MBSS Data Download Tool:
Data Guide

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Department of Natural Resources
Resource Assessment Service

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Introduction and Overview

Data Guide

This guide provides a general overview of the data available through the Maryland Biological Stream Survey (MBSS) Data Downloader Tool. This guide provides a general overview of each table that can be downloaded, and presents detailed descriptions of the fields comprising them. For additional details on MBSS field, lab, and analytical protocols, see the MBSS Sampling Manual (Harbold et al. 2024), Benthic Laboratory Standard Operating Procedures (Resource Assessment Service 2024), and other supporting documents (see Literature Cited section).

Maryland Biological Stream Survey (MBSS)

The Maryland Department of Natural Resources' (MD DNR) Monitoring and Non-Tidal Assessment Division (MANTA) maintains data on the condition of the State's freshwater non-tidal streams and rivers.

Since the mid-1990s, the Maryland Biological Stream Survey (MBSS) has monitored and assessed the ecological condition of the State's non-tidal streams and rivers. Primary indicators include fish and benthic macroinvertebrate assemblages. The MBSS also collects information on stream water chemistry, physical habitat conditions, riparian zone characteristics, and other ancillary data that contribute to our understanding of stream conditions.

These data are used by many state and federal agencies to support stream management decisions. An example is Maryland's Integrated Report of Surface Water Quality (https://mde.maryland.gov/programs/water/tmdl/integrated303dreports/pages/index.aspx). The quality, usefulness, and availability of these data are also exemplified by their use in a large number of peer-reviewed scientific publications.

MBSS Data Collection

MBSS data are collected using the standard methods documented in the MBSS Sampling Manual (Harbold et al. 2024). Sampling during spring and summer was conducted within specific time intervals, referred to as index periods. The Spring Index Period extends from 1 March to 30 April, and the Summer Index Period extends from 1 June to 30 September each year.

MBSS data are collected annually from sampleable sites from a list generated prior to the sampling season. Some sites are selected randomly to assess spatial and temporal trends in stream condition, others are sampled annually as a part of the Sentinel Site Network due to their superior ecological quality, and some sites correspond to specific projects.

Randomly Selected Sites

In order to partition sampling effort among Maryland's streams in a statistically sound manner that facilitates comparability among years, sampling of random sites was completed within distinct timeframes, referred to as Rounds.

MBSS Rounds

- **Round 1** 1995-1997
- **Round 2** 2000-2004
- **Round 3** 2007-2009
- **Round 4** 2014-2018
- **Round 5** 2021-present

Round 1 (1995 – 1997) provided Maryland's first statewide assessment of non-tidal stream ecological conditions. The information from Rounds 1 and 2 (2000-2004) was also useful in identifying many of the most pervasive stressors and providing a preliminary inventory of Maryland's stream biodiversity. A combination of targeted and randomly-selected sites were sampled during Round 3 (2007-2009). During Round 4 (2014-2018), a subset of randomly-selected sites

were revisited from sites that were previously sampled during either Round 1 or Round 2, to allow for comparisons over the intervening 20- or 14-year periods.

Some types of data and how they were collected varied between rounds. These changes reflect refinements and improvements to the MBSS protocols based on experience and need.

Sentinel Site Network

Superior-quality sites have been selected to receive annual monitoring as part of Maryland's Sentinel Site Network. From one year to the next, the site code assigned to each sample is consistent, aside from the year component (e.g., JONE-315-S-2000, JONE-315-S-2001, JONE-315-S-2002, etc.).

Sentinel Sites were initially selected from among randomly-selected MBSS sites or sites that were targeted for a specific project. To facilitate ease of querying the database, the data from such samples were duplicated in all tables. For example, JONE-315-S was initially sampled as BA-P-077-315-96; thus, all of the data corresponding to the record labeled JONE-315-S-1996 represents the same sampling event as BA-P-077-315-96, and the data corresponding to both records are identical.

Targeted Sites

Certain sites were selected for sampling as part of specific projects. Some of these targeted sites did not include the full suite of components typically employed via MBSS protocols.

Data Downloader Tool and Data Requests

The MBSS Data Downloader Tool may be used to download any of the data described within this manual. These represent the most frequently accessed MBSS data. The MBSS Data Downloader Tool enables users to rapidly obtain formatted datasets for sites of interest.

Users may obtain additional data by filing a data request on the MBSS Data Request webpage (https://dnr.maryland.gov/streams/Pages/dataRequest.aspx). Staff at MD DNR will query the database for the requested variables and deliver these data to the user as an Excel file. Because data queries must be individually customized, requests may require up to 30 days to be filled outside of the index periods but may take up to 60 days to complete while staff are sampling during the index periods. Please note that rare, threatened, endangered, and vulnerable aquatic species have been removed from the publicly available data set.

Data Terms of Use

•The data user agrees not to release or distribute the raw data in any form to any third party, without approval from the Maryland Department of Natural Resources (MD DNR). Data provided by MD DNR Monitoring and Non-tidal Assessment Division (MANTA) are intended only for the project outlined in this data request. Please inform MD DNR if you want to use this data for additional projects.

•Documents or presentations incorporating MD DNR MANTA data and data products should include explicit reference to the source as follows: "Data included in this document were provided by the Maryland Department of Natural Resources Monitoring and Non-tidal Assessment Division."

•These data can be cited using the following format:

Maryland Department of Natural Resources. (Year data received). Maryland Biological Stream Survey Database.

•The data user agrees to provide MD DNR MANTA with a list of any reports, manuscripts, published papers, or other printed materials prepared using MD DNR MANTA data, and also provide a copy of such material if requested by MD DNR MANTA.

•Although MD DNR MANTA maintains high standards of data quality control, MD DNR MANTA makes no warranty as to the suitability of our data for the data user's intended use, nor that the data are complete and free of errors and advises that the data user takes this into consideration when making any decisions, management or otherwise, based on these data.

