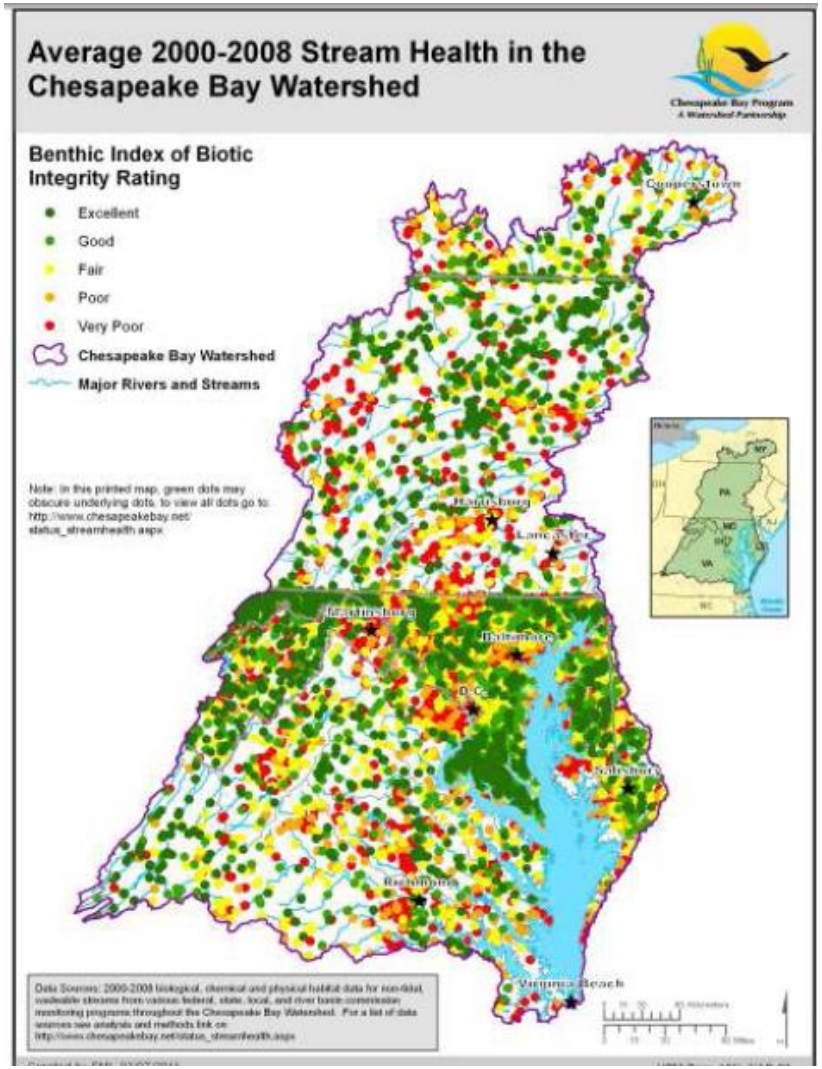
The Data Integrity Workgroup Can Help Improve the Rigor of Stream Health Assessments in the Chesapeake Bay Watershed



