1 INTRODUCTION AND OBJECTIVES

Since the mid-1990s, the Maryland Biological Stream Survey (MBSS) has monitored and assessed the condition of the State's non-tidal streams. Primary assessment tools include fish and benthic macroinvertebrate assemblages. The MBSS also collects relevant information on rare, threatened, and endangered species, stream water chemistry, physical habitat conditions, riparian zone characteristics, and other ancillary data (e.g., herpetofauna, crayfish, exotic plants) that contribute to our understanding of stream conditions. This guide provides a description of MBSS data and is organized by three MBSS "Rounds" (1995-1997; 2000-2004; 2007-2009). It includes descriptions of data tables and data fields within each table. Further background information and protocols can be found in several documents on the MBSS website at http://www.dnr.state.md.us/streams/mbss/index.html.

2 SUMMARY OF DATA TABLES

The MBSS Program maintains a Microsoft Access (2002) database containing all data collected since 1995. The data are arranged into tables by general subject matter. Queries can be generated from these tables to create datasets for summary or analysis.

Table 1. List of MBSS data tables

Table Name	Description
MasterSiteList	List of all sites sampled by the MBSS. Includes information on year, sample round, site type, and project.
SiteInfo	List of data types collected at each sample site
SiteCoordinates	Coordinate and watershed information for each sample site
WaterChemistry	Laboratory and field water chemistry
Habitat	Physical habitat measurements taken from sample site
Discharge	Stream flow and gradient measurement for sample site
StreamBlockage	Type and location of man-made stream blockages over six inches in height
ErosionSeverity	Extent and severity of bank erosion within sample site
BufferStrip	Buffer characteristics adjacent to sample site
BufferBreak	Type and severity of riparian buffer break
AllBenthics	List of benthic macroinvertebrate taxa collected from sample site
BIBI	Benthic Index of Biotic Integrity metrics values and scores and BIBI scores
FishList	Fish collected by electrofishing from sample site
FIBI	Fish Index of Biotic Integrity metrics values and scores and FIBI scores
ExoticPlants	Exotic plants observed near sample site
HerpList	Amphibians and reptiles observed near sample site
Crayfish	Crayfish observed near sample site
CrayfishAbundance	Crayfish abundance from sample site
StreamSalamanders	Abundance values for stream salamanders collected from sample site
MusselList	Freshwater mussels observed in sample site

3 GENERAL SITE INFORMATION

This information describes the location of each sample site and the types of data collected.

3.1 MasterSiteList

List of all sites sampled by the MBSS program since 1995.

Table 2. Site variables available with MBSS data

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char					Site identification
YEAR	Num					Calendar year sampled
ROUND	Num				1, 2, 3	Round 1 (1995-1997) Round 2 (2000-2004) Round 3 (2007-2009)
STYPE	Char				A – Tier II B – MDE 319	Site type

					C – Coldwater E – EPA H – Heritage M – Mine Bank Run N – National Park Q – EPA Quality Control R – Randomly selected S – Sentinel T – Targeted site X – Special project Z – Crayfish site	
PROJECT	Char				MDE 319 Acuminatus status survey Blackbanded survey Bridle Shiner survey CAFO Coldwater EPA EPA Quality Control Crayfish survey Heritage Maryland Darter survey MBSS random National park Patapsco project Rusty crayfish Sentinel Special project Stronghold watershed Targeted Tier II Western MD crayfish survey	Project type
METHOD	Char				Crayfish MBSS Preliminary Qualitative RTE	Method type
OLD_SITE	Char					Old site name

3.1.1 SITE IDENTIFICATION (SITEYR)

Within each sampling year, each sample segment is identified by a unique identification code. The variable SITEYR is used in each of the other MBSS data sets to identify the sample segment where the data were collected.

For Round 1 (1995-1997) data, site identifiers consist of 15-character codes with five parts: COUNTY-PHYSIO-reach id-SEGMENT-YEAR. The 3-digit segment code is a unique identifier for a segment within the basin and year, with the first digit signifying stream order.

For Round 2 (2000-2004) and Round 3 (2007-2009), site identifiers consist of 15-character codes with four parts: SHED-SEGMENT-STYPE-YEAR. The one-character STYPE represents the site type, as described below. The 3-digit segment code is a unique identifier for a segment within the basin and year, and is the combination of the 1-digit stream order, followed by the unique accession number for that site within the watershed.

3.1.2 YEAR (YEAR)

The calendar year that the site was sampled.

3.1.3 SAMPLING ROUND (ROUND)

Period of sampling: Round 1 (1995-1997), Round 2 (2000-2004), and Round 3 (2007-2009).

3.1.4 SITE TYPE (STYPE)

Data were collected from various site types: random (R), Tier II (A), MDE 319 (B), Coldwater (C), EPA (E), DNR Heritage (H), Mine Bank Run (M), National Park (N), EPA quality control (Q), sentinel (S), targeted (T), special project (X), and crayfish (Z).

3.1.5 SAMPLING PROJECT (PROJECT)
Specific project associated with each sample site.

3.1.6 SAMPLING METHOD (METHOD)
Sampling method used for each site. See Stranko et al. (2007) for a more detailed description of field sampling protocols, including gear used, index periods, safety, training, and QA/QC.

3.2 SiteInfo
List of data types collected at each sample site

Table 3. Site information variables available with MBSS data

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char					Site identification
ST_NAME	Char					Stream name
YEAR	Num					Calendar year sampled
PHYSIO	Char				A – Appalachian Plateau B – Blue Ridge N – North Coastal Plain P – Piedmont S – South Coastal Plain V – Valley & Ridge	Physiographic region
BASIN	Char				See Table 4	Drainage basin
ORDER	Num				1, 2, 3, 4	Strahler stream order
SAMP_SPR	Char				Y, N	Sampled spring
DATE_SPR	Num				mm/dd/yyyy	Spring sampling date
SAMP_BEN	Char				See Table 5	Sampleability for benthic macroinvertebrates during the spring
SAMP_HAB	Char				See Table 5	Sampleability for physical habitat during the spring
SAMP_WQT	Char				See Table 5	Sampleability for water quality during the spring
SAMP_VERNPL	Char	n/a	n/a		See Table 5	Sampleability for vernal pools during the spring
VERNPLOBS	Char	n/a	n/a		P – Present A – Absent	Vernal pool observed
SAMP_SUM	Char				Y, N	Sampled summer
DATE_SUM	Num				mm/dd/yyyy	Summer sampling date
SAMPELEC	Char				See Table 5	Sampleability for electrofishing during the summer
SAMPHAB	Char				See Table 5	Sampleability for physical habitat during the summer
SAMPWATCHEM	Char				See Table 5	Sampleability for water quality during the summer
SAMPHERP	Char				See Table 5	Sampleability for reptiles and amphibians during the summer
SAMPMUSS	Char				See Table 5	Sampleability for mussels during the summer
SAMPSAV	Char	n/a		n/a	See Table 5	Sampleability for submerged aquatic vegetation during the summer
SAMPSALAM	Char	n/a	n/a		See Table 5	Sampleability for salamanders during the summer

SAMPCRAY	Char	n/a	n/a		See Table 5	Sampleability for crayfish during the summer
SAMPAQPLANT	Char	n/a	n/a		See Table 5	Sampleability for aquatic vegetation during the summer
SAMPEXOTPLANT	Char	n/a	n/a		See Table 5	Sampleability for exotic plants during the summer

3.2.1 PHYSIOGRAPHIC REGION (PHYSIO)

One of the physiographic provinces with the state of Maryland (Figure 1). One letter codes for the variable PHYSIO are given in Table 3. The PHYSIO code is included as the second part of the SITEYR code for Round 1 data.