Maryland Biological Stream Survey Data

Table Name	Description
Standard Survey Information	These data are included with every downloaded dataset as fields preceding the user-selected data. This standard information includes a unique identification code for each survey site and fields describing when and where the sample was taken.
General Site Information	This table includes information about each MBSS site, including watershed codes, BIBI and FIBI strata, and which parameters may be available for download.
Habitat	The Habitat table contains data pertaining to the physical habitat observed at the site during both the Spring and Summer index periods. Data collection was conducted following the protocols set forth in the MBSS Sampling Manual.
Water Chemistry	The Water Chemistry table contains data pertaining to water samples that were collected from sites concurrent with benthic macroinvertebrate sampling during the spring data collection period. Water quality samples were analyzed by UMCES - Appalachian Lab using the protocols specified in the annual QAPP (UMCES-AL 2022).
Fish Index of Biotic Integrity (FIBI)	This table details the values that were used to calculate Maryland's Fish Index of Biotic Integrity (FIBI) score for each sample. The FIBI score corresponding to a particular sample is generated using the electrofishing sample composition documented on the FishTaxa table. The suite of metrics used to calculate a FIBI score depends upon the physical location of a site within one of four geographic strata in Maryland. Further details for calculating FIBI scores are given in Southerland et al. 2005.
Benthic Index of Biotic Integrity (BIBI)	This table details the values that were used to calculate Maryland's Benthic Index of Biotic Integrity (BIBI) score for each sample. BIBI scores were generated using the sampled benthic macroinvertebrates listed in the Benthic Macroinvertebrate Taxa table and calculated as described in Southerland et al. 2005.
Benthic Macroinvertebrate Taxa	This table summarizes the laboratory subsampling and identification of benthic samples collected at MBSS sites.
Fish Taxa	This table lists all fish collected for each sampling event and their abundances.

1. Standard Survey Information

These sample-level variables are included with every downloaded dataset as fields preceding the user-selected data. This standard information includes a unique identification code for each sample and fields describing when and where the sample was taken.

Field Name	Definition
SiteYr	Sample identification
Year	Calendar year corresponding to the sampling event date
StreamName	Name of waterbody that was sampled
SampleDate_Spr	The date that sampling occurred during the spring
SampleDate_Sum	The date that sampling occurred during the summer
Latitude	Latitude
Longitude	Longitude
CountyCode	Two-letter county abbreviation
CountyName	County name

1.1. SiteYr

Within each sampling year, each 75-m sample segment is identified by a unique identification code. The variable SiteYr is used in each of the MBSS data sets to identify specific samples.

For Round 1 data, collected 1995-1997, site identifiers consist of 15-character codes, separated by dashes into 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 (Strahler 1957). For example, the 1995 site CH-S-062-314-95 is located on a stream reach in Charles County (CH), within the Southern Coastal Plain physiographic province (S) and stream reach 062. The segment code 314 is a unique identifier for this site within the basin and also signifies the site is located on a third order stream.

Beginning in 2000, all site identifiers consist of 15-character codes with four parts:
SHED - SEGMENT - TYPE - YEAR.

The 4-letter watershed (SHED) code is typically an abbreviation of the MDE 8 digit watershed name. The 3-digit SEGMENT code is the combination of the 1-digit stream order (Strahler 1957), followed by a 2-digit number for that site that is unique for the basin and year. The one-character TYPE code represents the site type: randomly selected sites are indicated by an ‘R,’ sentinel sites are indicated by an ‘S,’ and targeted sites are typically indicated by an ‘X’; several other TYPE codes have been used sporadically over time in conjunction with additional projects and protocol variations. Finally, the four digit YEAR represents the year that the sample was obtained.

1.2. Year

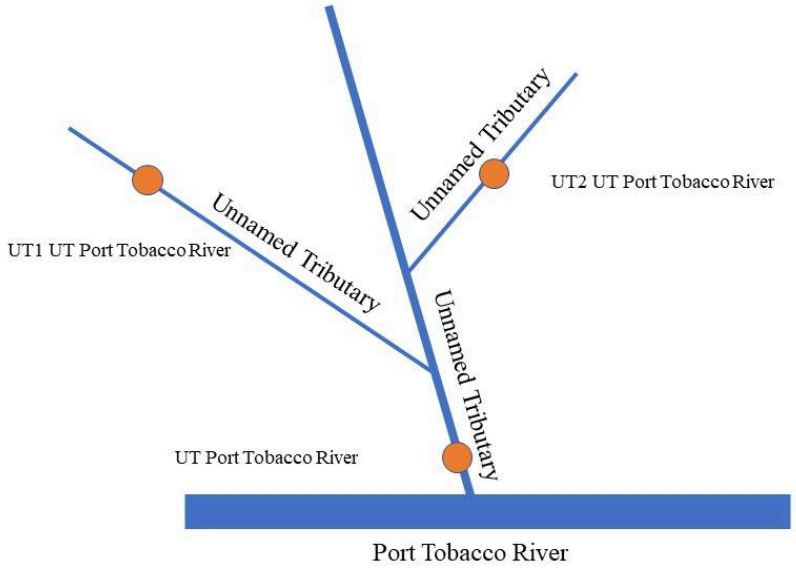
The four-digit calendar year that corresponding data were collected.

1.3. StreamName

This field lists the name of the waterbody that contains the site.

Unnamed tributaries were named using the prefix "UT," followed by the name of the nearest downstream waterbody with a name (e.g., an unnamed tributary to Big Pipe Creek would have the name "UT BIG PIPE CREEK"). If two or more tributaries to the same waterbody were sampled during the same year, a numeral was added to the prefix (e.g., two unnamed tributaries to Little Gunpowder Falls would have the names "UT1 LITTLE GUNPOWDER FALLS" and "UT2 LITTLE GUNPOWDER FALLS"). If the sampled waterbody was an unnamed tributary to another unnamed tributary, the "UT" prefix is repeated, as necessary, followed by the name of the closest downstream waterbody (e.g., an unnamed tributary to an unnamed tributary to Port Tobacco River would be named "UT UT PORT TOBACCO RIVER"). If two or more tributaries to the same unnamed tributary were sampled during the same year, numerals were assigned as needed (e.g., two unnamed tributaries to an unnamed tributary to Port Tobacco Creek would be named "UT1 UT PORT TOBACCO RIVER" and "UT2 UT PORT TOBACCO RIVER"). Similarly, if a tributary to one of two different unnamed tributaries sampled during the same year was sampled, numerals were assigned as needed (e.g., unnamed tributary to one of two unnamed tributaries [UT2] to Deep Run would be named "UT UT2 DEEP RUN").

Stream Naming Conventions for Sites on Unnamed Tributaries, pre-2007



1.4. Sampling Dates (SampleDate_Spr, SampleDate_Sum)

The dates that sampling occurred during the spring (SampleDate_Spr) and summer (SampleDate_Sum) index periods. If sampling did not occur at a site during the specified index period, the corresponding sample date is blank.

