.0}	LITTLE SLATE CREEK	stressed	TUG98 B100	7/8/1998	10	48	5	38	16	18	79	21	88	18	6	52	33
2	WVBST-70-O	ATWELL BRANCH	stressed	TUG98 B102	7/8/1998	21	100	8	62	50	54	26	75	58	66	6	57	69
2	WVBST-78-B	SHABBYROOM BRANCH	stressed	TUG98 B121	7/8/1998	14	67	4	31	64	69	29	72	81	30	6	61	55
2	WVBST-78-G	BADWAY BRANCH	stressed	TUG98 B125	7/1/1998	12	57	4	31	38	41	41	60	64	57	6	59	51
2	WVKC-10-{03.6}	LITTLE COAL RIVER	stressed	COAL97 B43	9/23/1997	16	76	6	46	82	89	6	95	63	57	4	81	74
2	WVKC-10-{17.0}	LITTLE COAL RIVER	stressed	COAL97 B44	9/22/1997	12	57	5	38	80	87	2	99	78	34	5	76	65
2	WVKC-10-I-{0.0}	BIG HORSE CREEK	stressed	COAL97 B5	9/22/1997	14	67	3	23	24	26	28	73	65	54	6	62	51
2	WVKC-10-I-{12.5}	BIG HORSE CREEK	stressed	COAL97 B6	9/23/1997	13	62	3	23	35	39	20	81	67	51	5	66	54
2	WVKC-10-I-{5.6}	BIG HORSE CREEK	stressed	COAL97 B7	9/22/1997	9	43	4	31	20	21	30	71	76	37	6	63	44
2	WVKC-10-J	LITTLE HORSE CREEK	stressed	COAL97 B45	9/22/1997	13	62	2	15	22	24	31	70	50	77	6	60	51
2	WVKC-10-T-{0.3}	SPRUCE FORK	stressed	COAL97 B74	9/24/1997	14	67	6	46	73	80	11	90	52	75	5	74	72
2	WVKC-10-T-{4.6}	SPRUCE FORK	stressed	COAL97 B77	9/24/1997	16	76	7	54	51	55	8	93	49	80	5	73	72
2	WVKC-10-T-10	STOLLINGS BRANCH	stressed	COAL97 B82	9/24/1997	15	71	6	46	60	65	12	89	47	83	4	79	72
2	WVKC-10-T-11-{0.2}	SPRUCE LAUREL FORK	stressed	COAL97 B78	9/25/1997	12	57	4	31	39	43	26	74	55	70	5	68	57
2	WVKC-10-T-11-{4.1}	SPRUCE LAUREL FORK	stressed	COAL97 B80	9/25/1997	9	43	3	23	67	73	14	87	62	60	5	69	59
2	WVKC-10-T-21	ADKINS FORK	stressed	COAL97 B1	9/25/1997	11	52	5	38	62	68	23	78	71	46	5	66	58
2	WVKC-10-T-24-{0.6}	BRUSHY FORK	stressed	COAL97 B10	10/8/1997	13	62	6	46	57	62	7	94	64	56	4	82	67
2	WVKC-10-T-3	LOW GAP CREEK	stressed	COAL97 B48	9/24/1997	7	33	1	8	4	4	9	92	81	30	6	58	38
2	WVKC-10-U-{0.4}	POND FORK	stressed	COAL97 B61	9/23/1997	18	86	6	46	59	64	9	92	52	75	5	74	73
2	WVKC-10-U-{24.4}	POND FORK	stressed	COAL97 B62	9/22/1997	10	48	4	31	62	68	11	90	71	46	5	68	58
2	WVKC-10-U-{4.9}	POND FORK	stressed	COAL97 B63	9/23/1997	13	62	5	38	72	79	7	94	74	41	5	71	64
2	WVKC-10-U-{9.0}	POND FORK	stressed	COAL97 B64	9/23/1997	19	90	6	46	47	51	18	83	49	80	6	50	67
2	WVKC-10-U-12-A	TRACE FORK/COW CREEK	stressed	COAL97 B88	9/22/1997	16	76	6	46	44	48	33	67	69	48	6	62	58
2	WVKC-10-U-7-{0.0}	WEST FORK	stressed	COAL97 B89	9/22/1997	10	48	4	31	73	79	16	85	77	35	5	67	58
2	WVKC-10-U-7-{4.3}	WEST FORK OF POND FORK	stressed	COAL97 B90	9/18/1997	10	48	1	8	46	50	19	81	66	54	5	66	51
2	WVKC-10-U-7-{7.9}	WEST FORK OF POND FORK	stressed	COAL97 B91	9/18/1997	10	48	3	23	61	67	19	82	77	37	5	64	53
2	WVKC-2-{2.0}	BROWNS CREEK	stressed	COAL97 B8	9/17/1997	17	81	7	54	41	44	38	62	64	57	6	63	60
2	WVKC-4-{2.5}	SMITH CREEK	stressed	COAL97 B72	9/17/1997	11	52	4	31	30	33	45	55	63	58	6	60	48
2	WVKC-46-{32.8}	MARSH FORK	stressed	COAL97 B53	10/6/1997	13	62	5	38	17	19	63	38	76	38	6	61	43
2	WVKC-47-L-{0.8}	TONEY FORK	stressed	COAL97 B87	9/22/1997	13	62	6	46	48	52	38	63	83	27	6	60	52
2	WVKG-1	SCRABBLE CREEK	stressed	GAU98 B11	7/15/1998	9	43	2	15	4	4	73	27	87	20	7	47	26
2	WVKG-13-{15.6}	PETERS CREEK	stressed	GAU98 B19	7/29/1998	12	57	4	31	58	63	9	92	56	68	5	70	63
2	WVKG-13-L	ROCKCAMP BRANCH	stressed	GAU98 B16	8/4/1998	19	90	6	46	64	70	10	91	57	67	5	69	72
2	WVKG-13-M	MCCLUNG BRANCH	stressed	GAU98 B17	8/5/1998	12	57	7	54	81	88	9	92	54	73	4	85	75
2	WVKG-19-V-{1.0}	LITTLE CLEAR CREEK	stressed	GAU98 B45	7/28/1998	8	38	2	15	12	13	39	61	58	66	6	50	41

