



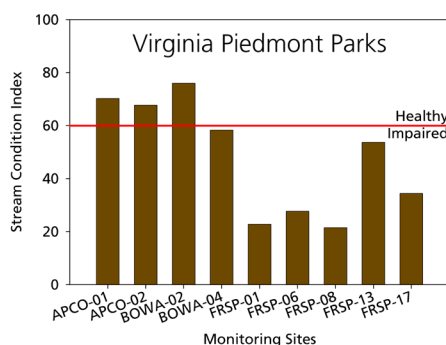
Mid-Atlantic Network

Macroinvertebrate Resource Brief



2009 Status & Trends

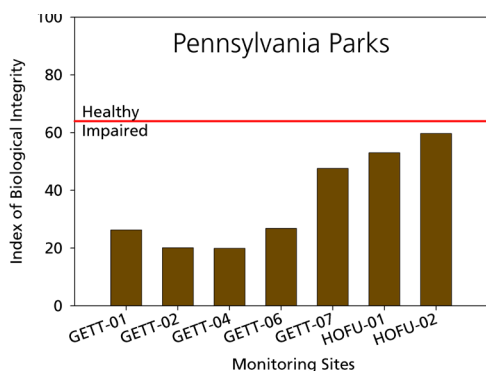
Benthic macroinvertebrate monitoring was initiated in the Mid-Atlantic Network (MIDN) in 2009. Twenty-three streams in eight parks were sampled, macroinvertebrates were identified and counted, and biological integrity indices (measures of ecosystem health) were calculated. Our initial results show that most of the network streams have impaired ecological conditions, a fact that is not surprising given most streams are located in watersheds with significant upstream influences including agricul-



Stream Condition Index for benthic macroinvertebrates monitoring sites in Virginia Piedmont parks for 2009.

ture and urban development. Future monitoring results will reveal whether conditions are improving or deteriorating.

The data from 2009 are summarized in the three graphs grouped by state and ecological index. The red line shows the level below which ecological condition is considered to be impaired. For parks in Pennsylvania, the Index of Biological Integrity (IBI) indicated that all streams monitored exhibited impaired ecological conditions; that is, they had a score



Index of Biological Integrity for benthic macroinvertebrate monitoring sites in Pennsylvania parks for 2009.

Objectives

1. Determine the status and trends in the structure and composition of benthic macroinvertebrate communities in streams within MIDN units.
2. Determine the status and trends in the habitat condition of the streams.
3. Relate the structure and composition of benthic macroinvertebrate communities to water quality and quantity and habitat condition in the streams.

below 63. At one site in Gettysburg NMP and two sites in Hopewell Furnace NHS, the IBI scores approached the threshold for acceptable ecological conditions.

In the Virginia Piedmont parks, the Stream Condition Index (SCI) indicated acceptable ecological conditions in the two streams monitored in Appomattox Court House NHP and one of the streams in Booker T. Washington NM, having SCI scores above 60. The second



Importance

Benthic macroinvertebrates (BMI) are aquatic animals lacking an internal skeleton that can be seen with the unaided eye. BMI were selected as a priority vital sign as they perform essential roles in stream ecosystem function, and are often used by government regulatory agencies to document stream condition under the Clean Water Act. BMI are ideal for stream monitoring

as they are: (1) relatively easy to sample; (2) reliably identified; (3) common in most freshwater habitats; (4) represented by many taxa varying in sensitivity to their environment; (5) mostly sedentary and thus cannot escape pollution or environmental stress; and (6) sufficiently long-lived (about 1 year) that they will respond to stress, yet not recover before they are next sampled.

Management Applications

- Identify changes in benthic macroinvertebrate communities in relation to changing land use and pollution.
- Evaluate the effects of land management within the national parks and surrounding lands on aquatic communities.
- Develop resource stewardship strategies for managing aquatic resources.

Long-term Monitoring

Twenty-three BMI sites, co-located with water quality monitoring, are sampled in Mid-Atlantic parks. At each site, a 100-m stream reach is sampled using a dip net in common microhabitats: riffles, root mats/undercut banks, leaf packs, macrophytes, and logs. These samples are analyzed separately to compare to regulatory agency data. Stream habitat quality is also measured. All BMIs are identified to the lowest feasible taxonomic level (usually

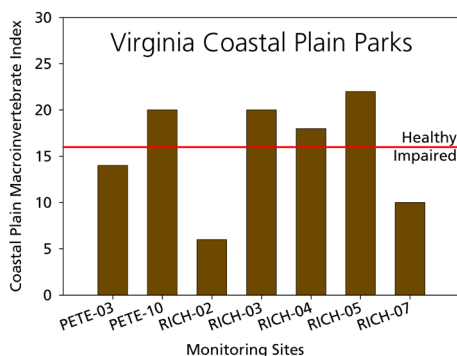
genus), and counted. Metrics are calculated to summarize the community structure and composition. In addition, multimetric indices, developed and calibrated to determine acceptable vs. impaired ecological condition of streams, are calculated. The Benthic Index of Biotic Integrity (IBI) is used for Pennsylvania. In Virginia, the Stream Condition Index (SCI) is used except in the coastal plain where the Coastal Plain Macroinvertebrate Index (CPMI) is used.

Status & Trends...

stream in Booker T. Washington was only marginally below the threshold. All five of the streams monitored in Fredericksburg and Spotsylvania NMP showed impaired ecological condition, with only



Macroinvertebrate sampling in the Spotsylvania unit of Fredericksburg and Spotsylvania NMP.



Coastal Plain Macroinvertebrate Index for Virginia Coastal Plain parks for 2009.

one site showing values that approached healthy conditions.

Streams monitored in Mid-Atlantic Network parks located in the Coastal Plain of Virginia exhibited somewhat better ecological condition according to the Coastal Plain Macroinvertebrate Index. One of the two streams monitored at Petersburg NB and three of the five

streams at Richmond NBP had scores above 16, the threshold for acceptable ecological condition. However, it should be noted that no streams within any of the Mid-Atlantic Network parks had scores that were appreciably above the thresholds, whereas, quite a few streams had scores that were far below the thresholds.

Continued monitoring of these streams will help us to understand how their condition is changing over time. In addition, future analyses will include other metrics that will shed light on the relationships between benthic macroinvertebrates, their habitat, and water quality.

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Parks monitored: Appomattox Court House NHP • Booker T. Washington NM • Eisenhower NHS • Fredericksburg & Spotsylvania NMP • Gettysburg NMP • Hopewell Furnace NHS • Petersburg NB • Richmond NBP

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