1.5. Latitude, Longitude

The midpoint of the sample site is located using the Latitude and Longitude, in positive decimal degrees and the NAD_1983_StatePlane_Maryland_FIPS_1900 projection.

1.6. CountyName, CountyCode

These fields specify the name and corresponding 2-letter code of the county where the site is located.

2. General Site Information

This table includes site-level information about each MBSS site, including watershed codes, BIBI and FIBI strata, and sampleability of parameters that may be available for download.

Field Name	Data Type	Definition
MDE6Name	Short Text	6-digit watershed code name
MDE6Digit	Short Text	6-digit watershed code
MDE8Name	Short Text	8-digit watershed code name
MDE8Digit	Short Text	8-digit watershed code
DNR12DIG	Short Text	12-digit watershed code
BIBIStrata	Short Text	Stratum designation for Maryland's Benthic Index of Biotic Integrity (BIBI)
FIBIStrata	Short Text	Stratum designation for Maryland's Fish Index of Biotic Integrity (FIBI)
SAMP_BEN	Short Text	Sampleability for benthic macroinvertebrates during the spring index period
SAMP_HAB	Short Text	Sampleability for physical habitat during the spring index period
SAMP_WQT	Short Text	Sampleability for water quality during the spring index period
SAMPELEC	Short Text	Sampleability for electrofishing during the summer index period
SAMPHAB	Short Text	Sampleability for physical habitat during the summer index period

2.1. MDE6Digit, MDE6Name

The MDE6Digit code identifies the watershed where the site is located. This 6-digit code is assigned to each watershed by the Maryland Department of the Environment (MDE) and MD DNR. These are generally broad-area watersheds that drain to major rivers and tributaries. This delineation breaks the state into 21 watersheds or basins. The names are also given in the MDE6Name field. The associated shapefiles are available at: https://www.arcgis.com/home/item.html?id=cc62868c3fb348338808809859f7a69f

2.2. MDE8Digit, MDE8Name

The MDE8Digit code identifies the watershed where the site is located. This 8-digit code is assigned to each watershed by MDE and MD DNR. There are 138 of these state-designated watersheds in Maryland. The names are also given in the MDE8Name field. The associated shapefiles are available at: https://data-maryland.opendata.arcgis.com/datasets/maryland::maryland-watersheds-8-digit-watersheds/explore

2.3. DNR12Digit

This code identifies the watershed where the site is located. This 12-digit code is assigned to each watershed by MDE and MD DNR. This fine-scale delineation divides the state into more than 1,100 watersheds. The associated shapefiles are available at: https://data-maryland.opendata.arcgis.com/datasets/maryland::maryland-watersheds-12-digit-watersheds/explore

2.4. BIBIStrata

Calculation of the Benthic Index of Biotic Integrity requires knowledge of the physiographic stratum in which each site is located. The strata used for benthic IBI calculations are: Coastal, Eastern Piedmont (Epiedmont), and Highland (Southerland et al. 2005). The GIS layer depicting these strata is available: https://data.imap.maryland.gov/datasets/maryland::maryland-biological-stream-survey-ibi-strata/about

2.5. FIBIStrata

Calculation of Maryland's 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 (Southerland et al. 2005).

2.6. Parameter Sampleability (SAMP_BEN, SAMP_HAB, SAMP_WQT, SAMPELEC, SAMPHAB)

During the spring index period, the sampleability of the following parameters was recorded as "S" if the parameter was sampleable: benthic macroinvertebrates (SAMP_BEN), physical habitat (SAMP_HAB), water quality (SAMP_WQT).

During the summer index period, the sampleability of the following parameters was recorded as "S" if the parameter was sampleable: fish (SAMPELEC), physical habitat (SAMPHAB).

During both index periods, any parameters that were not sampleable were indicated as such using a numerical sampleability code.

If a parameter was not attempted, no records appear in the corresponding table. For example, if electrofishing was not attempted, no corresponding records for that SiteYr appear in the FishList table. Any variables that were not sampled are left blank (null).

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

In tables that accumulate portions of data collected across both spring and summer index periods or by using different methodologies, only the data that were actually collected are presented. For example, if habitat was sampled in the spring but not summer, the Habitat table would have data corresponding to the spring sampling season only, whereas fields corresponding to the summer sampling season would be blank.

3. Habitat

The Habitat table contains data pertaining to the physical habitat observed during both the Spring and Summer index periods. Data collection was conducted following the protocols set forth in the MBSS sampling manual.

Field Name	Data Type	Index Period	Rounds	Defined Values	Definition
ACREAGE	Double				Catchment area (acres)
INSTRHAB	Integer	Summer		0-20	Instream habitat structure
EPI_SUB	Integer	Summer		0-20	Epifaunal substrate
VEL_DPTH	Integer	Summer		0-20	Velocity/depth diversity
POOLQUAL	Integer	Summer		0-20	Pool/glide/eddy quality
EXPOOL	Double	Summer			Extent of pool or glide (m)
RIFFQUAL	Integer	Summer		0-20	Riffle/run quality
EXRIFFRUN	Double	Summer			Extent of riffle or run (m)
SHADING	Double	Summer		0-100	Shading (%)
EMBEDDED	Double	Summer		0-100	Embeddedness (%)
CHANNEL	Short Text	Spring	1-4	Y, N	Evidence of channel straightening or dredging
CONCRETE	Short Text	Spring	1-4	Y, N	Presence of concrete/gabion
EFF_DIS	Short Text	Spring	1	Y, N	Presence of effluent discharge
BEAVPND	Short Text	Spring	1	Y, N	Presence of beaver pond
			2-4	A, P, E	
CHAN_ALT	Integer	Spring		0-20	Channel alteration
REMOTE	Integer	Spring		0-20	Remoteness score
DIST_RD	Double	Spring			Distance to nearest road (m)
AESTHET	Integer	Spring		0-20	Trash rating
WOOD_DEB	Integer	Summer			Number of woody debris
NUMROOT	Integer	Summer			Number of rootwads
RIP_WID	Double	Spring	1-4	0-50	Riparian buffer width (m)
RIP_WID_L	Double	Spring	2-4	0-50	Riparian buffer width, left bank (m)
RIP_WID_R	Double	Spring	2-4	0-50	Riparian buffer width, right bank (m)
ADJ_COVR	Short Text	Spring	1	Land cover code	Adjacent land cover type
AdjCoverL	Short Text	Spring	2-4	Land cover code	Adjacent land cover type, left bank
AdjCoverR	Short Text	Spring	2-4	Land cover code	Adjacent land cover type, right bank
MAXDEPTH	Double	Summer			Maximum depth in sample reach (cm)
AVGWID	Double	Summer			Average wetted width (m)
AVGTHAL	Double	Summer			Average thalweg depth (cm)
AVG_VEL	Double	Summer			Average velocity (m/s)
BAR_FORM	Integer	Summer		0-3	Bar formation
COB_BAR	Short Text	Summer		Y, N	Cobble bar substrate present
GRAV_BAR	Short Text	Summer		Y, N	Gravel bar substrate present
SAND_BAR	Short Text	Summer		Y, N	Sand bar substrate present
SC_BAR	Short Text	Summer		Y, N	Silt/clay bar substrate present
BRAIDED	Short Text	Summer		A, P, E	Presence of stream braiding
RIFFLE	Short Text	Summer		A, P, E	Presence of stream riffles
RUNGLIDE	Short Text	Summer		A, P, E	Presence of runs and glides
DEEPOOL	Short Text	Summer		A, P, E	Presence of deep pools
SHALPOOL	Short Text	Summer		A, P, E	Presence of shallow pools
LRGBOULD	Short Text	Summer		A, P, E	Presence of large boulders
SMLBOULD	Short Text	Summer		A, P, E	Presence of small boulders
COBBLE	Short Text	Summer		A, P, E	Presence of cobble

