Wolf Trap NP for Performing Arts

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. Aquatic (water-dwelling) or benthic (occupying the lowest level of a body of water) macroinvertebrates 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 macroinvertebrates provide food for other creatures: fish and other stream-dependent creatures like lizards and salamanders consume aquatic insects; crayfish are eaten by fish, birds, raccoons, and others; while mussels provide food and habitat to other animals.

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 followed a six-year rotation. Each spring 5-8 sites were visited. At Wolf Trap National Park for the Performing Arts (WOTR) monitoring is done in Courthouse Creek and Wolftrap 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 mark out a 75 meter stream segment. Organisms are dislodged from approximately 20 square feet of stream habitats and captured in a fine-meshed, D-shaped net (see photo). Riffles and other productive spots are sampled preferentially when available. The collected macroinvertebrates are preserved and subsampled to 100 individuals. Most are identified to genus if possible, using stereoscopes (low-magnification microscopes). Chironomidae (chironomids or non-biting midges) are slide-mounted and identified using compound microscopes. A list of taxa and their abundance at each site is generated.



Photo: NPS/Nortrup

A fine-meshed D-shaped net is used to scoop up macroinvertebrates from promising stream habitat.

BIBI Scores

The number and species of macroinvertebrates present in a stream segment is 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 chemical pollution, changes in water quantity, 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 Wolf Trap's location in the Eastern piedmont BIBI region. Key macroinvertebrate community attributes of a sampled site are compared to a non-degraded reference condition. 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).

More Information

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Results

Both Courthouse Creek and Wolftrap Creek were sampled in 2012. Both were also sampled in 2004 and Wolftrap Creek in 2006 while monitoring protocols were under development.

Courthouse Creek (DIFF-202-N-2012)

2012 BIBI = 2.67 (poor)

Number of taxa found: 25

Most common taxa: *Nais* (12), *Tvetenia* (12), *Eukiefferiella* (12), *Chaetogaster* (12), and *Orthocladius* (9).

Courthouse Creek (DIFF-202-N-2004)

2004 BIBI = 1 (very poor)

Number of taxa found: 12

Most common taxa: *Orthocladius* (15), *Hydropsyche* (7), *Thienemannimyia* (4), *Cardiocladius* (2), *Eukiefferiella* (2).

Wolftrap Creek (DIFF-201-N-2012)

2012 BIBI = 2 (poor)

Number of taxa found: 29

Most common taxa: *Nais* (24), *Eukiefferiella* (14), *Baetis* (13), *Tvetenia* (8), and *Rheocricotopus* (4).

Wolftrap Creek (DIFF-201-N-2006)

2006 BIBI = 1.33 (very poor)

Number of taxa found: 22

Most common taxa: *Tvetenia* (26), *Baetis* (17), *Cricotopus* (10), *Parametriocnemus* (10), and *Nadidae* (6).

Wolftrap Creek (DIFF-201-N-2004)

2004 BIBI = 1.33 (very poor)

Number of taxa found: 16

Most common taxa: *Orthocladius* (13), *Brillia* (8), *Tvetenia* (6), *Cheumatopsyche* (5), and *Hydrobaenis* (5).

Taxa Explained

Baetis- genus of mayflies in the family Baetidae.

Cricotopus- genus of non-biting midges in the subfamily Orthocladiinae of the bloodworm family Chironomidae.

Eukiefferiella-a genus of European non-biting midges of the bloodworm family Chironomidae.

Hydropsyche- net-spinning caddisflies.

Nais- subgroup of pollution-tolerant Oligochaetes (worms).

Orthocladius-genus of non-biting midges in the subfamily Orthocladiinae of the bloodworm family Chironomidae.

Tvetenia- a genus of non-biting midges of the bloodworm family Chironomidae.

Discussion

Both Courthouse Creek and Wolf Trap Creek BIBI scores improved from very poor to poor between 2004 and 2012. The total number of taxa found also rose over the sample period.

During both sampling years, Courthouse Creek had poor-numbers of pollution-intolerant species and low numbers of clingers. However, in 2012, numbers of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies), also known as EPT, improved to moderate levels along with Chironomids (non-biting midges), and overall taxa numbers rose from 12 to 25.

Wolftrap Creek made slight improvements from 2004 and 2006 to 2012. All years of sampling found poor ratings for numbers of EPT, pollution-intolerant species, and clingers present. However in 2012, Wolftrap Creek showed improvement as numbers of Chironomid taxa rose to moderate levels, and the number of overall taxa improved.

References:

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