



A Word from the Watershed: The Importance of Being a Bug

By Corrie Aiuto

Spineless bugs are the backbone of the watershed. Love them or hate them, bugs care for and clean our waterways. They reveal clues about the overall health of a stream and the Upper Nehalem Watershed Council is keeping an eye on them.

The bugs I'm talking about, specifically, are macroinvertebrates (known as macros to the bug-loving community). These are creatures without internal backbones that are large enough to be seen with the naked eye. They can be insects like flies or beetles, or crustaceans, like crayfish, or things like worms. Anything we can see that creeps, flies, or burrows while lacking a spine fits into this category. That means the macroinvertebrate world is huge, including thousands of species. Estimates vary, but 95 – 97% of species on Earth are invertebrates of some kind and wildly outnumber humans.

Aquatic macros are fascinating and benefit the ecology by being a vital link in the food chain. They feed on all sorts of things larger animals cannot: fungi, organic matter (including feces), bacteria, and the microbiota. They are

then eaten by birds, fish, and mammals, making nutrients available to larger creatures. Depending on how they feed and where they live, they perform this task in different ways.

First, we have shredders. Shredders feed on coarse particulate organic matter, or CPOM, like leaves and vegetation that has fallen into the water. They tear and shred as they work, breaking down the CPOM until it becomes fine particulate organic matter, or FPOM, which floats away.

Next we have the filter-feeders, collectors, and gatherers. These three types feed on the FPOM now floating downstream from the shredder folk. Collectors and gatherers scavenge on the stream bottom, looking for tasty bits in the deep pools and between rocks. Filter-feeders enjoy gathering what floats past and some species are predatory, feeding on live prey.

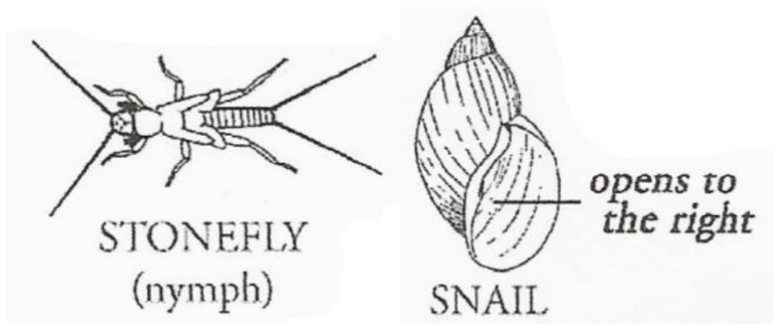
Then there are the grazers/scrapers. These creatures love biofilm, which is a community of microorganisms sticking together and sometimes clinging to a hard surface (classic examples include dental plaque and pond scum). Grazers/scrapers use their rasping mouthparts to scrape biofilm and algae off of rocks and plants, working to keep the nutrients moving along.

Finally, there are predators. Predators seem to occupy all parts of the stream, diving to the bottom for prey, floating mid-stream, resting on the surface,

clinging to rocks and plants, and flying about. Some consume smaller insects while others are voracious enough to prey on small fish.

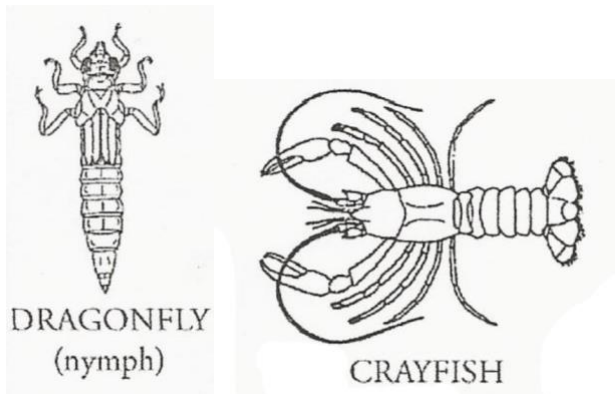
Because of the work they do breaking down organic matter and because they are a food source for so many animals, macroinvertebrates are an important part of a healthy watershed. They also serve science as a measuring tool. By taking samples of the macros in a body of water and looking at which species are present and which are absent we can gain knowledge about the health of a stream. This is because macros have varying levels of sensitivity to water quality and pollution.