BEDROCK	Short Text	Summer		A, P, E	Presence of bedrock
GRAVEL	Short Text	Summer		A, P, E	Presence of gravel
SAND	Short Text	Summer		A, P, E	Presence of sand
SILTCLAY	Short Text	Summer		A, P, E	Presence of silt/clay
UNDERCUT	Short Text	Summer		A, P, E	Presence of undercut
OH_COVER	Short Text	Summer		A, P, E	Presence of overhead cover
OldFieldObs	Short Text	Spring		Y, N	Old field observed from site
DecidForestObs	Short Text	Spring		Y, N	Deciduous forest observed
ConifForestObs	Short Text	Spring		Y, N	Coniferous forest observed
WetlandObs	Short Text	Spring		Y, N	Wetland observed from site
CroplandObs	Short Text	Spring		Y, N	Cropland observed from site
SurfaceMineObs	Short Text	Spring		Y, N	Surface mine observed from site
LandfillObs	Short Text	Spring		Y, N	Landfill observed from site
ResidentialObs	Short Text	Spring		Y, N	Residential observed from site
CommIndObs	Short Text	Spring		Y, N	Commercial/industrial observed
GolfcourseObs	Short Text	Spring		Y, N	Golf course observed from site
PastureObs	Short Text	Spring		Y, N	Pasture observed from site
OrchVineObs	Short Text	Spring		Y, N	Orchard/vineyard observed from site
VegType1L	Short Text	Spring		Veg. code	Primary buffer veg. type, left bank
VegType1R	Short Text	Spring		Veg. code	Primary buffer veg. type, right bank
VegType2L	Short Text	Spring		Veg. code	Secondary buffer vegetation type, left bank
VegType2R	Short Text	Spring		Veg. code	Secondary buffer vegetation type, right bank
VegType3L	Short Text	Spring		Veg. code	Tertiary buffer vegetation type, left bank
VegType3R	Short Text	Spring		Veg. code	Tertiary buffer vegetation type, right bank
VegType4L	Short Text	Spring		Veg. code	Quaternary buffer vegetation type, left bank
VegType4R	Short Text	Spring		Veg. code	Quaternary buffer vegetation type, right bank
RipBufferBreakL	Short Text	Spring		Y, N	Buffer break present, left bank
RipBufferBreakR	Short Text	Spring		Y, N	Buffer break present, right bank
ErodedExtentL	Integer	Summer			Extent of erosion along left bank (m)
ErodedExtentR	Integer	Summer			Extent of erosion along right bank (m)
ErosionSeverityL	Integer	Summer		0-3	Erosion severity along left bank
ErosionSeverityR	Integer	Summer		0-3	Erosion severity along right bank
ErodedHeightL	Double	Summer			Average height of erosion on left bank (m)
ErodedHeightR	Double	Summer			Average height of erosion on right bank (m)
DischargeCFS	Double	Summer	1-4		Stream discharge (cfs)

3.1. Catchment area (ACREAGE)

Drainage area of each catchment in acres (ACREAGE).

3.2. Instream Habitat Score (INSTRHAB)

Instream habitat was rated based on perceived value of the habitat to the fish community. Higher scores were assigned to sites with a variety of habitats and particle sizes. In addition, higher scores were assigned to sites with a high degree of hypsographic complexity (uneven bottom). In streams where iron flocculant was present, instream habitat scores were not lowered unless the precipitate changed the gross physical nature of the substrate. Low scores were assigned to streams that contained favorable substrate types but experienced low flows that precluded fish from using the habitat. If none of the habitat within a segment was usable by fish, a score of zero was assigned. Scores range from 0 (poor) to 20 (optimal).

Score	Description
0-5	Less than 10% stable habitat. Lack of habitat is obvious.
6-10	10-30% mix of stable habitat. Habitat availability less than desirable.
11-15	30-50% mix of stable habitat. Adequate habitat.
16-20	Greater than 50% of a variety of cobble, boulder, submerged logs, undercut banks, snags, root wads, aquatic plants, or other stable habitat

3.3. Epifaunal Substrate Score (EPI_SUB)

Epifaunal substrate was rated based on the amount and variety of hard, stable substrates usable by benthic macroinvertebrates. Because they inhibit colonization, flocculent materials or fine sediments surrounding otherwise good substrates were assigned low scores. Scores were also reduced when substrates were less stable. Scores range from 0 (poor) to 20 (optimal).

Score	Description
0-5	Stable substrate lacking or particles surrounded by > 75% fine sediment or flocculent material.
6-10	Large boulders or bedrock prevalent; cobble, woody debris, or other preferred surfaces uncommon.
11-15	Abundance of cobble with gravel or boulders common; or woody debris, aquatic veg., under-cut banks, or other productive surfaces common but not prevalent or suited for full colonization.
16-20	Preferred substrate abundant, stable, and at full colonization potential (riffles well-developed and dominated by cobble; stable woody debris prevalent.