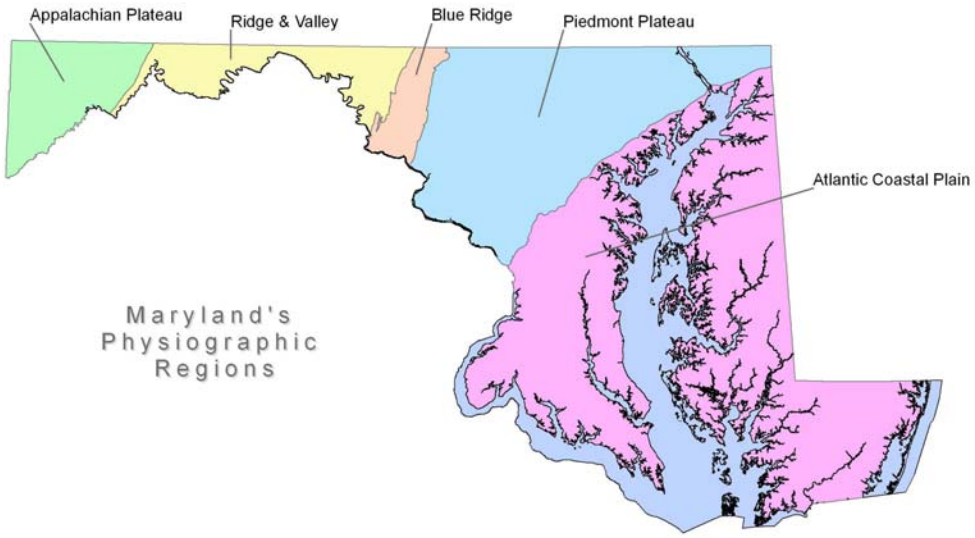

Figure 1. Maryland's physiographic regions.

3.2.2 DRAINAGE BASIN (BASIN)

Sampling sites for the MBSS were located in 17 distinct drainage basins (Figure 2). A basin is specified by a two-letter code (Table 4).

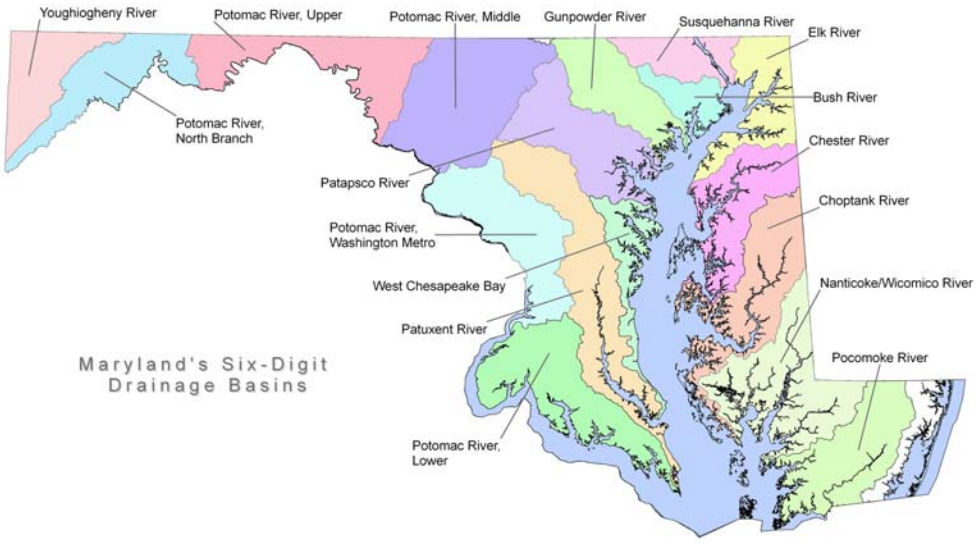

Figure 2. Maryland's 6-digit river basins.

Table 4. Drainage basin codes for each of Maryland's 6-digit drainage basins.

Drainage Basin Code	Basin Name
BU	Bush River
CK	Choptank River
CR	Chester River
CO	Conewego Creek
EL	Elk River
GU	Gunpowder River
LP	Lower Potomac River
MP	Middle Potomac River
NO	North Branch Potomac River
NW	Nanticoke River
OC	Ocean Coastal
PC	Pocomoke River
PP	Patapsco River
PW	Washington Metro Potomac River
PX	Patuxent River
SQ	Susquehanna River
UP	Upper Potomac River
WC	West Chesapeake
YG	Youghiogheny River

3.2.3 STREAM ORDER (ORDER)
The Strahler convention (Strahler 1957) was used for ranking stream reaches by order.

3.2.4 SAMPLEABILITY (SAMP_SPR, SAMP_SUM)
Spring sampleability indicates whether or not a site was able to be sampled during the spring index period. Sampleability is indicated by "Y" or "N". A site's spring sampleability is defined as *yes* if the site was sampleable for any of the following parameters: water quality, spring physical habitat, or benthic macroinvertebrates. A site's sampleability is defined as *no* if none of the parameters were sampleable.

Summer sampleability indicates whether or not a site was able to be sampled during the summer index period. Sampleability is indicated by "Y" or "N". A site's summer sampleability is defined as *yes* if the site was sampleable for any of the following parameters: electrofishing, summer physical habitat, water quality, herpetofauna, mussels, salamanders, or crayfish. A site's sampleability is defined as *no* if none of the parameters were sampleable.

MBSS field biologists recorded specific reasons why sites were considered unsampleable. Table 5 defines the sampleability codes.

Table 5. Sampleability codes for MBSS sampling events

Sampleability Code	Definition
S	Sampleable
1	Dry streambed
2	Too deep
3	Marsh, no defined channel
4	Excessive vegetation
5	Impoundment
6	Tidally influenced
7	Permission denied
8	Unsafe
9	Beaver
10	Other

3.3 SiteCoordinates
Coordinate and watershed information for each sample site.

Table 6. Site coordinate variables available with MBSS data

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char					Site identification
Year	Num					Year sampled
StreamName	Char					Stream name
Northing83	Num					Maryland plane coordinate (NAD83)
Easting83	Num					Maryland plane coordinate (NAD83)
Latitude83	Num					Latitude (decimal degree)
Longitude83	Num					Longitude (decimal degree)
MDE6Digit	Num					Maryland 6-digit watershed code
MDE6Name	Char					Maryland 6-digit watershed name
Basin	Char				See Table 4	Drainage basin
MDE8Digit	Num					Maryland 8-digit watershed code
MDE8Name	Char					Maryland 8-digit watershed name
SHEDNUM	Num					Last 4 digits of the Maryland 12-digit watershed code
DNR12DIG	Num					Maryland 12-digit watershed

						code
CountyName	Char				See Table 7	County name
CountyCode	Char					County code
BIBIStrata	Char				Coastal, Epiedmont, Highland	Benthic IBI strata
FIBIStrata	Char				Coastal, Epiedmont, Highland, Cold	Fish IBI strata

3.3.1 MARYLAND STATE PLANE COORDINATES (Northing83, Easting83)

Using the Maryland State Plane Coordinate System, the geographic location of the sample site is specified using a pair of coordinates (Northing83 and Easting83). MBSS Maryland State Plane Coordinates are based on the North American Datum 1983, the basis of the 1987 Maryland Coordinate System. These coordinates are given in meters.

3.3.2 LATITUDE AND LONGITUDE (Latitude83, Longitude83)

The location of the sample site is specified using a pair of geographic coordinates, latitude (Latitude83) and longitude (Longitude83). These coordinates are given in decimal degrees.