Site metrics and metric scores

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Data Set	Station ID	Stream Name	Site Type	Benthic Sample ID	Collect Date	Total taxa	Tot. taxa score	EPT taxa	EPT taxa score	% EPT	% EPT score	% Chiro.	%Chiro score	% Top 2 dominant	% Top 2 score	HBI	HBI score	INDEX (SCI)
2	WVKG-19-V-{6.0}	LITTLE CLEAR CREEK	stressed	GAU98 B47	7/30/1998	10	48	4	31	62	67	14	87	58	66	4	91	65
2	WVKG-24-{12.4}	HOMINY CREEK	stressed	GAU98 B58	7/22/1998	8	38	3	23	29	31	21	79	50	78	7	48	50
2	WVKG-24-I	COLT BRANCH	stressed	GAU98 B57	7/22/1998	23	110	11	85	45	49	44	56	61	61	6	60	68
2	WVKG-26-B-2	JONES RUN	stressed	GAU98 B61	7/15/1998	13	62	3	23	30	33	49	51	78	34	6	55	43
2	WVKG-26-F	TROUT RUN	stressed	GAU98 B63	7/14/1998	25	119	9	69	38	41	45	55	75	39	6	60	61
2	WVKG-26-K-1	LOWER SPRUCE RUN	stressed	GAU98 B66	7/22/1998	20	95	7	54	35	38	16	85	44	88	4	84	74
2	WVKG-26-K-1-A	SPRUCE RUN	stressed	GAU98 B67	7/22/1998	19	90	4	31	51	55	17	84	40	93	4	84	73
2	WVKG-30-K	PADDY RUN	stressed	GAU98 B79	7/27/1998	28	133	12	92	47	52	25	76	56	68	5	76	77
2	WVKG-31	LITTLE LAUREL CREEK	stressed	GAU98 B86	8/5/1998	8	38	4	31	86	94	2	99	83	27	5	75	61
2	WVKG-5-B-1-C	SANGAMORE FORK	stressed	GAU98 B112	7/16/1998	7	33	3	23	38	41	0	101	38	98	3	97	65
2	WVKG-5-F-1	SPRING BRANCH	stressed	GAU98 B118	7/22/1998	6	29	0	0	0	0	64	37	85	24	6	61	25
2	WVKG-5-P	ROBINSON FORK	stressed	GAU98 B125	7/20/1998	11	52	5	38	80	87	10	91	86	22	5	69	60
2	WVKG-6-A	LICK BRANCH	stressed	GAU98 B132	8/5/1998	7	33	0	0	0	0	85	15	94	9	7	42	17
2	WVKGW-10-G	MCCLINTOCK RUN	stressed	GAU98 B172	8/5/1998	13	62	10	77	92	100	6	95	72	44	3	94	79
2	WVOG-2-{77.2}	MUD RIVER	stressed	LGU98 B19	5/18/1998	16	76	8	62	42	45	32	68	64	57	5	64	62
2	WVOG-3	DAVIS CREEK	stressed	LGU98 B25	5/18/1998	5	24	2	15	8	9	87	13	93	11	7	45	19
2	WVOG-38-{0.8}	BIG UGLY CREEK	stressed	LGU98 B44	5/19/1998	11	52	6	46	48	52	9	92	52	74	4	79	66
2	WVOG-49-C.1	U.T. OF BIG CREEK	stressed	LGU98 B70	5/6/1998	4	19	2	15	2	2	98	2	99	2	7	43	14
2	WVOG-51-G.5	SOUTH FORK/CRAWLEY CREEK	stressed	LGU98 B76	5/13/1998	7	33	2	15	5	5	43	58	94	10	6	59	30
2	WVOG-6-{0.1}	MILL CREEK	stressed	LGU98 B83	5/18/1998	6	29	2	15	10	11	73	27	86	22	6	50	26
2	WVOGM-1.5	TANYARD BRANCH	stressed	LGU98 B87	5/18/1998	5	24	0	0	0	0	75	25	98	3	8	33	14