3.4. Velocity-and-Depth Diversity Score (VEL_DPTH)

Velocity depth and diversity was scored based on the variety of velocity/depth regimes present at the site: slow-shallow (<0.3 m/s, <0.5 m), slow-deep (<0.3 m/s, ≥0.5 m), fast-shallow (≥0.3m/s, <0.5 m), and fast-deep (≥0.3m/s, ≥0.5 m). Scores range from 0 (poor) to 20 (optimal).

Score	Description
0-5	Dominated by 1 velocity/depth category (usually pools).
6-10	Only 2 of the 4 habitat categories present.
11-15	Only 3 of the 4 habitat categories present.
16-20	Slow (<0.3 m/s), deep (≥0.5 m); slow, shallow (<0.5 m); fast (≥0.3 m/s), deep; fast, shallow habitats all present

3.5. Pool Quality Score and Extent (POOLQUAL, EXPOOL)

Pool quality (POOLQUAL) was based on the variety and special complexity of slow- or still-water habitat within the sample segment. It should be noted that even in high-gradient segments, functionally important slow-water habitat may exist in the form of larger eddies. Within a category, higher scores were assigned to segments that had undercut banks, woody debris or other types of cover for fish. Scores range from 1 (poor) to 20 (optimal) and a score of 0 was assigned if this habitat type is entirely absent. The linear extent of the pool-type habitat within the site segment (EXPOOL) was recorded in m. The combined extent of pool and riffle habitat may be more than 75 m if more than one channel was present or if both habitat types co-occurred along a perpendicular transect. The combined extent of pool and riffle habitat may be less than 75 m if part of the site was dewatered.

Score	Description
0-5	Max depth <0.2 m in pool/glide/eddy habitat; or absent completely
6-10	Shallows (<0.2 m) prevalent in pool/ glide/eddy habitat; little cover
11-15	Deep (≥0.5 m) areas present; but only moderate cover
16-20	Complex cover and/or depth ≥1.5m; both deep (≥ 0.5 m) and shallow (< 0.2 m) areas present.

3.6. Riffle Quality Score and Extent (RIFFQUAL, EXRIFRUN)

Riffle quality is based on the depth, complexity, and functional importance of riffle/run habitat present at the site, with highest scores assigned to segments dominated by deeper riffle/run areas, stable substrates, and a variety of current velocities. Scores range from 1 (poor) to 20 (optimal) and a score of 0 is assigned if this habitat type is entirely absent. The linear extent of the riffle/run habitat within the site segment is recorded in m. The combined extent of pool and riffle habitat may be more than 75 m if more than one channel is present or if both habitat types co-occur along a perpendicular transect. The combined extent of pool and riffle habitat may be less than 75 m if part of the site is dewatered.

Score	Description
0-5	Riffle/run depth < 1 cm; or riffle/run substrates concreted; or absent completely
6-10	Riffle/run depth generally 1-5 cm; primarily a single current velocity
11-15	Riffle/run depth generally 5-10 cm, variety of current velocities
16-20	Riffle/run depth generally >10 cm, with maximum depth greater than 50 cm (maximum score) substrate stable (e.g. cobble, boulder) & variety of current velocities

3.7. Percent of Channel Shaded (SHADING)

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.

3.8. Substrate Embeddedness (EMBEDDED)

The percentage of coarse riffle substrates surrounded by fine sediments and/or flocculent on the stream bottom.

3.9. CHANNEL

Evidence of stream channel modifications within the sampled site.

3.10. CONCRETE

Presence of concrete/gabion (Y/N) within the sampled site.

3.11. EFF_DIS

Presence of wastewater effluent discharge (Y/N) within the sampled site.

3.12. BEAVPND

Presence of a vegetation-based impoundment created by a resident beaver population.

3.13. Channel Alteration (CHAN_ALT)

Evidence of dredging, bank armoring, restoration, or other human activities intended to alter the shape or function of the stream channel.

3.14. Remoteness Score (REMOTE)

Remoteness scores the relative absence of human activity and the difficulty of accessing the site segment. This field was only recorded during Round 1 and at repeated sites in Round 4.

Score	Description
0-5	Site is immediately adjacent to a road with obvious human activities evident.
6-10	Site is within ¼ mile of road and accessible by trail and human activities are readily evident
11-15	Site is within ¼ mile of (but not immediately accessible by) the road and is accessed by trail and the site has moderately “wild” character
16-20	Site is more than ¼ mile from the nearest road, access difficult and little or no evidence of human activity

3.15. Distance from Road (DIST_RD)

For Rounds 2, 3, and 4, the distance to the nearest road was visually estimated and recorded in meters.

3.16. Aesthetic Score (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) and were recorded from Round 2 to present.

Score	Description
0-5	Refuse abundant and unsightly.
6-10	Refuse present in moderate amounts.
11-15	Refuse present in minor amounts.
16-20	Little or no human refuse visible from stream channel or riparian zone.

3.17. Woody Debris and Rootwads (WOOD_DEB, NUMROOT)

The number of pieces of woody debris (WOOD_DEB) and the number of rootwads (NUMROOT) at each site were recorded during the summer index period, and included those that were both instream and dewatered.

3.18. Riparian Buffer Width (RIP_WID, RIP_WID_L, RIP_WID_R)

The width of the vegetated riparian buffer was estimated in meters, to a maximum of 50 m. During Round 1, the average riparian width across both sides was estimated in the field and recorded as RIP_WID, unless a buffer break was observed, in which case it was assigned a zero. During Rounds 2-5, riparian width was independently estimated for the left (RIP_WID_L) and right (RIP_WID_R) sides of the stream, ascending, and RIP_WID was calculated as the average of the two sides unless a buffer break was observed, in which case it was assigned a zero.

3.19. Adjacent Land Cover (ADJ_COVR, AdjCoverL, AdjCoverR)

The dominant type of land cover immediately adjacent to the riparian buffer. During Round 1, the predominant adjacent land cover was recorded for the overall site (ADJ_COVR). During Rounds 2-5, predominant adjacent landcover was recorded independently for the left (AdjCoverL) and right (AdjCoverR) sides of the stream. Adjacent land cover was abbreviated using the following codes: CP=Cropland; DI=Dirt Road; EM=Emergent Vegetation; FR=Forest; GR=Gravel Road; HO=Housing; LN=Mowed Lawn; LO=Logged Area; OF=Old Field; OR=Orchard; PK=Parking/Industrial/Commercial; PV=Paved Road; PA=Pasture; RR=Railroad; SL=Bare Soil; TG=Tall Grass.