3.3.3 WATERSHED CODES AND NAMES (MDE6Digit, MDE6Name, MDE8Digit, MDE8Name, DNR12Digit)

This code identifies the watershed where the site is located. Maryland's 17 6-digit watersheds are represented by MDE6Digit and MDE6Name. MDE8Digit and MDE8Name refer to the 8-digit Hydrologic Unit Code (HUC) assigned to each of the 138 intermediate-size watersheds by the Maryland Department of the Environment (MDE) and DNR. Each 12-digit watershed identifier, corresponding to local watersheds, is represented by DNR12DIG.

3.3.4 COUNTY (CountyName, CountyCode)

The variable specifies one of 24 counties within the state of Maryland, as designated by political boundaries (Figure 3). Two-letter codes for the counties are given in Table 7.

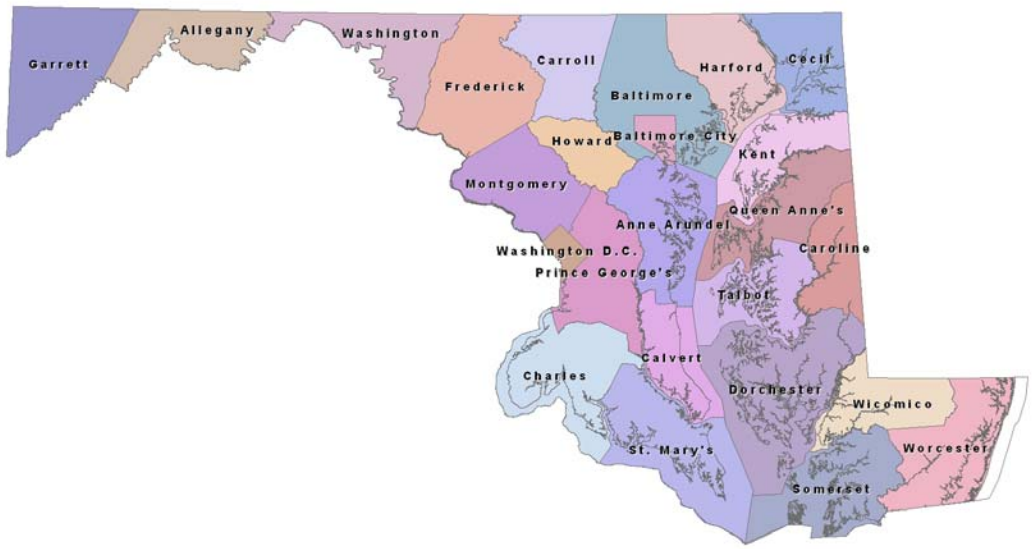

Figure 3. Maryland's counties

Table 7. County codes for each of Maryland's counties

County Code	County Name
AA	Anne Arundel
AL	Allegany
BA	Baltimore
BC	Baltimore City
CA	Calvert
CE	Cecil
CH	Charles
CN	Caroline
CR	Carroll
DO	Dorchester
FR	Frederick
GA	Garrett
HA	Harford
HO	Howard
KE	Kent
MO	Montgomery
PG	Prince George's
QA	Queen Anne's
SM	St. Mary's
SO	Somerset
TA	Talbot
WA	Washington
WI	Wicomico
WO	Worcester

3.3.5 STRATUM (BIBIStrata, FIBIStrata)

Calculation of the biotic indices requires knowledge of the physiographic stratum in which each site is located. The strata used for benthic IBI calculations are: Coastal, Epiedmont, and Highland. The strata used for fish IBI calculations are: Coastal, Epiedmont, Highland, and Cold (Southerland et al. 2005).

4 FIELD MEASUREMENTS

Data collected from field visits to the sample sites.

4.1 WaterChemistry

Roth et al. 2005 provides details regarding analytical methods and detection limits.

Table 8. Water chemistry variables available with MBSS data

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char					Site identification
ST_NAME	Char					Stream name
YEAR	Num					Year sampled
ROUND	Num					Round sampled
SAMP_WQT_LAB	Char				See Table 5. Sampleability codes	Sampled water quality laboratory
SAMP_WQT_FLD	Char				See Table 5. Sampleability codes	Sampled water quality field
PH_LAB	Num					Lab pH
COND_LAB	Num					Lab conductance (µmho/cm)
ANC_LAB	Num					Acid Neutralizing Capacity (µeq/L)
DOC_LAB	Num					Dissolved organic carbon (mg/L)
CL_LAB	Num	n/a				Chloride (mg/L)
SO4_LAB	Num					Sulfate (mg/L)
TN	Num	n/a				Total nitrogen (mg/L)
TP	Num	n/a				Total phosphorus (mg/L)

O_PHOS	Num	n/a				Ortho-Phosphate (mg/L)
NH3	Num	n/a				Ammonia (mg/L)
NO2	Num	n/a				Nitrite nitrogen (mg/L)
NO3_LAB	Num					Nitrate nitrogen (mg/L)
TEMP_FLD	Num					In-situ water temperature (° C)
DO_FLD	Num					Dissolved oxygen (mg/L)
PH_FLD	Num					In-situ pH
COND_FLD	Num					In-situ conductance (µmho/cm)
TURB_FLD	Num	n/a				In-situ turbidity (NTU)

4.1.1 SPRING AND SUMMER pH (PH_LAB, PH_FLD)

The spring pH (pH_LAB) and the *in situ* summer pH (PH_FLD) are given in standard pH units.

4.1.2 SPRING AND SUMMER CONDUCTANCE (COND_LAB, COND_FLD)

Conductance in both the spring (COND_LAB) and summer (COND_FLD) is given in µmho/cm.

4.1.3 ACID NEUTRALIZING CAPACITY (ANC_LAB)

Acid neutralizing capacity is given in µeq/L.

4.1.4 CARBON ANALYTES (DOC_LAB)

Dissolved organic carbon concentration is given in mg/L.

4.1.5 CHLORIDE (CL)

Chloride concentration is given in mg/L.

4.1.6 SULFATE (SO4_LAB)

Sulfate, nitrate nitrogen, and dissolved organic carbon concentrations are given in mg/L.

4.1.7 NITROGEN ANALYTES (NO3_LAB, NO2, NH3, TN)

Nitrogen analytes included nitrate-nitrogen, nitrite-nitrogen, ammonia-nitrogen, and total nitrogen. Concentrations appear in mg/L.

4.1.8 PHOSPHORUS ANALYTES (O_PHOS, TP)

Phosphorus analytes include ortho-phosphate (also called reactive phosphorus) and total phosphate. Concentrations appear in mg/L.

4.1.9 TEMPERATURE (TEMP_FLD)

Temperature is given in ˚C (degrees Celsius). Stream temperature measurements occur during summer field sampling events using an electronic multimeter.

4.1.10 DISSOLVED OXYGEN (DO_FLD)

Dissolved oxygen is given in mg/L.

4.1.11 SUMMER TURBIDITY (TURB_FLD)

Stream turbidity is measured during summer field sampling. Data are provided in Nephelometric Turbidity Units (NTUs).

4.2 Habitat

Physical habitat measurements taken from sample site reaches. Descriptions of all MBSS physical habitat measurements can be found in Stranko 2007; page 47.