2	WVOGM-12	INDIAN FORK	stressed	LGU98 B88	5/15/1998	7	33	3	23	5	5	57	43	88	19	7	47	28
2	WVOGM-14-{7.2}	CHARLEY CREEK	stressed	LGU98 B90	5/29/1998	10	48	5	38	37	40	22	79	52	75	5	75	59
2	WVOGM-20-{21.2}	TRACE FORK	stressed	LGU98 B106	5/29/1998	13	62	6	46	39	42	38	63	57	68	5	66	58
2	WVOGM-20-{6.4}	TRACE FORK	stressed	LGU98 B107	6/9/1998	17	81	7	54	60	65	18	83	56	69	5	74	71
2	WVOGM-20-D-{4.6}	BIG CREEK	stressed	LGU98 B94	5/28/1998	15	71	7	54	44	48	12	89	60	63	4	83	68
2	WVOGM-20-H	CLYMER CREEK	stressed	LGU98 B96	5/27/1998	20	95	8	62	50	54	16	85	48	81	6	61	73
2	WVOGM-20-I-1-{1.5}	KELLYS CREEK	stressed	LGU98 B97	5/28/1998	17	81	8	62	44	48	9	92	47	82	5	66	72
2	WVOGM-20-K	MARTIN RUN	stressed	LGU98 B98	5/6/1998	15	71	9	69	89	96	6	95	63	58	4	85	79
2	WVOGM-20-K-{0.1}	NELSON HOLLOW	stressed	LGU98 B100	5/4/1998	12	57	9	69	82	89	11	90	40	94	3	96	83
2	WVOGM-20-T-{3.5}	JOES CREEK	stressed	LGU98 B104	5/28/1998	13	62	7	54	50	54	20	81	43	90	5	73	69
2	WVOGM-25-H-1	VALLEY FORK	stressed	LGU98 B112	5/26/1998	15	71	10	77	16	17	16	84	79	33	5	68	59
2	WVOGM-25-I-{3.0}	SUGARTREE FORK	stressed	LGU98 B115	5/26/1998	17	81	9	69	51	56	9	92	58	66	4	78	74
2	WVOGM-3-{0.9}	LIDTTLE CABELL CREEK	stressed	LGU98 B116	5/26/1998	10	48	5	38	26	28	60	40	72	44	6	56	42
2	WVOGM-35-{1.8}	BIG CREEK	stressed	LGU98 B121	5/21/1998	14	67	8	62	69	75	7	94	58	66	4	80	74
2	WVOGM-35-{4.1}	BIG CREEK	stressed	LGU98 B122	5/19/1998	16	76	8	62	80	87	1	100	50	78	4	89	82
2	WVOGM-4-{0.2}	BIG CABELL CREEK	stressed	LGU98 B126	5/29/1998	10	48	3	23	41	44	47	54	85	23	6	55	41
2	WVOGM-40.3-{2.2}	UPTON BRANCH	stressed	LGU98 B129	5/19/1998	24	114	11	85	67	73	8	93	40	93	3	94	90
2	WVOGM-7-{0.4}	LOWER CREEK	stressed	LGU98 B134	5/26/1998	17	81	8	62	42	46	40	60	64	56	6	61	61
2	WVP-1-A-{0.8}	ELK BRANCH	stressed	POT98 B25	6/2/1998	10	48	4	31	9	10	31	69	66	53	5	64	46
2	WVP-4-{18.8}	OPEQUON CREEK	stressed	POT98 B30	6/3/1998	19	90	10	77	40	44	40	60	54	71	5	69	69
2	WVP-4-C-1	DRY RUN	stressed	POT98 B3	6/3/1998	14	67	4	31	8	9	44	56	65	55	6	55	46
2	WVP-4-M	MILL CREEK	stressed	POT98 B8	6/9/1998	15	71	8	62	42	46	43	58	72	44	5	65	58
2	WVP-6-{9.1}	BACK CREEK	stressed	POT98 B37	6/2/1998	17	81	9	69	83	90	8	93	63	57	3	92	80
2	WVP-9-E-{7.0}	MIDDLE FORK/SLEEPY CREEK	stressed	POT98 B56	6/10/1998	12	57	5	38	48	53	23	78	44	88	4	79	65