3.20. Maximum Depth (MAXDEPTH)

Maximum stream depth with the 75 m segment, recorded in centimeters.

3.21. Average Stream Width (AVGWID)

The wetted width of the stream, in meters, was measured along transects at the 0, 25, 50, and 75 m points of the sample segment. The average of these measures is reported in meters. In cases where the stream was dewatered at any or all of these points, the stream width was measured as 0 m and was incorporated into the average.

3.22. Average Thalweg Depth (AVGTHAL)

Thalweg depth, the deepest portion of the lateral transect of the stream, was measured in centimeters at the 0, 25, 50, 75 m points of the sample segment. The average of these measures is reported. In cases where the stream was dewatered at any or all of these points, the thalweg depth at dewatered points was measured as 0 cm and was incorporated into the average.

3.23. Average Velocity (AVG_VEL)

Thalweg velocity was measured with a flow meter, at 60% water depth, 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 meters per second. In cases where the stream was dewatered at any or all of these points, velocity at dewatered points was measured as 0 m/s and was incorporated into the average.

3.24. Bar Formation and Composition (BAR_FORM, COB_BAR, GRAV_BAR, SAND_BAR, SC_BAR)

Bar formation (BAR_FORM) is presented as 0 (absent), 1 (minor), 2 (moderate), or 3 (extensive). The presence (Y) or absence (N) of the dominant particle type(s) that make up the bars in the site is indicated for the following: cobble (COB_BAR), gravel (GRAV_BAR), sand (SAND_BAR), silt and/or clay (SC_BAR). More than one particle type can be present, however particles comprising only a minor part of the substrate are not indicated.

3.25. Stream Character (BRAIDED, RIFFLE, RUNGLIDE, DEEPOOL, SHALPOOL, LRGBOULD, SMLBOULD, COBBLE, BEDROCK, GRAVEL, SAND, SILTCLAY, UNDERCUT, OH_COVER)

A variety of stream characters were recorded as absent (A), present (P), or extensive (E). Morphological characteristics that are documented include braided channels (BRAIDED), riffles (RIFFLE), runs or glides (RUNGLIDE), pools deeper than 50 cm (DEEPOOL) and pools shallower than 50 cm (SHALPOOL), undercut banks (UNDERCUT), and overhead cover (OH_COVER). Substrate types that are assessed include the boulders larger than 2 m along the intermediate axis (LRGBOULD) and smaller than 2 m along the intermediate axis (SMLBOULD), cobble (COBBLE), bedrock (BEDROCK), gravel (GRAVEL), sand (SAND), and silt or clay (SILTCLAY).

3.26. Adjacent Landuse (OldFieldObs, DecidForestObs, ConifForestObs, WetlandObs, CroplandObs, SurfaceMineObs, LandfillObs, ResidentialObs, CommIndObs, GolfcourseObs, PastureObs, OrchVineObs)

Any land use that can be observed while in or alongside the stream at the site received a "Y" and any that cannot be observed received an "N." The specific classes of adjacent landuse that were noted include old fields (OldFieldObs), deciduous forest (DecidForestObs) or coniferous forest (ConifForestObs), wetlands (WetlandObs), crop fields (CroplandObs), surface mining (SurfaceMineObs), landfill (LandfillObs), residential housing (ResidentialObs), commercial or industrial properties (CommIndObs), golf courses (GolfcourseObs), pasture (PastureObs), and orchards or vinyards (OrchVineObs).

3.27. Adjacent Vegetation (VegType1L, VegType1R, VegType2L, VegType2R, VegType3L, VegType3R, VegType4L, VegType4R)

The primary vegetation type on the left bank (VegType1L) and right bank (VegType1R) are noted in a survey of the surrounding area. If more than one vegetation type is present, secondary (VegType2L and VegType2R), tertiary (VegType3L and VegType3R), and quaternary (VegType4L and VegType4R) vegetation types may be recorded. These values are recorded using the Adjacent Vegetation Codes: A=Regenerative coniferous (<4 in DBH); B=Young coniferous (4-12 in DBH); C=Mature coniferous (12-24 in DBH); D=Old coniferous trees; G=Grasses; L=Lawn; M=Mature deciduous trees (12-24 in DBH); O=Old deciduous trees (>24 in DBH); R=Regenerative deciduous trees (<4 in DBH); Y=Young deciduous trees (4-12 in DBH).

3.28. Buffer Breaks (RipBufferBreakL, RipBufferBreakR)

If no riparian buffer breaks were present within the reach, an "N" was recorded in this field. If any riparian buffer breaks were noted, a "Y" was recorded in this field.

3.29. Eroded Extent (ErodedExtentL, ErodedExtentR)

The visually estimated linear extent of erosion above the water surface on the left bank (ErodedExtentL) and right bank (ErodedExtentR) of the stream, within the 75 m site. In braided streams it is possible to have the total extent of eroded bank on either side add up to more than 75 m.

3.30. Erosion Severity (ErosionSeverityL, ErosionSeverityR)

The visually estimated average severity of erosion above the water surface, where it occurs, along the left bank (ErosionSeverityL) and right bank (ErosionSeverity_R). Severity is scored on a scale of 0 to 3, with 0 indicating no erosion, 1 indicating minimal erosion, 2 indicating moderate erosion, and 3 indicating severe bank erosion.

3.31. Eroded Height (ErodedHeightL, ErodedHeightR)

The visually estimated average height of erosion above the water surface, where it occurs, along the left bank (ErosionSeverityL) and right bank (ErosionSeverity_R).

3.32. DischargeCFS

Stream discharge is reported in cubic feet per second (cfs) and is an estimate of the streamflow that was observed at a site during the summer index period. The calculation presented by Buchanan and Somers (1969) was used to calculate discharge from measurements of flow velocity (m/s), water depth (cm), and current velocity (at 60% water depth) measured at 10 or more regularly-spaced instream intervals along a transect perpendicular to flow.

