

Carolina LabSheets®

# Simulating Macroinvertebrate Sampling for Assessing Freshwater Quality

## Overview

Clean, noncontaminated water is an essential natural resource for all living organisms—animals and plants. Assessing water quality provides the opportunity to gather and analyze data, construct explanations, and establish cause-and-effect relationships that guide individuals and municipalities in decision-making about current water quality and water quality treatment.

Water quality analysis is often a two-prong endeavor. One prong includes taking abiotic data such as temperature, dissolved oxygen levels, flow rate, and a chemical analysis for substances like nitrates, phosphates, silica, and heavy metals. The other prong is a biotic approach that requires sampling of the macroinvertebrates in a body of water.

What are aquatic macroinvertebrates? They are organisms that are large enough to be seen with the naked eye and lack a backbone. Examples of aquatic macroinvertebrates include insects in the larval or nymph stages, crayfish, mussels, clams, worms, and leeches. Most aquatic macroinvertebrates spend a portion of their life attached to logs, rocks, or vegetation in streams. Macroinvertebrates can be found in cool, fast-moving mountain streams to broad, muddy, slow-moving rivers.

Aquatic macroinvertebrates can be used as indicators of stream quality. They are affected by the physical (temperature, flow rate, dissolved oxygen), chemical (pollutants, sediments, and naturally occurring ions), and biological conditions of the stream. Macroinvertebrates are continuously bathed in the water and can't escape pollution. Consequently, they show the effects of short-term and long-term pollution and serve as water quality indicators.

You will use two different indexes of water quality indicators: the Biotic Index and the Pollution Tolerance Group index. The Biotic Index ranges in value from 0–10, with 0 being assigned to organisms that require clean, nonpolluted waters and 10 being assigned to organisms that can tolerate pollution. The calculation for Biotic Index can be completed on an individual organism (BI) or family basis (FBI). See the data sheet for calculation steps. The range of Biotic Index scores is 0.0–10.0 with a score of 0.0 indicating excellent water quality and 10.0 indicating very poor water quality.

## Objective

Determine stream water quality from simulated macroinvertebrate collection samples.

## Needed Materials

[Carolina® Aquatic Macroinvertebrate Card Set](#)

## Procedures

1. Obtain a “stream macroinvertebrate sample” of [Carolina® Aquatic Macroinvertebrate Card Set](#).
2. Complete the data table for the sample set.
3. You may be asked to analyze more than one stream sample.
4. Calculate stream health using pollution tolerance and biotic value.

*Continued on next page.*