Some species, like mayflies, stoneflies, and snails, are very sensitive to pollution, or pollution-intolerant. When they are dominant in a stream, you can safely assume the water quality is good. However, if they are not present in a habitat that should support them, that might be an indicator of lowered water quality.



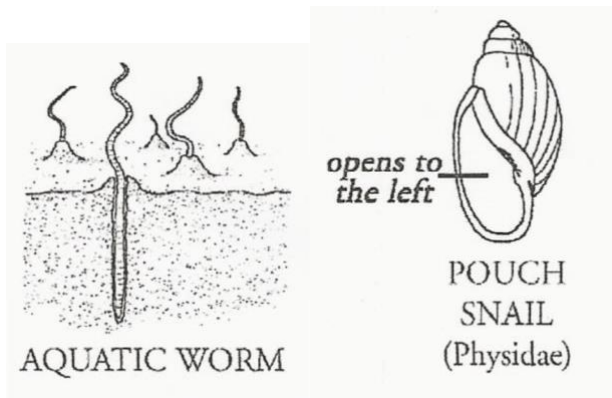
Examples of pollution-intolerant species

Other species of macros are tolerant to a wide range of water quality conditions. Their absence would signify poor water quality, while their abundance may not reveal much, since they would be present in all but the worst conditions. Examples in this category include crayfish, dragonfly nymphs, and scuds.



Examples of species that tolerate a wide range of conditions.

There are also certain species that generally tolerate pollution. When organisms in this group are dominant, that usually signals the water quality is fair to poor. Pouch snails, aquatic worms, roundworms, and leeches are a few of the pollution-tolerant types.



Examples of species tolerant of pollution.

Of course, when collecting macroinvertebrate samples and analyzing the data, there are important factors to consider. Stream morphology (how does the stream move across and reshape the land?) and geology (what kind of materials make up the stream bed and embankments?) can tell us a lot about what kind of creatures might like to live in that waterway. If the necessary habitat is absent, then naturally so are the macros that live in that habitat.

To help understand relationships between all the factors experts use different models to sort large amounts of data into meaningful information. One model, known as RIVPACS (River InVertebrate Prediction And Classification System), was first used in Great Britain and uses information from streams with the least human disturbance to create reference conditions. Data from the sample site can then be compared to the reference conditions to predict what kind of macros should be living and thriving there. Once the biological condition of the

sample site has been determined by a RIVPACS or similar model, then a Stressor model can be used to reveal what kind of pollution is causing problems. Stressor models, developed by our own Oregon DEQ staff, use temperature and fine sediment data to create a scoring system, where a stream is considered impaired if the temperature score is above 19.0 or the sediment score is above 13.

The Upper Nehalem Watershed Council, in conjunction with the Xerces Society and Oregon Trout (now Freshwater Trust) conducted macroinvertebrate sampling from 1998 to 2002 and found moderate to severe impairment below the Fishhawk Lake reservoir and slight impairment at other sites throughout the Upper and Lower Nehalem. This confirms what we already know: that the watershed struggles to maintain habitats that support biodiversity in the face of human disturbance. More sampling is needed to see what conditions are like now, but funding for such projects has become scarce in recent years.

Macroinvertebrates are intriguing, important creatures that serve the watershed well. Whether they shred, scrape, or filter, their work helps keep the ecology in balance. Without these strange, sometimes terrifying-looking creatures our waterways could not function and the entire food chain would feel the impacts. We all must care about the wellbeing of bugs, so give a thumbs up to the next dragonfly or spider you see rather than the hard side of a rolled-up magazine.

If you want to learn more about macroinvertebrates and their effect on our watershed or if you want to become an eco-volunteer, reach out to the Upper Nehalem Watershed Council. Call (503) 429-0869 or visit our website at unwc.nehalem.org.

Be sure to join us at our next board meeting with presenter Chris Rasor of Weyerhaeuser to discuss herbicide use in a forestry setting. It will be held on Thursday, September 26 from 5:30 pm to 7:30 pm in the daylight basement of 1201 Texas Avenue, Suite A, Vernonia. All are welcome and we hope to see you there.