

BENTHIC MACROINVERTEBRATES

Biological Indicators of Water Quality that dwell in North American Streams

Macroinvertebrates are animals without backbones that are large enough to observe without a microscope.

We call them “**benthic**” when they dwell on the sediments and stones at the bottom of streams or attached to plants and wood in streambeds. The presence of a particular benthic macroinvertebrate can tell us a great deal about the health of a particular stream.

Common benthic macroinvertebrates include the larval and immature stages of many insects, such as dragonflies, stoneflies and mayflies, as well as permanent stream dwellers like mussels, crayfish, leeches, aquatic worms and snails. Aquatic insects are a choice group of organisms for biological monitoring since they live in the same stream long enough to

be exposed to the adverse effects of any pollutants that may be in the water. Because, unlike fish, the immature stages of insects are unable to escape less favorable conditions, previously unknown sources of pollution can be pinpointed by examining them.

Each creature varies in its ability to tolerate pollution (the dot beside each creature in the captions below indicates its pollution tolerance level). Mayfly larvae and nymphs need clear, oxygen-rich streams in order to thrive, while rat-tailed maggots and aquatic worms can tolerate very degraded waterways.

Water velocity is another thing to consider when determining the health of a stream by its benthic population. Faster-moving riffles may possess more **dissolved oxygen** (DO)

than in the slower-moving portions of the stream, and may be inhabited by different insect larvae or other benthic macroinvertebrates. See an example of the correlation between velocity and dissolved oxygen in the box below. Pollution is another factor that can decrease dissolved oxygen levels.

When studying your stream, remember that clean water is only part of it. A diverse stream community includes many habitats—riffles, runs, glides and pools, each varying in water velocity, dissolved oxygen, food, and shelter for its benthic community.

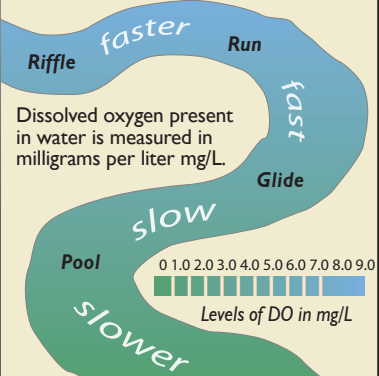


For more information contact:
Department of Environmental Protection
Division of Water & Waste Management
(304) 926-0499 www.dep.wv.gov/sos

Pollution Tolerance

● Low ● Mod ● Fair ● High

Water velocity can greatly affect oxygen levels beneficial to benthic macroinvertebrate communities in different portions of a stream.