Table 9. Physical habitat variables available with MBSS data

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char					Site identification
ST_NAME	Char					Stream name
YEAR	Num					Year sampled
PASTURE	Char				Y, N	Presence of pasture land
CHANNEL	Char				Y, N	Evidence of channel straightening or dredging
CONCRETE	Char				Y, N	Presence of concrete/gabion
EFF_DIS	Char				Y, N	Presence of effluent discharge
BEAVPND	Char				Y, N	Presence of beaver pond
INSTRHAB	Num				0-20	Instream habitat structure
EPI_SUB	Num				0-20	Epifaunal substrate
VEL_DPTH	Num				0-20	Velocity/depth diversity
POOLQUAL	Num				0-20	Pool/glide/eddy quality
EXPOOL	Num					Extent of pool or glide (m)
RIFFQUAL	Num				0-20	Riffle/run quality
EXRIFRUN	Num					Extent of riffle or run (m)
CHAN_ALT	Num				0-20	Channel alteration
BAR_FORM	Char					Bar formation
BANKSTAB	Num				0-20	Bank stability
EMBEDDED	Num				0-100	Embeddedness (%)
CH_FLOW	Num		n/a	n/a	0-100	Channel flow status (% channel filled with water)
SHADING	Num				0-100	Shading (%)
REMOTE	Num		n/a	n/a	0-20	Remoteness score
DIST_RD	Num	n/a				Distance to nearest road (m)
AESTHET	Num				0-20	Trash rating
WOOD_DEB	Num			n/a		Number of woody debris
NUMROOT	Num			n/a		Number of rootwads
INSTREAMWOOD	Num	n/a	n/a			Number of instream woody debris
DEWATERWOOD	Num	n/a	n/a			Number of dewatered woody debris
INSTREAMROOT	Num	n/a	n/a			Number of instream rootwads
DEWATERROOT	Num	n/a	n/a			Number of dewatered rootwads
RIP_WID	Num			n/a		Riparian buffer width (m)
RV_WID_L	Num	n/a				Riparian buffer width, left bank (m)
RV_WID_R	Num	n/a				Riparian buffer width, right bank (m)
ADJ_COVR	Char			n/a	FR – forest OF – old forest EM – emergent vegetation LN – mowed lawn TG – tall grass LO – logged area SL – bar soil RR – railroad PV – paved road PK – parking lot	Adjacent land cover type

					GR – gravel road DI – dirt road PA – pasture OR – orchard CP – cropland HO - housing	
AdjCoverL	Char	n/a	n/a			Adjacent land cover type, left bank
AdjCoverR	Char	n/a	n/a			Adjacent land cover type, right bank
MAXDEPTH	Num					Maximum depth in sample reach (cm)
AVGWID	Num					Average wetted width (m)
AVGTHAL	Num					Average thalweg depth (cm)
AVG_VEL	Num					Average velocity (m/s)
COB_BAR	Char	n/a			Y, N	Cobble bar substrate present
GRAV_BAR	Char	n/a			Y, N	Gravel bar substrate present
SAND_BAR	Char	n/a			Y, N	Sand bar substrate present
SC_BAR	Char	n/a			Y, N	Silt/clay bar substrate present
BRAIDED	Char	n/a			A – Absent P – Present E – Extensive	Presence of stream braiding
RIFFLE	Char	n/a			A – Absent P – Present E – Extensive	Presence of stream riffles
RUNGLIDE	Char	n/a			A – Absent P – Present E – Extensive	Presence of runs and glides
DEEPOOL	Char	n/a			A – Absent P – Present E – Extensive	Presence of deep pools
SHALPOOL	Char	n/a			A – Absent P – Present E – Extensive	Presence of shallow pools
LRGBOULD	Char	n/a			A – Absent P – Present E – Extensive	Presence of large boulders
SMBOULD	Char	n/a			A – Absent P – Present E – Extensive	Presence of small boulders
COBBLE	Char	n/a			A – Absent P – Present E – Extensive	Presence of cobbles
BEDROCK	Char	n/a			A – Absent P – Present E – Extensive	Presence of bedrock
GRAVEL	Char	n/a			A – Absent P – Present E – Extensive	Presence of gravel
SAND	Char	n/a			A – Absent P – Present E – Extensive	Presence of sand
SILTCLAY	Char	n/a			A – Absent P – Present E – Extensive	Presence of silt and clay
UNDERCUT	Char	n/a			A – Absent P – Present E – Extensive	Presence of undercut banks
OH_COVER	Char	n/a			A – Absent P – Present E – Extensive	Presence of overhead cover
PHI_98	Num			n/a	1-5	Physical habitat index (1998)
PHI_05	Num	n/a		n/a	1-5	New physical habitat index (2005)

4.2.1 INSTREAM HABITAT QUALITY (INSTRHAB)
Instream habitat is rated based on perceived value of the habitat to the fish community. Higher scores are assigned to sites with a variety of habitats and particle sizes. Scores range from 0 (poor) to 20 (optimal).

4.2.2 EPIFAUNAL SUBSTRATE (EPI_SUB)
Epifaunal substrate is rated based on the amount and variety of hard, stable substrates useable by benthic macroinvertebrates. Scores range from 0 (poor) to 20 (optimal).

4.2.3 VELOCITY AND DEPTH DIVERSITY (VEL_DPTH)
Velocity depth and diversity is based on the variety of velocity/depth regimes present at the site. Scores range from 0 (poor) to 20 (optimal).

4.2.4 POOL QUALITY AND EXTENT (POOLQUAL, EXPOOL)
Pool quality is based on the variety and special complexity of slow- or still-water habitat within the sample segment. Scores range from 0 (poor) to 20 (optimal). The linear extent of the pools within the site segment is recorded in m.

4.2.5 RIFFLE QUALITY AND EXTENT (RIFFQUAL, EXRIFRUN)
Riffle quality is based on the depth, complexity, and functional importance of riffle/run habitat present at the site. The linear extent of the riffle/run habitat within the site segment is recorded in m.

4.2.6 SUBSTRATE EMBEDDEDNESS (EMBEDDED)
Substrate embeddedness is presented as the percentage of the surface area of larger particles that is surrounded by fine sediments and/or floc on the stream bottom.

4.2.7 CHANNEL FLOW (CH_FLOW)
Channel flow is presented as the percentage of the stream channel containing water.

4.2.8 WOODY DEBRIS AND ROOTWADS (WOOD_DEB, INSTREAMWOOD, DEWATERWOOD, NUMROOT, INSTREAMROOT, DEWATERROOT)
The number of pieces of woody debris (WOOD_DEB) and the number of rootwads (NUMROOT) at each site were recorded during the Round 1 and 2 periods. For Round 3, distinctions were made for instream woody debris (INSTREAMWOOD) and rootwads (INSTREAMROOT) and for dewatered dewatered woody debris (DEWATWOOD) and rootwads (DEWATERROOT).

4.2.9 PERCENTAGE OF CHANNEL SHADED (SHADING)
The percentage of the channel shaded refers to the shading extent and duration during the summer. A site that is fully exposed all day during the summer would have 0% shading, while a site that is fully shaded all day during the summer would have 100% shading.

4.2.10 REMOTENESS (REMOTE, DIST_RD)
Remoteness scores the relative absence of human activity and the difficulty of accessing the site segment. Scores range from 0 (poor) to 20 (optimal). For Round 2 and 3, the distance to the nearest road was determined and recorded in m.

4.2.11 AESTHETICS (AESTHET)
The aesthetic rating is based on the visual appeal of the site and the presence or absence of human refuse. Scores range from 0 (poor) to 20 (optimal).

4.2.12 RIPARIAN BUFFER WIDTH (RIP_WID, RIP_WID_L, RIP_WID_R)
The width of the vegetated riparian buffer was estimated in m, to a maximum of 50 m. If a buffer break was observed, the riparian buffer width equals zero.

