FACT sheet

WATERWATCH Goulburn/Broken Catchment

OUR CATCHMENT - Aquatic Macro-invertebrates

What are aquatic macro-invertebrates?

Aquatic macro-invertebrates or 'macros' are animals without backbones that live all or part of their life in water and can be seen without the aid of a microscope. They include many insects, crustaceans, molluscs, worms and mites.

Indicators of water quality

Macro-invertebrates are good indicators of water quality because:

- They are affected by physical, chemical and biological conditions of the waterway.
- They are a critical part of the aquatic food web - feeding on plants and being eaten by predators.
- They can't easily escape pollution and therefore can show the effects of short and long term pollution events in a waterway.

Some macro-invertebrates are more tolerant to pollution than others. If a stream is polluted, tolerant macro-invertebrates will usually be found in larger numbers than the more sensitive ones. However, if a habitat is close to pristine or in its natural state, tolerant macro-invertebrates will be found alongside the more sensitive ones which will be in equal or greater numbers than the tolerant ones.

Other reasons why they are good indicators of water quality are:

- They are found in almost every water body, even ones that may be dry from time to time.
- They are easy to catch with simple hand nets and are relatively easy to identify.

How is a macro sample taken?

There are two main ways macro-invertebrates can be sampled:

- A **Kick Sample** is taken from the water and a net is placed downstream of the sampler so that the current flows through the net. To collect the sample the stream bed is disturbed by the sampler vigorously kicking the mud and stones around their feet. This disturbs the macros living in or on the rocky bottom of the waterway and allows the current to sweep them into the net.

- A **Sweep Sample** is a sample is taken from the vegetation overhanging the edge of the waterway and from the emergent vegetation in the shallow water. The net is vigorously swept through the water around the banks of the stream, sweeping around and through any vegetation or other material in this area. One method is to walk along the stream bank and scrape the surface of tree roots, gravel, leaf packs (piles of leaves), and other debris with a net. This samples the macros living in and around the vegetation and/or edges of waterways. It can also be used to sample the beds of muddy bottom streams.

What do we do with a macro sample?

After collection of a sample, the macros are sorted, identified and counted.

Once sorted, counted and identified with their common name, such as boatman or backswimmer, it is usually easier to identify macros with their family and species name using a microscope and reference texts and keys.

Under the microscope we can look at the number of appendages, mouth parts, antennae, segmented legs. All of this information together with the help of taxa keys is used to help us identify the sampled macros with their scientific name.

How are macros used as an indicator of water quality?

After determining the type and number of macros collected from a waterway, we can use this information to tell us more about the health of a waterway.

Certain macro-invertebrate species prefer particular conditions, and this knowledge allows us to rate the robustness of each bug. If a particular species is only ever found in mountain streams with fast running water and low turbidity, it is assumed that it is a weak or sensitive species, as it can't live anywhere but pristine conditions. This species would receive a **high** rating.

Alternatively, a macroinvertebrate found in the pristine streams, but also in turbid, urban waterways much further down in the catchment, is assumed to be strong, as it can handle imperfect conditions, and would receive a **low** rating.

Based on this concept, aquatic macro-invertebrates can be divided into four main categories:

1. Very Sensitive invertebrates
2. Sensitive invertebrates
3. Tolerant invertebrates
4. Very Tolerant invertebrates

Within each category are further levels to assist with accurate rating. In the sensitive category there are varying levels of sensitivity —both damselfly larvae and water mites are classified as sensitive, but damselfly has a rating of 6 while water mites score 5.

Using this method, the water sample is given an overall score which, by using an interpretation chart, gives the numbers and rating scores some meaning.

Some common Macros

Backswimmer: has two pairs of piercing mouth parts, can be found up to 70mm in size

Boatman: likes vegetated areas or still or flowing waterways, amongst rocks and vegetation.

Freshwater Shrimp: has fanned tail, bent abdomen, small spine above the eye. Prefers lowland rivers.

Water Mite: likes well vegetated, shallow areas of both flowing or still water. 4 pairs of legs, no antennae.

Water Strider: flat and long, without wings, sometimes called pond skaters, skim on top of the water.

Leech: feeds on blood of people and animals, segmented cylindrical worm with a sucker on each end.

Macro sampling with schools

School groups enjoy sifting through water samples from their local river or creek and use sophisticated catching equipment (plastic spoons!) and two-way microscopes to catch and identify what is living in the water.

For further information

Please visit the Goulburn Valley Water website: www.gvwater.vic.gov.au

or contact a Goulburn Valley Water Education Officer:

Phone: 5832 0400 Fax: 5831 1467

Email: education@gvwater.vic.gov.au