APPENDIX D

SUPPORTING GRAPHS

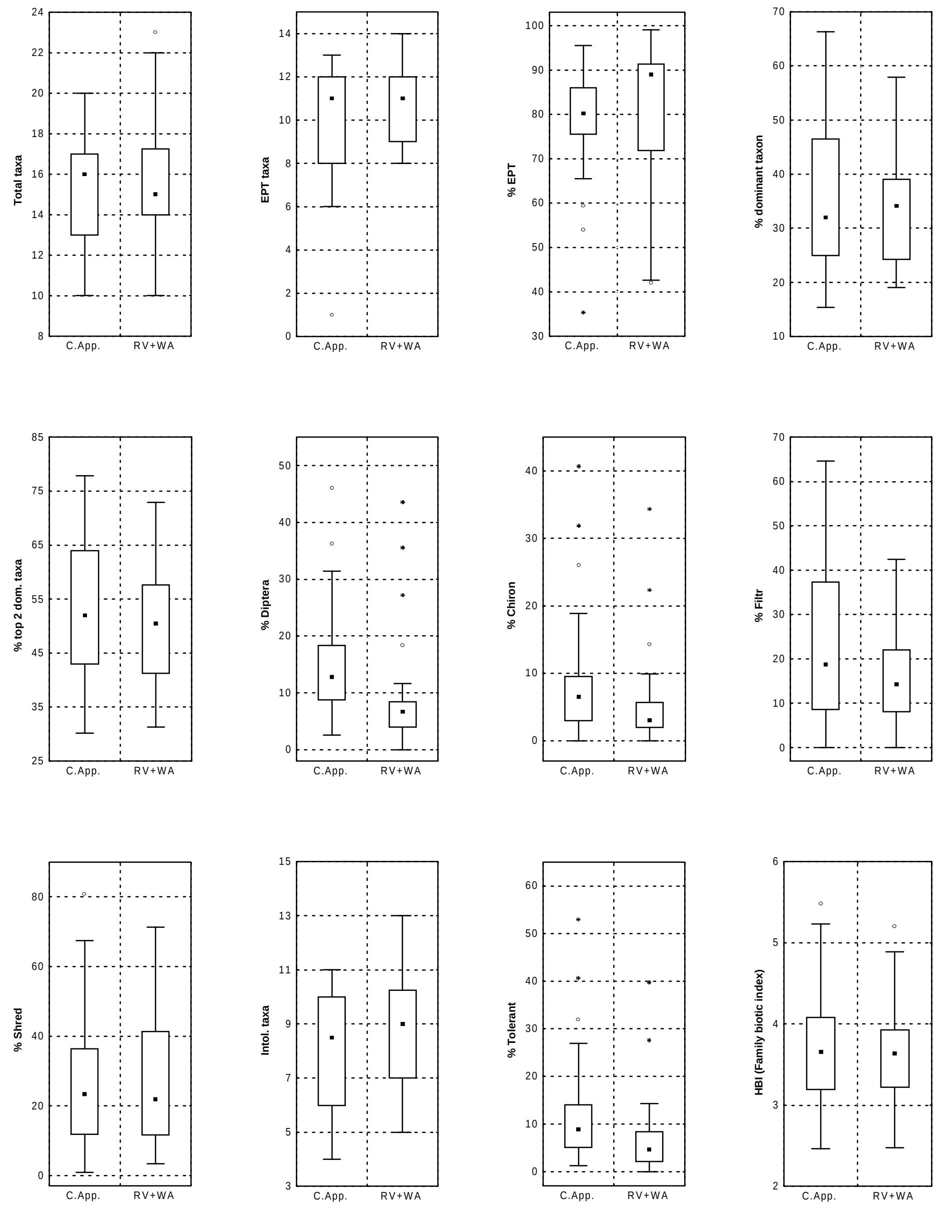

Figure D-1. Benthic attributes (candidate metrics) in 67 reference sites divided into 2 Ecoregion groups. Three Western Allegheny Plateau reference sites combined with 32 Ridge and Valley reference sites were compared with 32 Central Appalachian reference sites. The %Diptera metric shows the most noteworthy difference in ranges of values between the two ecoregion groups, with somewhat lesser separation also shown by % Chironomid and % Tolerants; these three metrics are highly correlated (Table 4-2). In most of these candidate metrics, there is no clear difference in ranges of values between the two ecoregion groups.