4.2.13 BUFFER TYPE AND ADJACENT LAND COVER (ADJ_COVR, Adj_coverL, Adj_coverR)
The dominant type of riparian buffer is described by one of the vegetative cover codes.

4.2.14 MAXIMUM DEPTH (MAXDEPTH)
Maximum stream depth with the 75 m segment, recorded in cm.

4.2.15 AVERAGE WIDTH (AVGWID)
The wetted width of the stream, in m, was measured at the 0, 25, 50, and 75 m points of the sample segment. The average of these measures is reported in m.

4.2.16 AVERAGE THALWEG DEPTH (AVGTHAL)
Thalweg depth, the deepest portion of the lateral transect of the stream, was measured in cm at the 0, 25, 50, 75 m points of the sample segment. The average of these measures is reported in cm.

4.2.17 AVERAGE VELOCITY (AVG_VEL)
Thalweg velocity was measured with a flowmeter at the deepest portion of the lateral transect at the 0, 25, 50, and 75 m points of the sample segment. Average thalweg velocity is reported in m/s.

4.2.18 BAR TYPES (COB_BAR, GRAV_BAR, SAND_BAR, SC_BAR)
Substrate of any observed bars in the stream channel. Each substrate type is indicated as absent ("A"), present ("P") or extensive ("E"). Allowed types include cobble (COB_BAR), grave (GRAV_BAR), sand (SAND_BAR), or silt/clay (SC_BAR).

4.2.19 SUBSTRATE TYPES (LRGBOULD, SMBOULD, COBBLE, BEDROCK, GRAVEL, SAND, SILTCLAY)
Various substrate types are recorded as absent ("A"), present ("P") or extensive ("E"). Types include large boulders, small boulders, cobble, bedrock, gravel, sand, or silt/clay.

4.2.20 UNDERCUT BANKS (UNDERCUT)
Undercut banks are recorded as absent ("A"), present ("P") or extensive ("E").

4.2.21 OVERHEAD COVER (OH_COVER)
Overhead cover is recorded as absent ("A"), present ("P") or extensive ("E").

4.2.22 PHYSICAL HABITAT INDEX (PHI_98, PHI_05)
The Physical Habitat Index (PHI) is a quantitative rating of the physical habitat at each site. Scores range from 0 (very poor) to 100 (good). See Paul et al. (2002).

4.3 Discharge
Stream flow and gradient measurement for sample site reaches

Table 10. Flow and gradient variables available with MBSS data

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char					Site identification
ST_GRAD	Num				0-100	Stream gradient (%)
DischargeCFS	Num					Streamflow (cfs)
DischError	Char					Comments related to discharge

4.3.1 STREAM GRADIENT (ST_GRAD)
Stream gradient was measured from the downstream boundary (0 m point) to the upstream boundary of the segment (75 m point) using an inclinometer (1995-2004) and a level (2007-2009) to determine the water surface slope. Stream gradient is recorded as percent slope.

4.3.2 DISCHARGE (DischargeCFS)
Discharge (streamflow) is reported in cubic feet per second (cfs). Discharge was calculated from raw data collected at each site during summer. A standard transect method was employed. Flow velocity (m/s) and water depth (cm) were measured at 10 to 20 regular intervals. Velocity was measured at a point 0.6 of the distance from the water surface to the bottom. Calculation of discharge from raw velocity, depth, and lateral location data followed standard procedures as described by Buchanan and Somers (1969).

4.4 StreamBlockage

Type and location of man-made stream blockages.

Table 11. Stream blockage variables available with MBSS data

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char	n/a				Site identification
YEAR	Num	n/a				Year sampled
ChannelizedYN	Char	n/a			Y, N	Evidence of channel straightening or dredging
ConcreteL	Num	n/a				Extent of concrete along the left bank of the reach (m)
ConcreteB	Num	n/a				Extent of concrete along the bottom of the reach (m)
ConcreteR	Num	n/a				Extent of concrete along the right bank of the reach (m)
GabionL	Num	n/a				Extent of gabion along the left bank of the reach (m)
GabionB	Num	n/a				Extent of gabion along the bottom of the reach (m)
GabionR	Num	n/a				Extent of gabion along the right bank of the reach (m)
RiprapL	Num	n/a				Extent of riprap along the left bank of the reach (m)
RiprapB	Num	n/a				Extent of riprap along the bottom of the reach (m)
RiprapR	Num	n/a				Extent of riprap along the right bank of the reach (m)
BermL	Num	n/a				Extent of earthen berm along the left bank of the reach (m)
BermR	Num	n/a				Extent of earthen berm along the right bank of the reach (m)
DredgeL	Num	n/a				Extent of dredge material along the left bank of the reach (m)
DredgeR	Num	n/a				Extent of dredge material along the right bank of the reach (m)
PipeL	Num	n/a				Extent of pipe along the left bank of the reach (m)
PipeB	Num	n/a				Extent of pipe along the bottom of the reach (m)
PipeR	Num	n/a				Extent of pipe along the right bank of the reach (m)
CulvertPresent	Char	n/a			Y, N	Culvert present
CulvertSampled	Char	n/a			Y, N	Culvert sampleable
CulvertWidth	Num	n/a				Width of culvert (m)
CulvertLength	Num	n/a				Length of culvert (m)
StreamBlockLat	Num	n/a				Latitude of stream blockage
StreamBlockLong	Num	n/a				Longitude of stream blockage
StreamBlockHeight	Num	n/a				Height of stream blockage (m)
StreamBlockType	Char	n/a			DM – Dam PC – Pipe culvert F – Fishway G – Gabion PX – Pipeline crossing AC – Arch culvert BC – Box culvert GW – gaging station	Type of stream blockage

4.4.1 CHANNELIZATION (ChannelizedYN)

Evidence of stream channelization within the sample reach. The allowed values include “Y” or “N”.

4.4.2 CONCRETE (ConcreteL, ConcreteB, ConcreteR)
Linear extent of concrete along each bank and the stream bottom measured in m.

4.4.3 GABION (GabionL, GabionB, GabionR)
Linear extent of gabion baskets along each bank and the stream bottom measured in m.

4.4.4 RIPRAP (RiprapL, RiprapB, RiprapR)
Linear extent of riprap material along each bank and the stream bottom measured in m.

4.4.5 BERM (BermL, BermR)
Linear extent of earthen berm along each bank measured in m.

4.4.6 DREDGE (DredgeL, DredgeR)
Linear extent of dredge material along each bank measured in m.

4.4.7 PIPE (PipeL, PipeB, PipeR)
Linear extent of pipe along each bank and the stream bottom measured in m.

4.4.8 CULVERT (CulvertPresent, CulvertSampled, CulvertWidth, CulvertLength)
The presence of culvert within the site. Sampleability of the culvert using standard MBSS methods is indicated using "Y" or "N". Culvert width and culvert length were measured in m.

4.4.9 STREAM BLOCKAGE (StreamBlockLat, StreamBlockLong, StreamBlockHeight, StreamBlockType)
Latitude and longitude of stream blockage in decimal degrees. Stream blockage height measured in m. Stream blockage type from Instream Blockage Codes found in Table 11.

