



Aquatic Macroinvertebrate Monitoring

Affected Parks

Big South Fork NRR (BISO)
Blue Ridge Parkway (BLRI)
Obed Wild and Scenic River (OBRI)

Importance/Issues

At both BISO and OBRI, free-flowing rivers are the central resource management focus. The parks' enabling legislation, together with National River (BISO) and Wild and Scenic River (OBRI) designations, reflects this emphasis. Both parks harbor significant aquatic resources – including numerous federally listed species, and both are threatened by industries of resource extraction, upstream development, and water withdrawal. BLRI protects a significant number of high elevation wetlands in the Southern Appalachians, numerous high elevation seeps and streams, and managed trout fisheries. These resources are threatened by air pollution impacts, including acid deposition, and deposition of toxic substances (e.g. mercury). Other management issues include development along the park boundary, management of agricultural leases within the park, and forest insect and disease impact.

Monitoring Objectives

Specific monitoring objectives are:

1. Determine long-term trends in species composition and tolerance indices at selected index sites.
2. Correlate trends in water quality and physical habitat measures with changes in the composition of aquatic macroinvertebrate species assemblages.

Benthic macroinvertebrate monitoring in accordance with this protocol will be utilized for:

- Characterization of the existence, severity, and trends of impairment to the water resource.
- Identification of sources and causes of impairment.
- Evaluation of the effectiveness of control actions and restoration activities.
- Supporting use attainability studies and cumulative impact assessments.



Polycentropus sp. – a rare caddisfly recently found at BLRI

- Characterizing regional biotic attributes of reference conditions.

Methods

Aquatic macroinvertebrates are effective long-term integrators of the short term events influencing water quality in a particular location. To evaluate the condition of a water body, water resource professionals use an integrated approach that may include analyses of water quality and quantity, physical habitat characterization, and biological assessment, which utilizes biological surveys. To meet the need for cost-effective sampling, a number of rapid bioassessment methods have been developed. These methods are generally described in the EPA's *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers* (EPA 841-B-99-002), and individual state and federal investigators have developed a number of rapid bioassessment protocols (RBP).

The principal conceptual underpinnings of RBPs are:

- Cost-effective, scientifically valid, procedures for biological surveys
- Provisions for efficiently sampling multiple sites
- Relatively quick turn-around of results for management decisions.
- Scientific reports easily translated to management and the public
- Environmentally-benign procedures.



Green Darners (photo by Alvin Braswell)

Protocol Development and Status

The Network evaluated RBP protocols employed in the four states (TN, VA, KY, and NC) in which APHN parks are resident. In general all states use some modification of general procedures described in the EPA Wadeable Streams Manual. APHN will utilize a rapid bioassessment protocol adapted from the Standard Operating Procedures developed and used by the North Carolina Department of Environment, Health, and Natural Resources.

The North Carolina protocol has been widely adopted for use in other monitoring programs, including the Great Smoky Mountains National Park, and six years of macroinvertebrate monitoring has been accomplished using this

protocol in BISO. In most cases, sampling stations will be co-located with water quality monitoring stations, in order to provide park managers with the appropriate level of information needed to determine whether management changes are warranted.

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