Catoctin Mountain Park

National Park Service
U.S. Department of the Interior

Macroinvertebrates *Resource Brief*

Importance

A macroinvertebrate is any animal without a backbone that is large enough to be seen by the naked eye. Macroinvertebrates that are aquatic (water-dwelling) or benthic (occupying the lowest level of a body of water) include aquatic insects, crayfish, and mussels. Crayfish, and aquatic insects (including stoneflies, mayflies, and caddisflies), consume organic matter that falls into rivers and streams, while mussels filter nutrients and sediment from the water. All are a food source for other animals. Fish and other stream-dependent creatures like water turtles and salamanders consume aquatic insects; crayfish are eaten by fish, birds, raccoons, and others; and mussels provide food and habitat to other animals.

Macroinvertebrates are good indicators of watershed health and water quality because they live in the water for all or most of their life, have limited mobility, and differ in their tolerance to amounts and types of pollution.



Photo: NPS/Nortrup. Illustration: University of Maryland, Integration & Application Network

Above: A fine-meshed D-shaped net is used to scoop up macroinvertebrates from promising stream habitat. Left: Presence of pollution-sensitive species like this mayfly (Ephemeroptera), along with stoneflies and caddisflies can indicate healthy stream condition.

Monitoring

Macroinvertebrate monitoring is part of a broader effort by the National Capital Region Network (NCRN) Inventory & Monitoring (I&M) program to assess the condition of streams and watersheds.

Long-term macroinvertebrate monitoring at thirty-seven park sites throughout the NCRN began in 2008 and follows a set, six-year rotation. Each spring 5-8 sites are visited. At Catoctin, monitoring is done on Owens Creek, Big Hunting Creek, and Whiskey Still Creek. Macroinvertebrate monitoring is co-located with fish monitoring and stream physical habitat analysis.

The objectives of this combined monitoring are to:

- determine current conditions and track long-term trends in stream condition,
- determine trends in species composition and functional groups of fish and benthic invertebrates

At each site, monitoring teams work within a 75 meter stream segment. Organisms are dislodged from available riffles and other productive stream habitats and captured in a fine-meshed, D-shaped net (see photo). A subsample of 100 individuals are preserved and identified to genus if possible, using stereoscopes (low-magnification microscopes). Chironomidae (chironomids or non-biting midges) are slide-mounted and identified using compound microscopes.

BIBI Scores

The species and number of macroinvertebrates present in a stream segment are used to calculate a Benthic Index of Biotic Integrity (BIBI) score. Scoring takes into account factors such as:

- number and diversity of taxonomic groups
- the proportion of individuals belonging to specific taxonomic groups
- ability of individuals present to survive short- and long-term exposure to stressors from pollution, changes in stream flow, or habitat degradation
- mode of feeding including scrapers, predators, collectors, filterers, and shredders
- habit tendencies including burrowers, climbers, clingers, and sprawlers

Scores also take into account Catoctin's location in the Eastern Piedmont physiographic province. BIBI scores range from 1 to 5 and are ranked as follows: 1.0-1.9 (very poor), 2.0-2.9 (poor), 3.0-3.9 (fair), and 4.0-5.0 (good). For results, see reverse.

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Results

Catoctin's streams were sampled in 2010. BIBI scores indicated relatively healthy stream conditions.

No exotic crayfish or mussel species were found during 2010 sampling.

Big Hunting Creek (MONO-201-N-2010)

2010 BIBI = 4.00 (good)

Number of taxa found: 41

Most common taxa: *Acentrella* (27), *Baetis* (16), *Amphinemura* (6), *Ephemerella* (6), *Nais* (6), *Simulium* (6)

Owens Creek (MONO-133-N-2010)

2010 BIBI = 4.00 (good)

Number of taxa found: 44

Most common taxa: *Baetis* (26), *Acentrella* (15), *Simulium* (14), *Amphinemura* (7), *Diplectrona* (7)

Whiskey Still Creek (MONO-134-N-2010)

2010 BIBI = 4.33 (good)

Number of taxa found: 32

Most common taxa: *Epeorus* (23), *Ameletus* (18), *Perlodidae* (12), *Leuctra* (11), *Leptophlebiidae* (9)

Discussion

Good BIBI scores for Catoctin's streams stem from the relative abundance of pollution- and disturbance-sensitive taxa including Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies). Catoctin streams also had very low numbers of pollution-tolerant Chironomid taxa.

Taxa Explained

Acentrella- genus mayflies in the family Baetidae

Ameletus- genus of mayflies

Amphinemura- genus of stoneflies

Baetis- genus of mayflies in the family Baetidae

Diplectrona – a caddisfly group including net-spinners

Epeorus- genus of mayflies in the family Heptageniidae

Ephemerella - genus of mayflies

Leptophlebiidae - genus of mayflies

Leuctra – genus of stoneflies including needleflies

Nais - subgroup of pollution-tolerant Oligochaetes (worms)

Perlodidae - Perlodid stoneflies, stripetails, or spongeflies

Simulium - a genus of blackflies

As of publication of this document (May 2012), the presence of the invasive algae didymo (*Didymosphenia geminata*) was documented in Big Hunting Creek. It has not been detected in any other Catoctin streams. This effects of this organism have the potential to show up in results from the re-monitoring of Catoctin sites scheduled for 2016.

References:

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