4.5 ErosionSeverity
Extent and severity of bank erosion within sample site reaches

Table 12. Bank erosion variables available with MBSS data

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char	n/a				Site identification
Year	Num	n/a				Year sampled
ErodedExtentL	Num	n/a				Extent of erosion along left bank (m)
ErodedExtentR	Num	n/a				Extent of erosion along right bank (m)
ErosionSeverityL	Num	n/a			0, 1, 2, 3	Erosion severity along left bank
ErosionSeverityR	Num	n/a			0, 1, 2, 3	Erosion severity along right bank
ErodedHeightL	Num	n/a				Average height of erosion on left bank (m)
ErodedHeightR	Num	n/a				Average height of erosion on right bank (m)

4.5.1 EROSION (ErodedExtent, ErosionSeverity, ErodedHeight)
The extent, severity, and height of bank erosion within the sample reach. Extent and height are measured in m. Severity is given a score of 0 to 3, with 0 indicating no erosion and 3 indicating severe bank erosion.

4.6 BufferStrip
Buffer characteristics adjacent to sample site reaches

Table 13. Buffer strip variables available with MBSS data

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition

SITEYR	Char	n/a				Site identification
YEAR	Num	n/a				Year sampled
RipVegWidthL	Num	n/a			0-50	Average riparian buffer width, left bank (m)
RipVegWidthR	Num	n/a			0-50	Average riparian buffer width, right bank (m)
AdjCoverL	Char	n/a			FR – Forest OF – Old forest EM – Emergent vegetation LN – Mowed lawn TG – Tall grass LO – Logged area SL – Bare soil RR – Railroad PV – Paved Road PK – Parking lot GR – Gravel road DI – Dirt road PA – Pasture OR – Orchard CP – Cropland HO - Housing	Adjacent land cover type, left bank
AdjCoverR	Char	n/a			FR – Forest OF – Old forest EM – Emergent vegetation LN – Mowed lawn TG – Tall grass LO – Logged area SL – Bare soil RR – Railroad PV – Paved Road PK – Parking lot GR – Gravel road DI – Dirt road PA – Pasture OR – Orchard CP – Cropland HO - Housing	Adjacent land cover type, right bank
VegType1L	Char	n/a			G – Grasses R – Regen deciduous trees/shrubs (<4" DBH) Y – Young deciduous trees (4-12" DBH) M – Mature deciduous trees (12-24" DBH) O – Old deciduous trees (>24" DBH) A – Regen coniferous trees (<4" DBH) B – Young coniferous trees (4-12" DBH) C – Mature coniferous trees (12-24" DBH) D – Old coniferous trees (>24" DBH) L – Lawn	Primary buffer vegetation type, left bank
VegType1R	Char	n/a			G – Grasses R – Regen deciduous trees/shrubs (<4" DBH) Y – Young deciduous trees (4-12" DBH) M – Mature deciduous trees (12-24" DBH) O – Old deciduous trees (>24" DBH) A – Regen coniferous trees (<4" DBH) B – Young coniferous trees (4-12" DBH)	Primary buffer vegetation type, right bank

					C – Mature coniferous trees (12-24" DBH) D – Old coniferous trees (>24" DBH) L – Lawn	
VegType2L	Char	n/a				Secondary buffer vegetation type, left bank
VegType2R	Char	n/a				Secondary buffer vegetation type, right bank
VegType3L	Char	n/a				Tertiary buffer vegetation type, left bank
VegType3R	Char	n/a				Tertiary buffer vegetation type, right bank
VegType4L	Char	n/a				Quaternary buffer vegetation type, left bank
VegType4R	Char	n/a				Quaternary buffer vegetation type, right bank
RipBufferBreakL	Char	n/a			Y, N	Buffer break present, left bank
RipBufferBreakR	Char	n/a			Y, N	Buffer break present, right bank

4.6.1 RIPARIAN BUFFER WIDTH (RIP_WID_L, RIP_WID_R)

The width of the vegetated riparian buffer was estimated in meters, to a maximum of 50 m. If a buffer break was observed, the riparian buffer width equals zero.

4.6.2 BUFFER TYPE AND ADJACENT LAND COVER (Adj_coverL, Adj_coverR)

The dominant type of riparian buffer is described by one of the vegetative cover codes.

4.6.3 VEGETATION TYPE (VegTypeL, VegTypeR)

The type of land cover immediately adjacent to the stream buffer. If the buffer is 50 m or more, then the same code recorded for the buffer was recorded for the adjacent land cover.

4.7 BufferBreaks

Type and severity of riparian buffer break

Table 14. Buffer break variables available with MBSS data

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char	n/a				Site identification
Year	Num	n/a				Year sampled
BufferBreakSide	Char	n/a			L, R	Side of bank with buffer break
BufferBreakType	Char	n/a			Storm drain Tile drain Impervious drainage Gully Orchard Crop Pasture New construction Dirt road Gravel road Railroad	Type of buffer break
BufferBreakSeverity	Char	n/a			M – Minor S – Severe	Severity of buffer break

4.7.1 BUFFER BREAK TYPES (BufferBreakType, BufferBreakSeverity)

If a buffer break is observed, the severity of the break is recorded as minor (M) or severe (S) along with the buffer break type (Table 14).

4.8 AllBenthics

List of benthic macroinvertebrate taxa collected from sample sites

Table 15. Benthic macroinvertebrate variables available with MBSS data

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char					Site identification
DATE	Num				mm/dd/yyyy	Date on which the benthic sample was collected
FinalName	Char					Species name (scientific)
TAXON	Char					Species name (scientific)
N_TAXA	Num					Total number of individuals identified for that taxon
N_GRIDS	Num				0-100	Number of grids picked in order to obtain 100 organisms
EXCLUDE	Char					Anomalies observed

4.8.1 ACTUAL SAMPLE DATE (DATE)

The date refers to the actual date in the spring on which the benthic macrinvertebrate sample was collected. It is not the date on which the taxonomic identification in the laboratory occurred.

4.8.2 TAXONOMIC IDENTIFICATION (FinalName, TAXON)

Most benthic macroinvertebrates are identified to genus (Boward and Friedman 2000). In some cases, genus-level identification was not possible, and higher taxonomic levels are provided.

4.8.3 NUMBER OF INDIVIDUALS (N_TAXA)

The number of individuals by taxon that were identified in that site's 100-organism subsample.

4.8.4 NUMBER OF GRIDS (N_GRIDS)

The number of grids picked from a standard gridded pan in order to acquire the necessary 100-organism subsample.

4.9 BIBI

Benthic Index of Biotic Integrity (BIBI) metrics and scores. Please note that the narratives in the "Definition" column refers to variables used to calculate BIBI metrics. See Southerland et al. (2005) for detailed descriptions of MBSS BIBI metrics.

Table 16. Benthic metrics and BIBI scores for MBSS sites

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char					Site identification
ntaxa	Num					Total number of taxa
nept	Num					Number of EPT taxa (Ephemeropter, Plecoptera, Trichoptera)
nephem	Num					Number of Ephemeroptera taxa
totind	Num					Total number of individual organisms identified
totephem	Num					Total number of Ephemeroptera individuals
nscrape	Num					Number of scraper taxa
totclimb	Num					Total number of individual climbers
totchiron	Num					Total number of individual Chironomidae
totcling	Num					Total number of individual clingers
tottany	Num					Total number of individual Tanytarsini