4. Water Chemistry

The Water Chemistry table contains data pertaining to water samples that were collected from sites during the spring survey. Water quality samples were analyzed by UMCES - Appalachian Lab using the protocols specified in the annual QAPP (UMCES-AL 2022). Analyte detection limits are listed in Section 4.2.

Field Name	Years	Definition
Date		Date water sample obtained
ANC_LAB	1995-present	Acid Neutralizing Capacity (µeq/L)
DOC_LAB	1995-present	Dissolved organic carbon concentration (mg/L)
PH_LAB	1995-present	pH
SAMP_WQT_LAB	1995-present	Indicates whether laboratory water quality was analyzed
COND_LAB	1995-present	Conductance, with temperature compensation to 25°C. (µmho/cm)
CL_LAB	1999-present	Chloride concentration (mg/L)
SO4_LAB	1995-present	Sulfate concentration (mg/L)
TN	1999-present	Total nitrogen concentration (mg/L)
TP	1999-present	Total phosphorous concentration (mg/L)
O_PHOS	1999-present	Orthophosphate concentration (mg/L-P/L)
NH3	1999-present	Total Ammonia Nitrogen concentration (mg/L-N/L)
NO2	1999-present	Nitrite concentration (mg/L)
NO3_LAB	1995-present	Nitrate concentration (mg/L-N/L)
BICARBONATE	2016-2017	Bicarbonate concentration ()
BROMIDE	2012-present	Bromide concentration (mg/L)
NH4	2005-2006	Ammonium concentration ()
MAGNESIUM	2009-present	Magnesium concentration (mg/L)
CALCIUM	2009-present	Calcium concentration (mg/L)
COPPER	2014-present	Copper concentration (µg/L)
ZINC	2014-present	Zinc concentration (µg/L)
ALUMINUM	2013	Aluminum concentration (µg/L)
BARIUM	2012-2013	Barium concentration (µg/L)
IRON	2013	Iron concentration (µg/L)
MANGANESE	2013	Manganese concentration (µg/L)
SELENIUM	2013	Selenium concentration (µg/L)
STRONTIUM	2012-2013	Strontium concentration (µg/L)
ALKALINITY	2013	Alkalinity concentration (mg $CaCO_3$/L)
TDS	2013	Total dissolved solids (mg/L)
SODIUM	2013, 2017-present	Sodium concentration (mg/L)
POTASSIUM	2013, 2017-present	Potassium concentration (mg/L)
HARDNESS	2009-2010	Water hardness (mg equivalent CaCO3/L)

4.1. Date

Date of water sample collection. This is typically the same date as spring sampling, but may differ due to extenuating circumstances that precluded concurrent water sample collection or transfer to the laboratory.

4.2. Analyte detection limits (DOC_BDL, CL_BDL, SO4_BDL, TN_BDL, TP_BDL, O_PHOS_BDL, nh3_bdl, no2_bdl, no3_bdl, BROM_BDL MG_BDL CA_BDL CU_BDL ZN_BDL, AL_BDL, MN_BDL, SODIUM_BDL, POTASSIUM_BDL

If the measured value for an analyte was less than the detection threshold, it is indicated in the appropriate field with the "<" symbol. The minimum detection thresholds depend on the equipment used, and therefore differ over the years. The following tables indicate detection thresholds for all years 1995 – 2019. UN = unavailable, NA = not applicable/was not analyzed.

Analyte	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Closed pH	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
ANC	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Specific Conductance	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
DOC	UN	UN	UN	UN	UN	0.11	0.44	UN	0.068	0.002	0.002	0.013	0.192
Chloride	NA	NA	NA	UN	UN	0.03	0.01	0.01	0.01	0.01	0.0249	0.02	0.01
Sulfate	UN	UN	UN	UN	UN	0.02	0.01	0.02	0.02	0.01	0.01	0.02	0.02
Total Nitrogen	NA	NA	NA	NA	NA	0.1574	0.125	0.098	0.098	0.098	0.098	0.098	0.0561
Total Phosphorus	NA	NA	NA	NA	NA	UN	0.0052	0.004	0.0051	0.0074	0.0074	0.0037	0.0078
Orthophosphate	NA	NA	NA	NA	NA	0.0051	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0011
Total Ammonia Nitrogen	NA	NA	NA	NA	NA	0.025	0.0075	0.002	0.0025	0.002	0.002	0.002	0.0004
Nitrite-N	NA	NA	NA	NA	NA	0.003	0.0025	0.0004	0.0004, 0.0019	0.0004	0.0019	0.0019	0.0011
Nitrate-N	UN	UN	UN	UN	UN	0.001	0.001	0.001	0.001	0.0004	0.0019	0.0019	0.0007

Analyte	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Closed pH	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
ANC	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Specific Conductance	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
DOC	0.192	0.192	0.192	0.192	0.192	0.192	0.192	0.192	0.253	0.183	0.067	0.083
Chloride	0.01	0.01	0.01	0.01	0.01	0.01	0.072	0.008	0.008	0.0032	0.01	0.0121
Sulfate	0.02	0.02	0.03	0.03	0.02	0.02	0.02	0.031	0.031	0.0017	0.002	0.0179
Total Nitrogen	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561	0.024	0.024	0.0216	0.0216	0.0774
Total Phosphorus	0.0037	0.008	0.003	0.0078	0.0078	0.008	0.0078	0.003	0.003	0.0044	0.0044	0.0102
Orthophosphate	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.003	0.003	0.0031	0.0031	0.0032
Total Ammonia Nitrogen	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.002	0.002	0.0026	0.0026	0.0084
Nitrite-N	0.0019	0.0019	0.002	0.0011	0.001	0.0011	0.0011	0.0011	0.004	0.0022	0.0022	0.0052
Nitrate-N	0.0019	0.0019	0.002	0.002	0.001	0.001	0.001	0.003	0.003	0.0015	0.0015	0.0026
Bromide	NA	NA	NA	NA	0.002	0.001	0.001	0.004	0.004	0.0015	0.0015	0.0179
Magnesium	NA	0.005	0.004	0.004	0.008	0.085	0.039	0.038	0.038	0.067	0.038	0.033
Calcium	NA	0.149	0.045	0.045	0.054	0.026	0.097	0.164	0.164	0.201	0.164	0.0937
Copper	NA	NA	NA	NA	NA	NA	0.02	0.06	0.04	0.008	0.1	0.039
Zinc	NA	NA	NA	NA	NA	NA	0.07	0.3	0.11	0.084	0.3	0.064
Aluminum	NA	NA	NA	NA	NA	5.0	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	UN	UN	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	25.0	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	1.0	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	UN	NA	NA	NA	0.137	0.158	0.1796
Potassium	NA	NA	NA	NA	NA	UN	NA	NA	NA	0.07	0.07	0.134

5. Fish Index of Biotic Integrity (FIBI)

This table details the values that were used to calculate Maryland's Fish Index of Biotic Integrity (FIBI) score for each sample. The FIBI score corresponding to a particular sample is generated using the electrofishing sample composition documented on the FishTaxa table. The suite of metrics used to calculate a FIBI score depends upon the physical location of a site within one of four geographic strata in Maryland. Further details for calculating FIBI scores are given in Southerland et al. 2005.