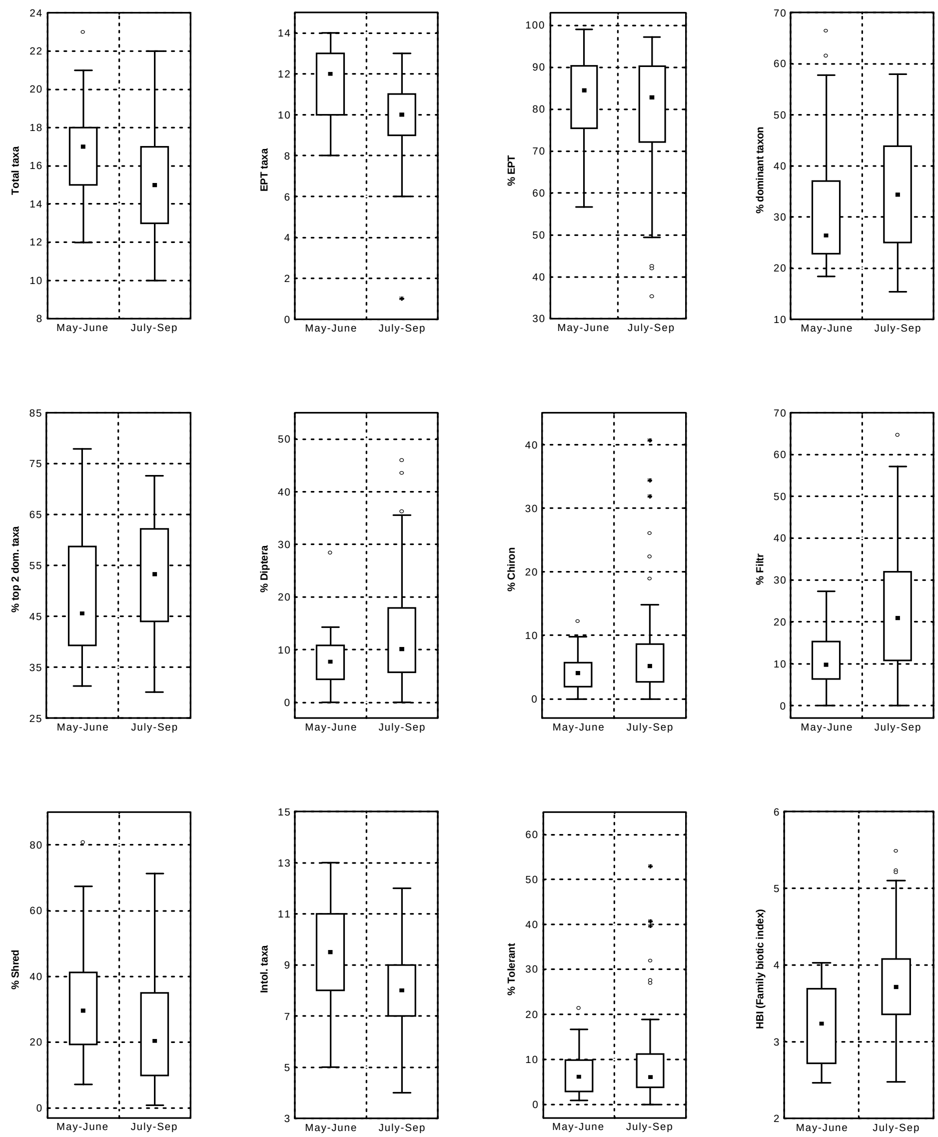

Figure D-2. Benthic attributes (metrics) in 67 reference sites divided into 2 sampling periods. Twenty reference sites sampled in May and June were compared with 47 reference sites sampled in July through September. Possible classification is exhibited by % Filterers, EPT taxa, and Intolerant taxa. However, % Filterers was eliminated as a metric for use in the index because of its poor discrimination of impairment (Chapter 4; Figure D-5). EPT taxa and Intolerant taxa measured essentially the same thing in the WV family-level data (Table 4-2, 92% correlated). The distinction shown here by these metrics most likely reflects the presence of more Ephemeroptera in the earlier sampling period and may support possible improvement in the assessment program by concentrating sampling earlier in the summer. However, combined with other analyses (Chapter 3), we did not conclude that classification by index period was required.