Indicators of Local Stream Health and Non-Tidal Indicators Chesapeake Bay Health

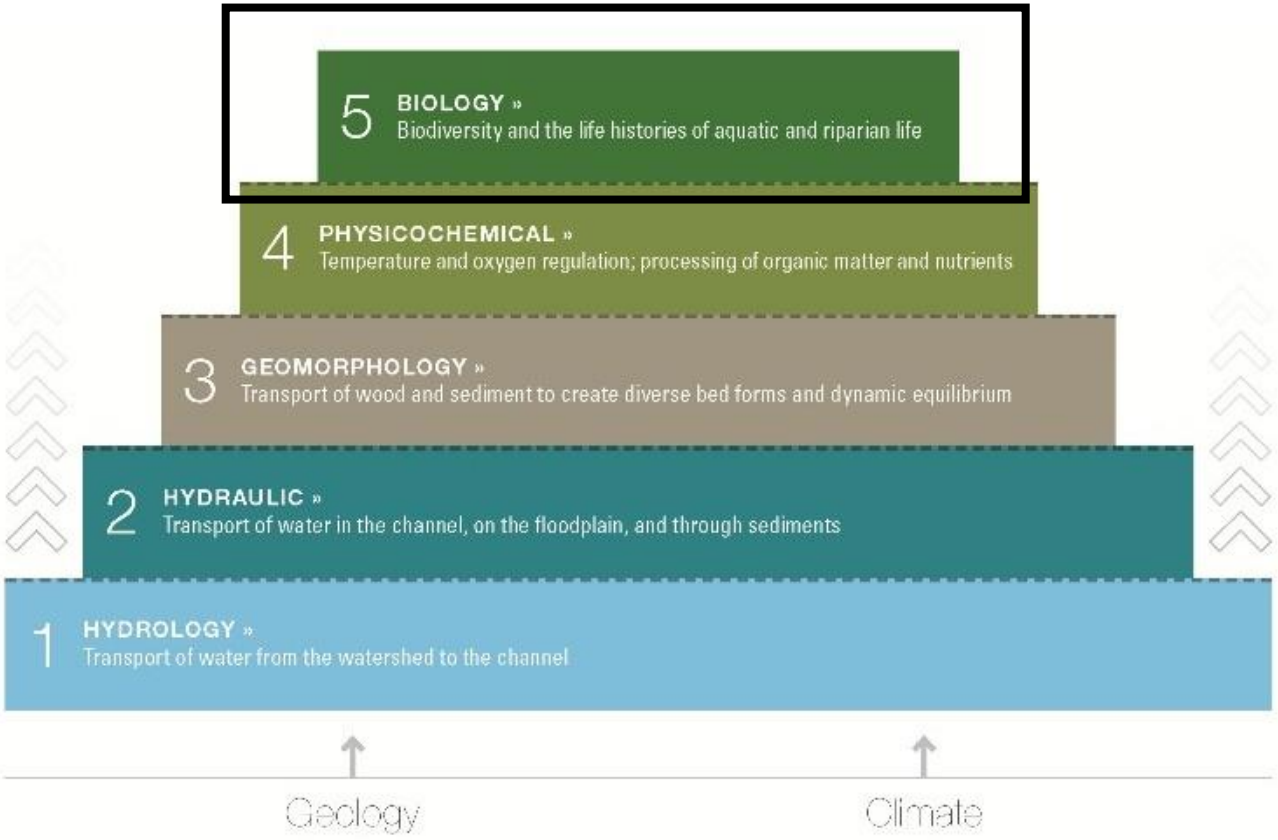
Critical pollutants to Chesapeake Bay from Non-Tidal Streams

- Nitrogen
- Phosphorus
- Sediment

Indicators of the local stream conditions (many!)

- Biology (benthic macros, fish, periphyton, etc.)
- Physical habitat (channel, flood plain, riparian, etc.)
- Other Water Chemistry (metals, toxics, salts, etc.)

Biological Indicators integrate physical and chemical conditions and so are excellent indicators of overall stream health



Animals living in streams require certain conditions to survive

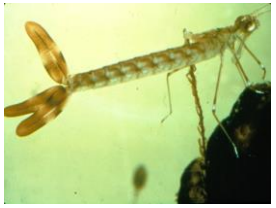
Benthic Macroinvertebrates
The Most Commonly Used Biological Indicator of Stream Health

- Insects and other invertebrates large enough to see with the naked eye









Primary Sources of Stream Health (benthic macroinvertebrate) Data in the Bay Watershed

- EPA National Rivers and Streams Assessment
- State data
- “Chessie BIBI”

The Perfect Data Set For Assessing Stream Health in the Bay Watershed

- Uses thousands of randomly selected sites throughout the watershed to represent stream condition