Field Name	Data Type	Definition
FIBI	Double	Final calculated fish index of biotic integrity (2005)
FIBISTRATA	Short Text	Fish IBI strata (Coastal, Epiedmont, Highland, Cold)
ACREAGE	Double	Catchment area (acres)
LEN_SAMP	Double	Length of reach sampled (m)
AVGWID	Double	Average wetted width (m)
STRMAREA	Double	Stream area in square meters
TOTBIOM	Double	Total biomass (g)

5.1. FIBI_05

Final calculated Maryland Fish Index of Biotic Integrity score. FIBI values range from 1 to 5. Sites where no fish were observed were assigned FIBI scores of 1.00. Site scores < 3.00 are considered "Poor," 3.00 - < 4.00 are considered "Fair," and scores ≥ 4.00 are considered "Good." See Southerland et al. (2005) for a more detailed explanation of IBI development.

5.2. FIBISTRATA

Calculation of Maryland's 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.

5.3. Catchment area (ACREAGE)

Drainage area of each catchment in acres. Catchment is defined as the area of the watershed upstream that drains to the site, and is calculated in GIS.

5.4. Sampled area (LEN_SAMP, AVGWID, STRMAREA)

The length sampled (LEN_SAMP) reflects the linear extent of watered stream channel that was sampled; LEN_SAMP is typically 75 m, unless the stream was partially dewatered; for partially dewatered stream channels, LEN_SAMP is the cumulative length of watered habitat within the 75-m stream reach. The average width (AVGWID) that is used for FIBI calculations is typically the AVGWID from the HABITAT table, unless the stream was partially dewatered; for partially dewatered stream channels, the average width was determined by averaging the mean widths of standing pools. The estimated stream area sampled (STRMAREA) was calculated by multiplying LEN_SAMP and AVGWID.

5.5. Total Biomass (TOTBIOM)

Total weighed mass of all fish collected during the two passes that comprise an MBSS fish survey.

6. Benthic Index of Biotic Integrity (BIBI)

This table details the values that were used to calculate Maryland's Benthic Index of Biotic Integrity (BIBI) score for each sample. BIBI scores were generated using the sampled benthic macroinvertebrates listed in the Benthic Macroinvertebrate Taxa table. The suite of metrics used to calculate a BIBI score depends upon the physical location of a site within one of three geographic strata in Maryland. Further details for calculating BIBI scores are given in Southerland et al. 2005.

Field Name	Data Type	Definition
BIBI	Double	Final calculated Maryland Benthic Index of Biotic Integrity
strata_r	Short Text	Benthic IBI stratum (COASTAL, EPIEDMONT, or HIGHLAND)
totind	Integer	Total number of individual organisms identified
ntaxa	Integer	Total number of taxa

6.1. Benthic Index of Biotic Integrity score (bibi_05)

Final calculated Maryland Benthic Index of Biotic Integrity (BIBI) score. BIBI values range from 1.00 to 5.00. Site scores < 3.00 are considered "Poor," 3.00 - < 4.00 are considered "Fair," and scores ≥ 4.00 are considered "Good." See Southerland et al. (2005) for a more detailed explanation of IBI development.

6.2. STRATUM (strata_r)

Calculation of Maryland's Benthic Index of Biotic Integrity requires knowledge of the physiographic stratum in which each site is located. The strata used for benthic IBI calculations are: Coastal, Eastern Piedmont (Epiedmont), and Highland (Southerland et al. 2005).

6.3. Total individuals (totind)

Total number of individual organisms identified. This value is used as the denominator in all calculations for percent individuals conforming to a specified trait.

6.4. Number of taxa (ntaxa)

Total number of distinct taxa identified (typically to genus).

7. Benthic Macroinvertebrate Taxa

This table summarizes the laboratory processing of benthic samples collected at MBSS sites. Sampling was conducted during the spring index periods. The listed identities and quantities for each SiteYr represent a sub-sample that was randomly selected (from the field-collected sample) in the lab using a 100-grid methodology (Boward and Friedman 2019).

Field Name	Data Type	Definition
TAXON	Short Text	Taxonomic name (scientific)
N_TAXA	Integer	Total number of individuals
EXCLUDE	Short Text	Exclude from BIBI calculation (Y/N)

7.1. Taxonomic identification (TAXON)

Most benthic macroinvertebrates were identified to Genus (Boward and Friedman 2019). In some cases, genus-level identification was not possible, and higher taxonomic levels were provided.

7.2. Number of individuals (N_TAXA)

The number of individuals of the specified taxa that were identified from the subsample.

7.3. EXCLUDE

Specifies non-unique taxa in a sample (i.e., parent taxon with one or more child taxa present in the sample; Boward and Friedman 2019). This designation is crucial to accurately calculating BIBI scores, as it omits the taxon from richness metrics (i.e., Number of Taxa, Number of EPT Taxa, Number of Ephemeroptera Taxa), while retaining the traits for other metrics.

8. Fish Taxa

This table lists fish collected for each sampling event and their abundances. Some vulnerable, rare, threatened, or endangered species may have been removed from this list.

Field Name	Data Type	Definition
FishTaxa	Short Text	Common Name
TOTAL	Integer	Total number sampled using MBSS protocols

8.1. FishTaxa

Fish species common name. Sampling events where no fish were collected at the site using MBSS electrofishing protocols were indicated in this table as a single record where the FishTaxa field was “NO FISH OBSERVED.”

8.2. TOTAL

The total number of fish, of a given taxa, sampled during the two passes that comprise an MBSS fish survey.

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