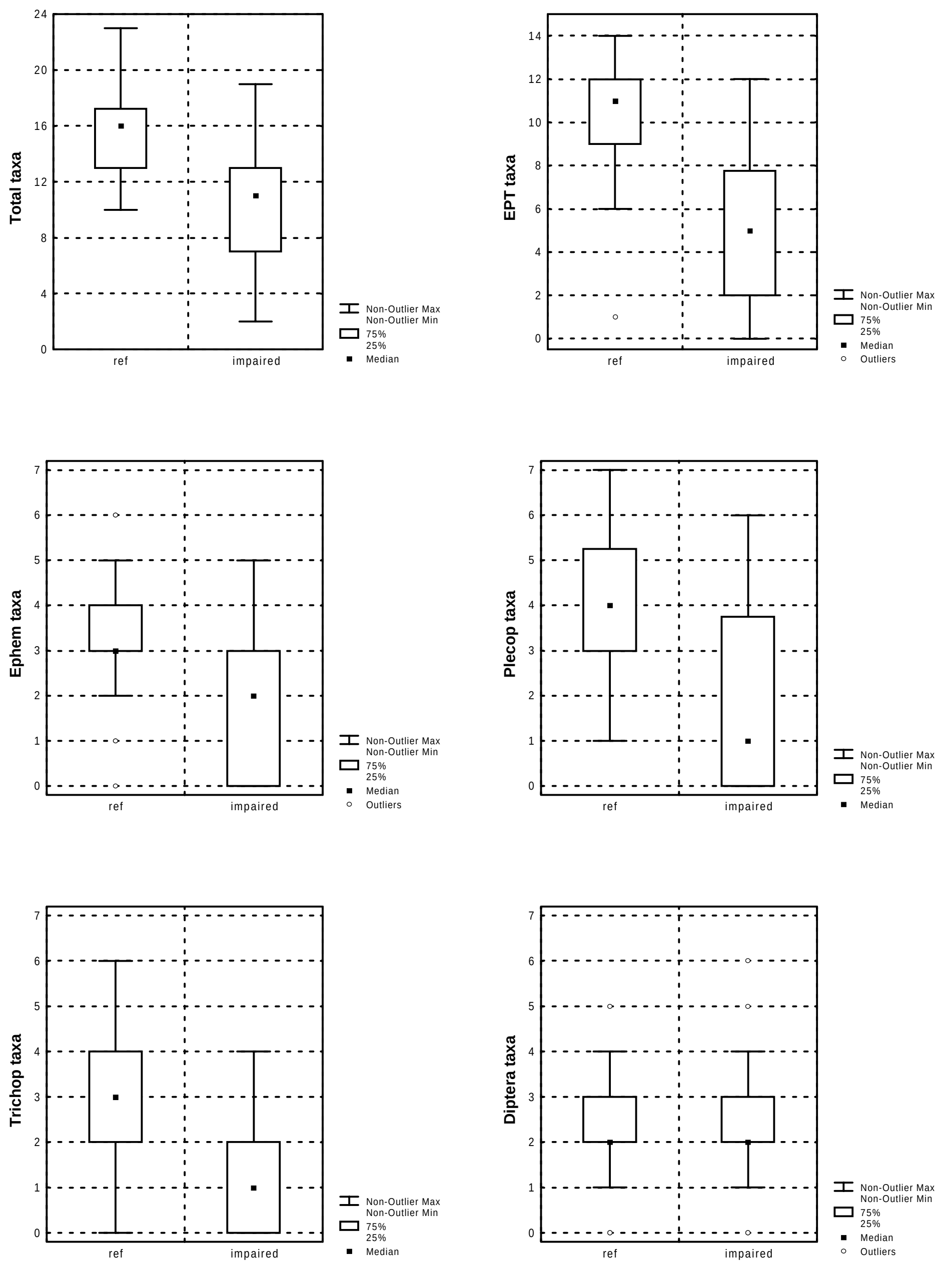

Figure D-3. Discriminatory ability of candidate metrics for West Virginia streams using 1996-1997 calibration data reference and impaired sites: Total taxa, EPT taxa, Ephemeroptera taxa, Plecoptera taxa, Trichoptera taxa, and Diptera taxa.