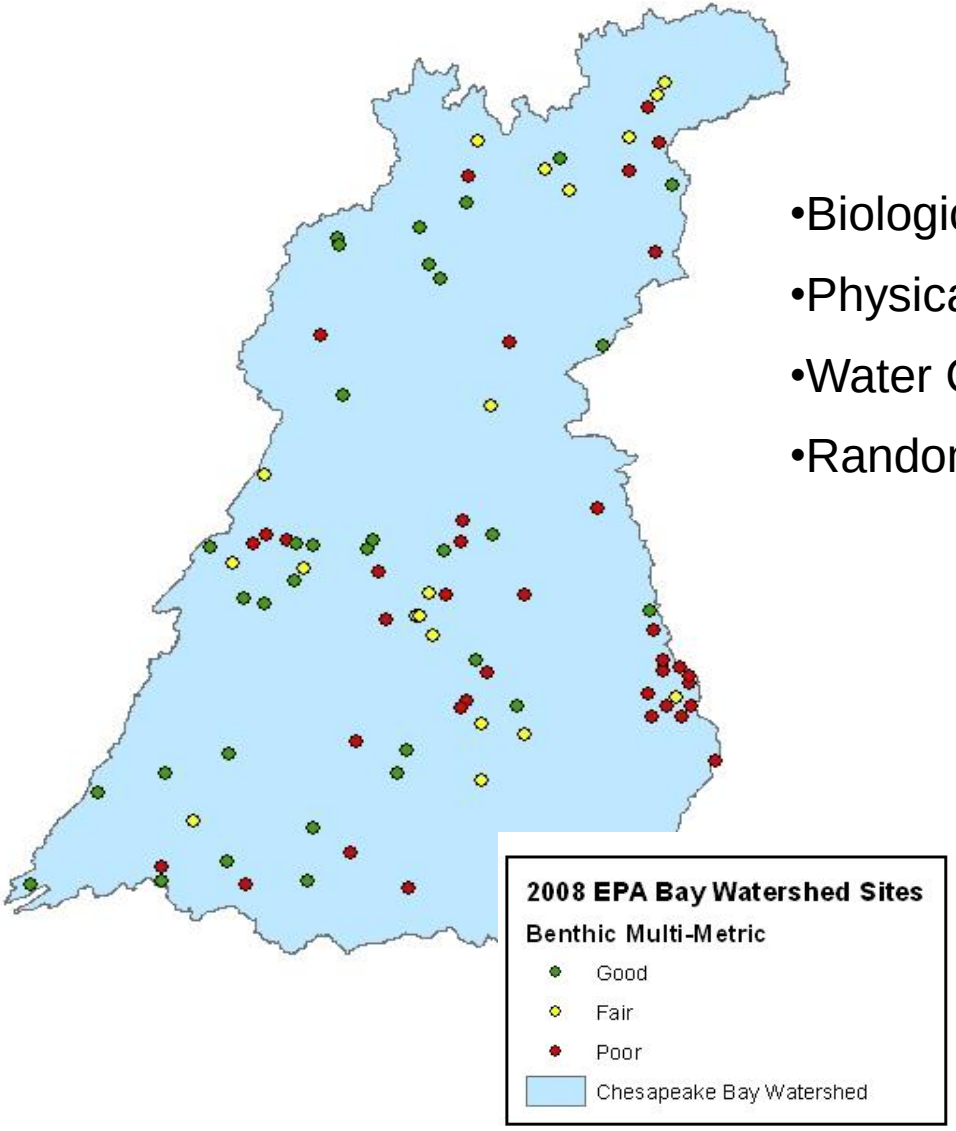
- Consistent sampling and analysis protocols

- Assesses conditions at the Bay Watershed scale in 2008 (baseline) and periodically until at least 2025

- Would also include additional indicators of stream health

There is no data set like this

EPA National Rivers and Streams Assessment



- Biological (benthic macros, fish, periphyton)
- Physical Habitat
- Water Chemistry
- Randomly-Selected Sites

NRSA Benthic Macro Data Advantages:

- Consistent sampling and analysis protocols for all sites

- Statistically valid estimate of stream conditions in the Bay Watershed

- An assessment of conditions during 2008/2009 and updated every five years

- Additional indicators

NRSA Disadvantages:

Many sites nationally but only 89 in Bay Watershed

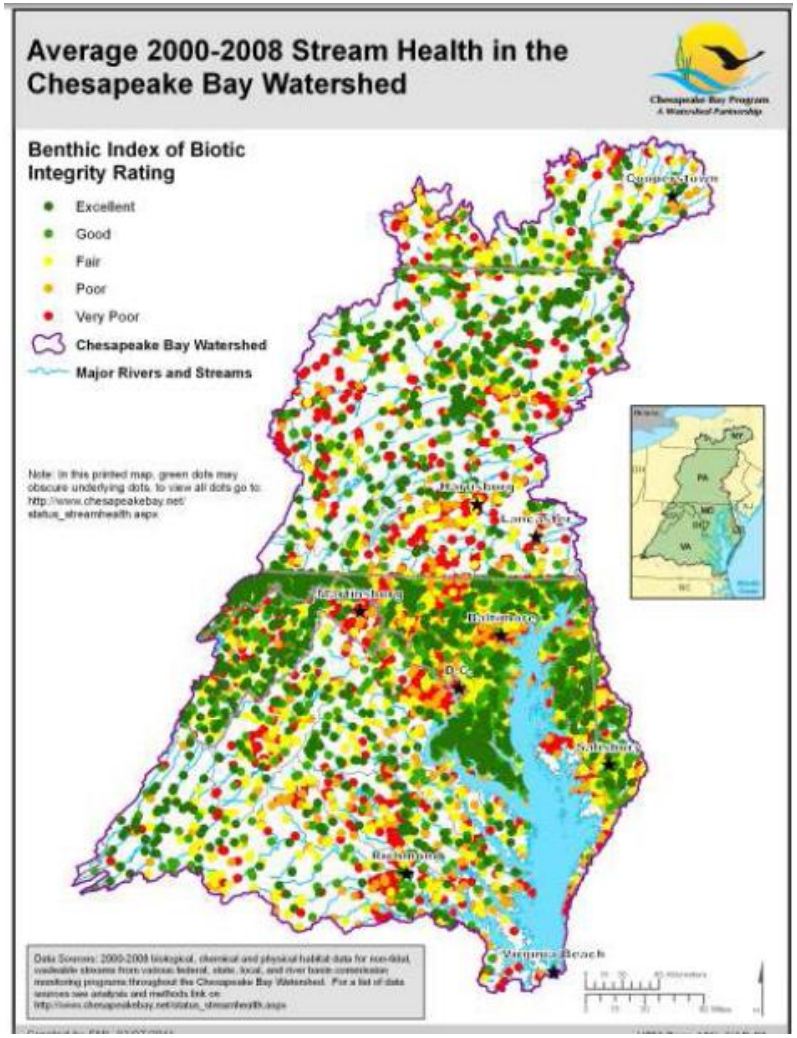
State Benthic Macro Data Advantages:

- Large number of sites
- Often used to support State and Federal regulations (enhanced data quality)
- Many additional indicators

State Benthic Macro Data Disadvantages:

- Inconsistent sampling and analysis protocols
- Not designed to derive statistically valid estimates of stream conditions in the Bay Watershed
- Lack of sampling schedule for tracking progress among states

“Chessie BIBI”
(Basin-wide Benthic Index of Biotic Integrity)



Family-level Benthic macroinvertebrate IBI

Applied to over 14,000 sites from 23 federal, **state**, local, and regional monitoring programs throughout the Bay Watershed

Chessie BIBI Advantages:

- Consistent Benthic Macroinvertebrate ***analysis*** protocols
- A very large number of sites (using mostly state data)

Chessie BIBI Disadvantages:

- Only one indicator
- Family taxonomy
- Inconsistent ***sampling*** protocols
- Sampling not designed to derive statistically valid estimates of stream conditions in the Bay Watershed
- Sampling schedule does not match CB tracking timeline

CHESSIE BIBI REVISION
Opportunities for Consistency Among Bay States

Design

• Continue to only use random sites on 1st - 4th order streams

QA/QC General

• Use only data from programs with an EPA-approved QAPP and appropriate SOPs

• Establish Data Quality Objectives agreeable to the workgroup

Field Methods

• Use only data collected in a single season (more important with genus-level taxonomy)

• Use only RBP type samples (possibly explore differences with quantitative samples?)

• Establish minimum number of duplicate samples

CHESSIE BIBI REVISION
Opportunities for Consistency Among Bay States

Field Methods (cont.)

- Continue using comparable mesh size (450 – 900 micron)
- Continue using gridded tray subsampling method (e.g., Caton tray)
- Minimum 100 organism subsample

Lab Methods

- Taxonomists certified by The Society for Freshwater Science (at a minimum: General Arthropods East, EPT East, Chironomids East)
- Establish minimum number of duplicate subsamples
- Voucher collection and re-identification by second, independent taxonomist (interlab comparison)

Data Handling and Storage

- Use only double-entered data
- Store data in widely-available (standard) software such as MS Access

Consistent State Sampling Protocols and Taxonomy Would Improve the Rigor of Chessie BIBI Assessments of Stream Health Using State Benthic Macro Data