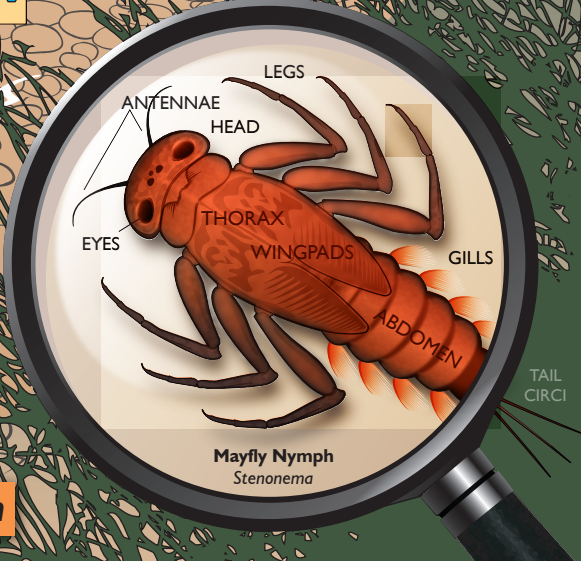


Dissolved oxygen present in water is measured in milligrams per liter mg/L

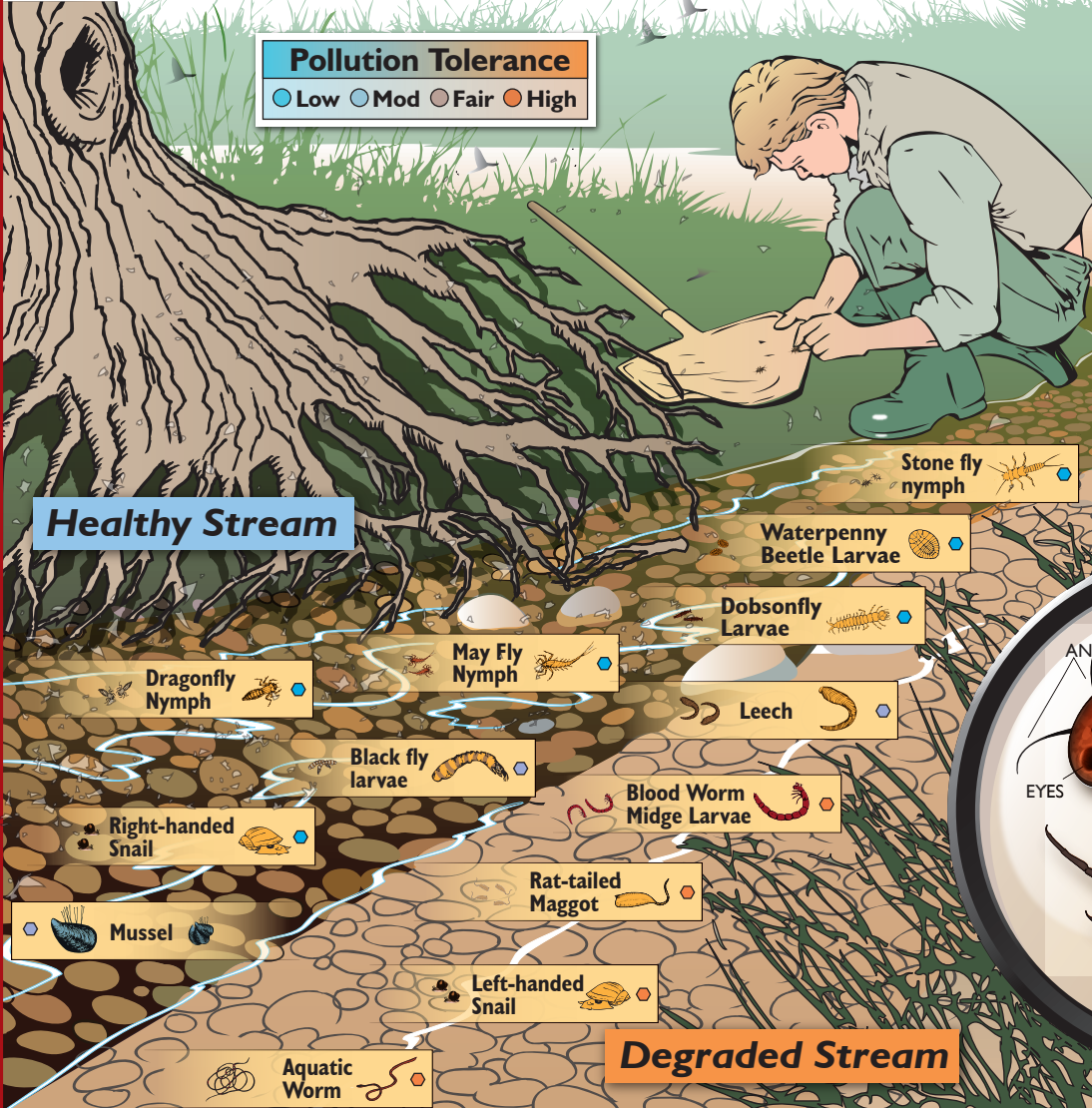
Levels of DO in mg/L

Healthy Stream

Degraded Stream



Mayfly Nymph
Stenonema



- Stone fly nymph (High)
- Waterpenny Beetle Larvae (High)
- Dobsonfly Larvae (High)
- May Fly Nymph (High)
- Dragonfly Nymph (High)
- Black fly larvae (High)
- Right-handed Snail (High)
- Mussel (High)
- Leech (High)
- Blood Worm Midge Larvae (High)
- Rat-tailed Maggot (Low)
- Left-handed Snail (High)
- Aquatic Worm (Low)