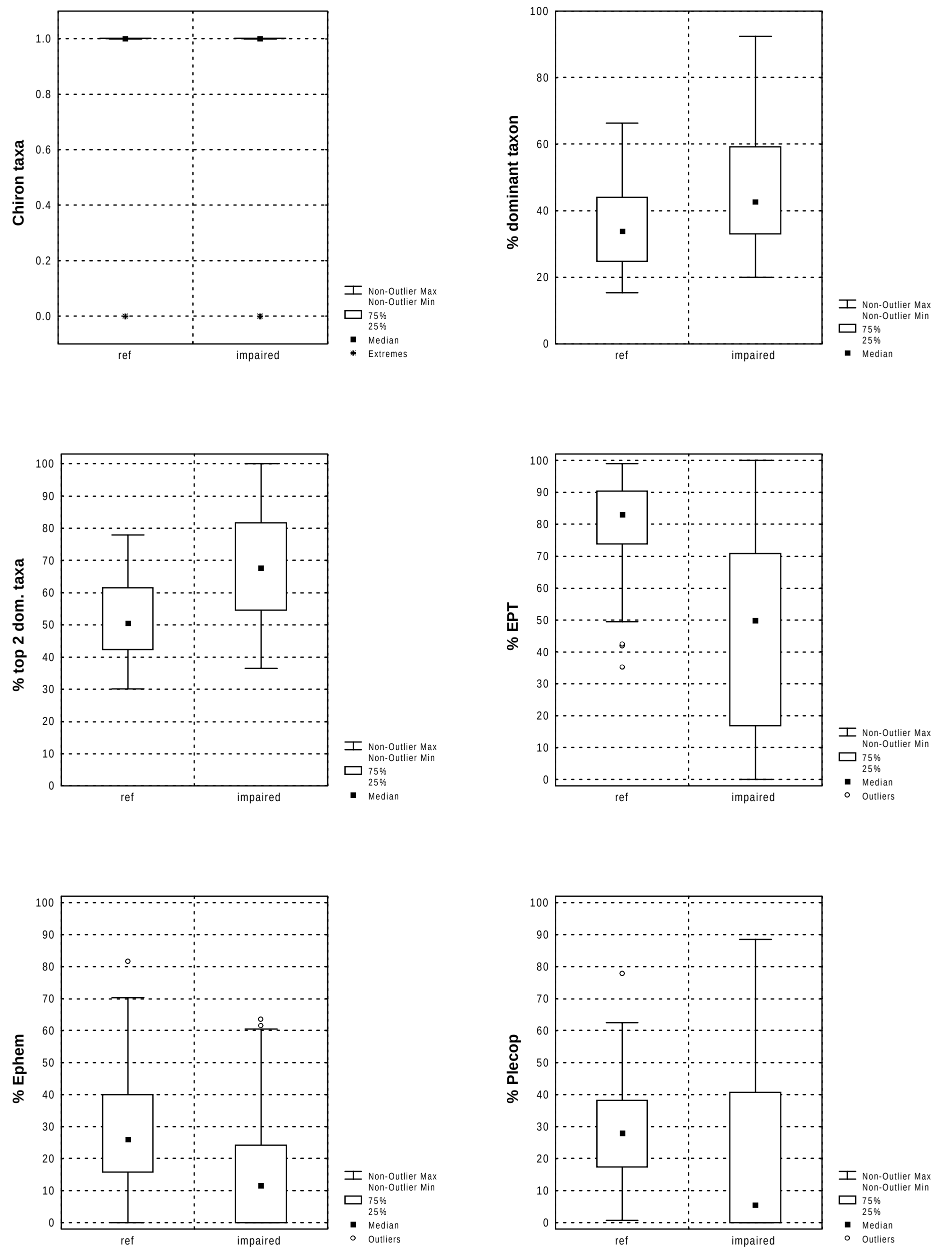

Figure D-4. Discriminatory ability of candidate metrics for West Virginia streams using 1996-1997 calibration data reference and impaired sites: Chironomidae taxa, % dominant, %2 dominant, %EPT, %Ephemeroptera, and %Plecoptera.