totscrape	Num					Total number of individual scrapers
totswim	Num					Total number of individual swimmers
totdipt	Num					Total number of individual Diptera
totintol_urb	Num					Total number of individual intolerant urban
pephem	Num				0-100	Percentage of Ephemeroptera
pclimb	Num				0-100	Percentage of climbers
pchiron	Num				0-100	Percentage of Chironomidae
pcling	Num				0-100	Percentage of clingers
ptany	Num				0-100	Percentage of Tanytarsini
pscrape	Num				0-100	Percentage of scrapers
pswim	Num				0-100	Percentage of swimmers
pdipt	Num				0-100	Percentage of Diptera
pintol_urb	Num				0-100	Percentage intolerant urban
BIBIStrata	Char				Coastal, Epiedmont, Highland	Benthic IBI stratum
sc_ntaxa	Num				1, 3, 5	Score for number of taxa
sc_nept	Num				1, 3, 5	Score for number of EPT taxa
sc_nepehm	Num				1, 3, 5	Score for number of Ephemeroptera taxa
sc_pintol_urb	Num				1, 3, 5	Score for percentage intolerant urban
sc_pephem	Num				1, 3, 5	Score for percentage Ephemeroptera
sc_nscrape	Num				1, 3, 5	Score for number of scraper taxa
sc_pclimb	Num				1, 3, 5	Score for percentage climbers
bibi_05	Num				1-5	Final calculated benthic index of biotic integrity (2005)
sc_pchiron	Num				1, 3, 5	Score for percentage Chironomidae
sc_pcling	Num				1, 3, 5	Score for percentage clingers
sc_ptany	Num				1, 3, 5	Score for percentage Tanytarsini
sc_pscrape	Num				1, 3, 5	Score for percentage scrapers
sc_pswim	Num				1, 3, 5	Score for percentage swimmers
sc_pdipt	Num				1, 3, 5	Score for percentage Diptera

4.9.1 TAXONOMIC RICHNESS (ntaxa, nept, nephem)

Taxonomic richness metrics are counts of the distinct number of taxa within selected taxonomic groups. Total taxa (ntaxa), EPT taxa (nept), and Ephemeroptera (nephem) are broadly used metrics that provide information on the overall taxonomic diversity.

4.9.2 TAXONOMIC COMPOSITION (pephem, pchiron, ptany, pdipt)

These metrics are based on the proportion of individuals in a sample belonging to a specified taxonomic group relative to all individuals. Specifically, these metrics describe the percentage of Ephemeroptera (pephem), Chironomidae (pchiron), Tanytarsini (ptany), and Diptera (pdipt).

4.9.3 TOLERANCE/INTOLERANCE (pintol_urb)

The tolerance of a taxon is based on its ability to survive short- and long-term exposure to physiochemical stressors that result from chemical pollution, hydrologic alteration, or habitat degradation. Tolerance values range from 0 to 10. Taxa with the greatest sensitivity (least tolerance) to stressors have tolerance values of 0, and taxa with the least sensitivity (most tolerance) have tolerance values of 10. Criteria for determining tolerance values are described in Stribling et al. (1998) and Bressler et al (2004).

4.9.4 TROPHIC FEEDING HABITS (nscrape, pscrape)

These metrics are based on the dominant mode of feeding. Specifically, the number and percentage of taxa that feed by scraping are identified. Scrapers are those organisms that remove periphyton or other algal material and the associated microbes from substrates.

4.9.5 HABITAT (pclimb, pcling, pswim)

These metrics describe the organisms' dominant habitat, according to their locomotion or behavior in relation to their habitat. Climbers live on the surface of living plant material or organic detritus. Clingers have morphological or behavioral adaptations that allow them to avoid or withstand the hydraulic forces of stream riffles or other fast-flowing zones. Swimmers are adapted for locomotion in the open water column.

4.9.6 STRATUM (BIBIStrata)

Calculation of the Benthic Index of Biotic Integrity requires knowledge of the physiographic stratum in which each site is located. The three strata are: Coastal, Eastern Piedmont (Epiedmont), and Highland.

4.9.7 FINAL BIBI SCORE (bibi_05)

Final calculated Benthic Index of Biotic Integrity score. BIBI values range from 1 to 5. Site scores <3 are considered "Poor", 3-4 are considered "Fair", and scores >4 are considered "Good". See Southerland et al. (2005) for a more detailed explanation of IBI development.

4.10 FishList

Fish collected by electrofishing from sample sites

Table 17. Fish species variables available with MBSS data

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char					Site identification
FishTaxa	Char				See Appendix E	Species name (common)
Total	Num					Total abundance

4.10.1 TAXONOMIC IDENTIFICATION (FishTaxa)

Species names are given as common names, as listed in Appendix E

4.11 FIBI

Fish Index of Biotic Integrity (FIBI) metrics and scores. Please note that the narratives in the "Definition" column refer to variables used to calculate FIBI metrics. See Southerland et al. 2005 for detailed descriptions of MBSS FIBI metrics.

Table 18. Fish metrics and FIBI scores for MBSS sites

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char					Site identification
FIBISTRATA	Char				Coastal, Epiedmont, Highland, Cold	Fish IBI strata
ACREAGE	Num					Catchment area (acres)
LOGACRES	Num					Log (base 10) of catchment area
LEN_SAMP	Num					Length of reach sampled (m)
STRMAREA	Num					Stream area in square meters (calculated from length sampled times average stream width)
TOTCNT	Num					Total number of fish collected
ABUNSQM	Num					Fish abundance per square meter
SC_ABUNSQM	Num				1, 3, 5	Score for abundance per square meter

ABDOM	Num					Abundance of dominant taxa
PABDOM	Num				0-100	Percentage abundance of dominant taxa
SC_PABDOM	Num				1, 3, 5	Score for percentage abundance of dominant taxa
TOTBIOM	Num					Total biomass (g)
BIOM_MSQ	Num					Biomass per square meter
SC_BIOM_MSQ	Num				1, 3, 5	Score for biomass per square meter
NUMBENTSP	Num					Number of benthic species
NUMBENTSPA	Num					Number of benthic species adjusted for catchment area
SC_NUMBENTSPA	Num				1, 3, 5	Score for number of benthic species adjusted for catchment area
NUMBROOK	Num					Number of brook trout
PBROOK	Num				0-100	Percentage brook trout
SC_PCBROOK	Num				1, 3, 5	Score for percentage brook trout
NUMGEOMIV	Num					Number of generalist, omnivorous, and insectivorous species
PGEOMIV	Num				0-100	Percentage generalist, omnivorous, and insectivorous species
SC_PGEOMIV	Num				1, 3, 5	Score for percentage number of generalist, omnivorous, and insectivorous species
NUMIS	Num					Number of insectivores
P_IS	Num				0-100	Percentage insectivores
SC_P_IS	Num				1, 3, 5	Score for percentage number of insectivores
NUMLITH	Num					Number lithophilic spawners
P_LITH	Num				0-100	Percentage lithophilic spawners
SC_P_LITH	Num				1, 3, 5	Score for percentage lithophilic spawners
NUMROUND	Num					Number of round-bodied suckers
PROUND	Num				0-100	Percentage of round-bodied suckers
SC_PROUND	Num				1, 3, 5	Score for percentage of round-bodied suckers
NUMSCULP	Num					Number of sculpins
PSCULP	Num				0-100	Percentage sculpins
SC_PSCULP	Num				1, 3, 5	Score for percentage sculpins
NUMTOL	Num					Number of tolerant individuals
PTOL	Num				0-100	Percentage tolerant individuals
SC_PTOL	Num				1, 3, 5	Score for percentage tolerant individuals
FIBI_05	Num				1-5	Final calculated fish index of biotic integrity (2005)

4.11.1 FISH ABUNDANCE AND CONDITION (ABUNSQM, BIOM_MSQ)

Two fish abundance metrics were used in calculating the Fish Index of Biotic Integrity: abundance per square meter of stream sampled and biomass per square meter of stream sampled.

