

Caring for Aquatic Macroinvertebrates

Best Practices for Educators



Aquatic macroinvertebrates are living animals that have evolved in cool, flowing, oxygen-rich streams. By re-creating these natural conditions as closely as possible, you can minimize stress during classroom investigations and help ensure they remain healthy until they are returned to their stream. Collect only what is needed for learning. Every organism plays an important role in the stream ecosystem.

What They Need

- Oxygen-rich water
- Cool temperatures
- Natural leaf food
- Places to hide and cling
- Minimal disturbance

Things to Avoid

- ✗ Direct sunlight
- ✗ Tap water with chlorine
- ✗ Sudden temperature changes
- ✗ Crowded containers
- ✗ Long-term captivity
- ✗ Overhandling

Collection

- Check for any required collection permits before sampling.
- Avoid collecting during extremely hot weather or when stream flows are unusually low, as aquatic organisms may already be under environmental stress.
- Never wash sampling containers or nets with soap immediately before sampling, as soap residues can be toxic to aquatic organisms.
- Transport macroinvertebrates in buckets or containers filled with stream water and secured with lids.
- Minimize handling whenever possible.
- Use battery-powered aerators (“bubblers”) during transport, and add small ice packs around the outside of the container if needed. Keep the water within approximately $\pm 5^{\circ}\text{F}$ of the stream’s original temperature.
- Collect only the number of organisms needed for your lesson. If holding organisms together, separate predatory species (such as dragonfly nymphs, crayfish, and hellgrammites) from smaller macroinvertebrates to prevent predation. Place larger macroinvertebrates, such as crayfish, in a critter carrier (see right) with a bubbler so it’s easier to view them with minimal disturbance.
- Include leaves, small sticks, and stream substrate (gravel or cobble) to provide natural food, shelter, and places for organisms to cling.



During Observations

- Keep water as close as possible to the stream temperature at the time of collection.
- Use an aerator whenever possible to maintain dissolved oxygen levels.
- Keep organisms submerged in stream water at all times. Avoid placing organisms directly in your hands, as oils, heat, and dry skin can harm delicate bodies and gills.
- Keep containers shaded and out of direct sunlight.
- Replace stream water periodically during extended programs.
- Handle organisms gently using spoons, soft paintbrushes, or plastic transfer tools. Avoid forceps whenever possible. Pipettes may be appropriate for very small organisms if used carefully, but soft paintbrushes or spoons are often safer.
- Return organisms promptly after observations.

Returning Macroinvertebrates to the Stream

- Return organisms gently to the same stream where they were collected.
- Whenever possible, release them near their original collection location, placing them back among leaves, rocks, or woody debris where they can quickly find shelter.
- After releasing organisms back into the stream, check nets and instructional supplies for any lingering organisms that may cling to surfaces.
- Minimize time away from their habitat.

Why These Recommendations Matter

Many aquatic macroinvertebrates — especially mayflies, stoneflies, and caddisflies — are adapted to cool, well-oxygenated streams. Warm water holds less dissolved oxygen while simultaneously increasing the organisms' metabolic demands, making them more vulnerable to stress. By maintaining cool, oxygen-rich conditions and minimizing handling, you'll help ensure healthier organisms, more natural observations, and a more meaningful learning experience for your students.

Good Stewardship Is Good Science

Every careful decision — from collecting only what is needed to returning organisms safely — helps protect stream ecosystems while modeling ethical scientific practices for students. Caring for aquatic macroinvertebrates teaches students that scientific investigations should always be conducted with respect for the living organisms that make discovery possible.