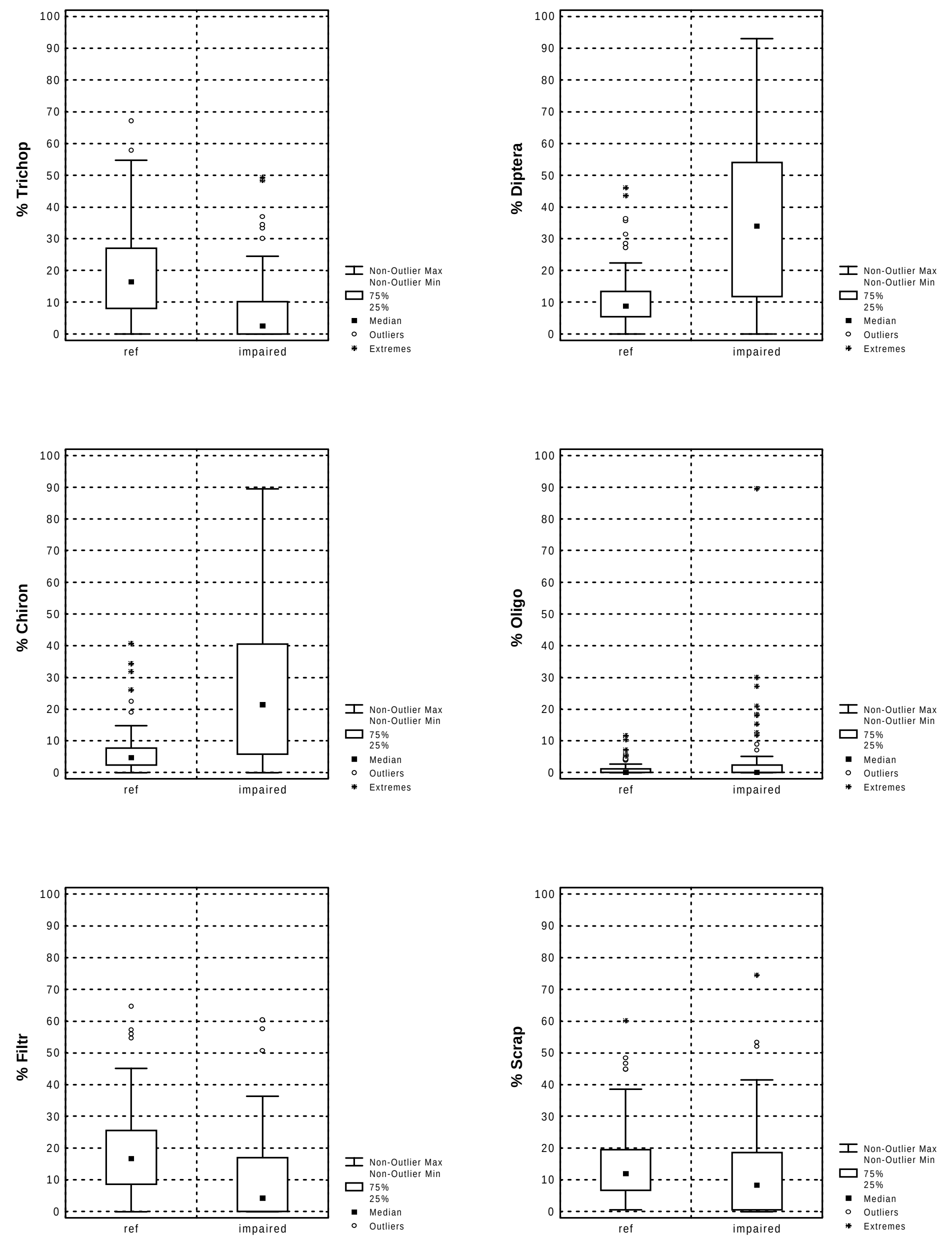

Figure D-5. Discriminatory ability of candidate metrics for West Virginia streams using 1996-1997 calibration data reference and impaired sites: %Trichoptera, %Diptera, %Chironomidae, %Oligochaeta, %Filterers, and %Scrapers.

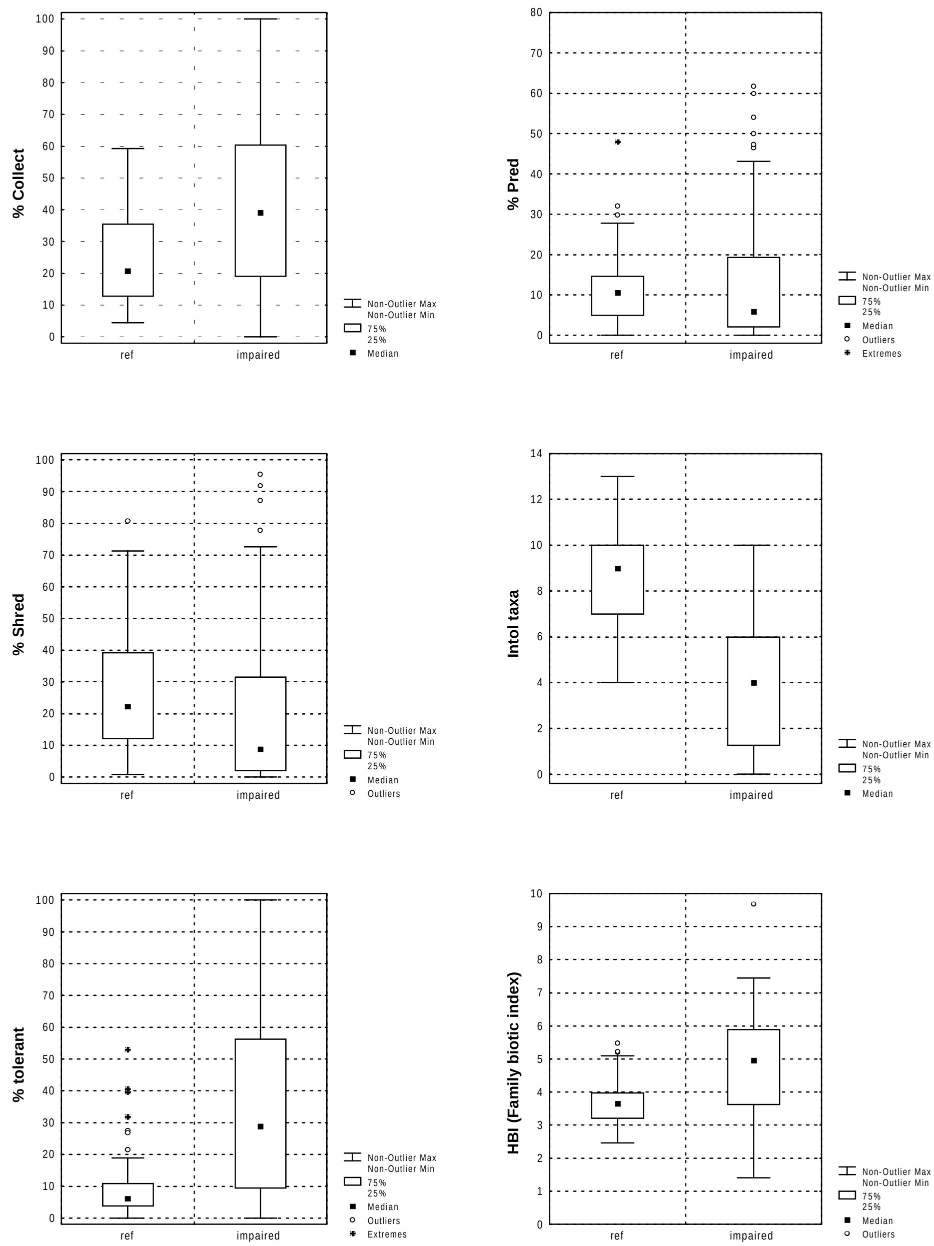

Figure D-6. Discriminatory ability of candidate metrics for West Virginia streams using 1996-1997 calibration data reference and impaired sites: %Collectors, %Predators, %Shredders, Intolerant taxa, %Tolerants, and HBI (Family biotic index).