4.11.2 SPECIES RICHNESS AND COMPOSITION (NUMBENTSP, NUMBENTSPA, PROUND, PBROOK, PSCULP)

Several measures of species richness and composition re provided, including the number of benthic species (both unadjusted and adjusted for catchment area), percentage or round-bodied suckers, percentage of brook trout, and percentage sculpins.

4.11.3 INDICATOR SPECIES (PABDOM, PTOL)
Two metrics indicating the presence of indicator species (i.e., species that are particularly tolerant or intolerant of short- and long-term exposure to physiochemical stressors that result from chemical pollution, hydrologic alteration, or habitat degradation) are presented: percentage of dominant taxa and percentage of tolerant taxa.

4.11.4 TROPHIC COMPOSITION (PGEOMIV, P_IS)
Trophic composition metrics are based on the dominant feeding mode exhibited by the observed taxa. Generalists and omnivores are less sensitive to environmental stresses because they can more easily vary their diets. Insectivores have a more specialized diet, and may show lower tolerance to stressors. The percentage of generalist, omnivorous, and insectivorous species and the percentage of insectivores are presented.

4.11.5 REPRODUCTIVE FUNCTION (P_LITH)
The percentage of lithophilic spawners refers to the percentage of individual fish that spawn in gravel. These fish are sensitive to siltation, which results from development and excessive erosion.

4.11.6 NORMALIZING VARIABLES (TOTCNT, STRMAREA, ACREAGE, LOGACRES)
Several variables are required to calculate some of the metrics presented above. Total count of fish (TOTCNT) is required to estimate abundances; stream area (STRMAREA) is used to calculate abundance per square meter and biomass per square meter; and catchment area (ACREAGE) is used to adjust the number of benthic species for catchment area.

4.11.7 STRATUM (FIBISTRATA)
Calculation of the Fish Index of Biotic Integrity requires knowledge of the physiographic stratum in which each site is located. The four strata are: Coastal, Eastern Piedmont (Epiedmont), Highland, and Cold.

4.11.8 FINAL FIBI SCORE (FIBI_05)
Final calculated Fish Index of Biotic Integrity score. FIBI values range from 1 to 5. Site scores <3 are considered "Poor", 3-4 are considered "Fair", and scores >4 are considered "Good". See Southerland et al. (2005) for a more detailed explanation of IBI development.

4.12 ExoticPlants
Exotic plants observed in or near sample sites

Table 19. Exotic plant variables available with MBSS data

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char	n/a				Site identification
PlantTaxa	Char	n/a			See Appendix B	Species name (common)
Abundvalue	Char	n/a			P – Present E – Extensive	Relative abundance

4.12.1 TAXONOMIC IDENTIFICATION (PlantTaxa)
Species names are given as common names, as listed in Appendix B.

4.13 HerpList
Amphibians and reptiles observed near sample sites

Table 20. Herpetofauna variables available with MBSS data

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char					Site identification
HerpTaxa	Char				See Appendix D	Species name (common)
HerpAdultObs	Char	n/a	n/a		Y, N	Adult herpetofauna observed
HerpJuvObs	Char	n/a	n/a		Y, N	Juvenile herpetofauna observed

HerpLarvaObs	Char	n/a	n/a		Y, N	Larval herpetofauna observed
HerpEggObs	Char	n/a	n/a		Y, N	Herpetofauna eggs observed
HerpSeen	Char				Y, N	Herpetofauna visually observed
HerpHeard	Char				Y, N	Herpetofauna heard
HerpRetained	Char				Y, N	Herpetofauna retained
NumHerpRetained	Num					Number of herpetofauna retained
HerpSeason	Char				Spring, summer, vernal pool, stream salamander	Season when herpetofauna was observed
HerpComment	Char					Herpetofauna comments

4.13.1 TAXONOMIC IDENTIFICATION (HerpTaxa)
Species names are given as common names, as listed in Appendix D.

4.13.2 HERPETOFAUNA OBSERVATIONS
For Round 3 herpetofauna data, the life stage of the individual was recorded as either adult, juvenile, larval, or egg. The observations were indicated with "Y" or "N".

4.14 Crayfish
Crayfish observed near sample sites

Table 21. Crayfish variables available with MBSS data

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char					Site identification
OLDSITE	Char					Name of old site
STREAM	Char					Stream name
SITE	Char					Brief site description
YEAR	Num					Year sampled
NORTHING	Num					Maryland plane coordinate (NAD83)
EASTING	Num					Maryland plane coordinate (NAD83)
COLLECTOR	Char					Name of collector
PROJECT	Char					Name of crayfish project
CRAYFISH_TAXA	Char				See Appendix C	Species name (scientific)

4.14.1 TAXONOMIC IDENTIFICATION (CRAYFISH_TAXA)
Species names are given as scientific names, as listed in Appendix C.

4.15 CrayfishAbundance
Crayfish abundance values from sample site reaches

Table 22. Crayfish abundance variables available with MBSS data

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char	n/a	n/a			Site identification
Year	Num	n/a	n/a			Year sampled
CrayfishTaxa	Char	n/a	n/a		See Appendix C	Species name (scientific)
NumPass1	Num	n/a	n/a			Number crayfish collected from first electrofishing pass
NumPass2	Num	n/a	n/a			Number of crayfish collected from second electrofishing pass

NUM_TOTAL	Num	n/a	n/a			Total number of crayfish collected by electrofishing
CrayfishRetained	Num	n/a	n/a			Number of crayfish retained

4.15.1 TAXONOMIC IDENTIFICATION (CrayfishTaxa)

Species names are given as scientific names, as listed in Appendix C.

4.16 StreamSalamanders

Abundance values for stream salamanders collected from sample sites

Table 23. Stream salamander variables available with MBSS data

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char	n/a	n/a			Site identification
YEAR	Num	n/a	n/a			Year sampled
HerpTaxa	Char	n/a	n/a		See Appendix D	Species name (common)
Lifestage	Char	n/a	n/a		A - Adult L - Larval	Lifestage
ElectrofishingCatch	Num	n/a	n/a			Number of salamanders collected during stream electrofishing
GeneralCatch	Num	n/a	n/a			Number of salamanders collected from general search of area
TransectCatch	Num	n/a	n/a			Number of salamanders collected from downstream 25 m transect
NumRetained	Num	n/a	n/a			Number of salamanders retained
HerpSeason	Char	n/a	n/a		Stream Salamander	Period salamanders were collected
HerpComment	Char	n/a	n/a			Stream salamanders comments

4.16.1 TAXONIMIC IDENTIFICATION (HerpTaxa)

Species names are given as common names, as listed in Appendix D.

4.16.2 STAGE OF LIFE (Lifestage)

Life stage of salamanders collected, adult (A) or larval (L).

4.16.3 METHOD OF COLLECTION (ElectrofishingCatch, GeneralCatch, TransectCatch)

Number of salamanders collected from stream electrofishing, general search, and downstream 25m transect search.

4.17 MusselList

Freshwater mussels observed in sample site reaches

Table 24. Mussel variables available with MBSS data

Field Name	Data Type	Round 1 Data Notes	Round 2 Data Notes	Round 3 Data Notes	Defined Value List	Definition
SITEYR	Char					Site identification
MusselTaxa	Char				See Appendix A	Species name (scientific)
Observation	Char				Y, N	Mussels observed at the site
Condition	Char				L – Living D – Dead	Condition of mussels collected from site
MusselsRetained	Char					Mussels retained from the site

4.17.1 TAXONOMIC IDENTIFICATION (MusselTaxa)
Species names are given as scientific names, as listed in Appendix A

4.17.2 MUSSEL CONDITION (Condition)
Condition of mussels collected from sample reaches, living (L) or dead (D).

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