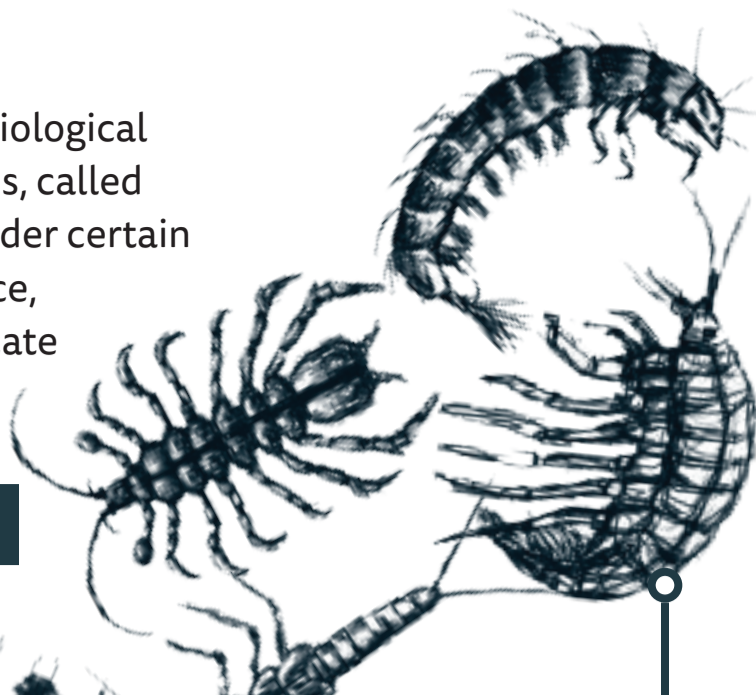


# BIOMONITORING WHYS AND HOWS

## WHAT IS BIOMONITORING?

Biomonitoring uses aquatic organisms as biological indicators of water quality. These organisms, called benthic macroinvertebrates, only thrive under certain water quality conditions, so their abundance, distribution, and overall presence can indicate watershed health.



## BENTHIC MACROINVERTEBRATES

Live at the bottom of a water body between stones, within organic debris, and on aquatic plants.

Large enough to see with the naked eye



Do not have an internal skeleton

All crayfish, clams mussels and some snails and worms are aquatic their whole lives. Most insects found in streams are larvae that become terrestrial for a short time.

## VARIABLES IMPACTING BENTHIC MACROINVERTEBRATES

Conditions that impact the diversity and population density of benthic macroinvertebrates can be abiotic, biotic, and/or cultural.

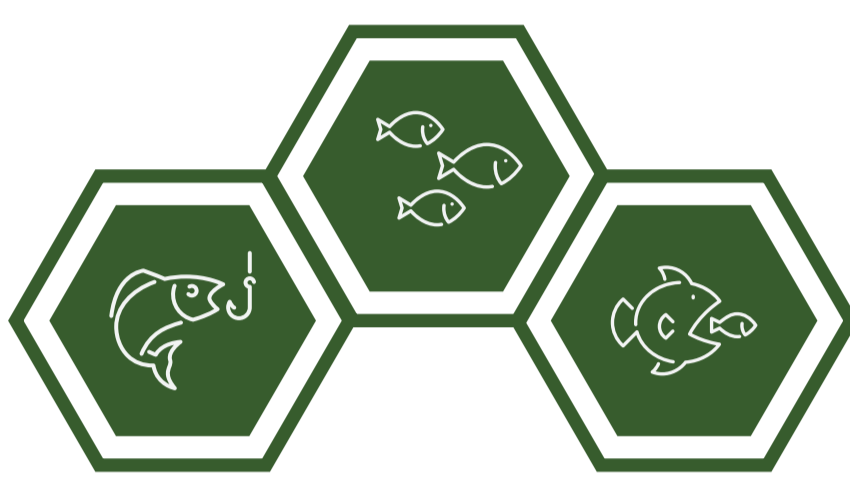


### ABIOTIC CHANGES

Chemical pollutants, Sedimentation, Temperature extremes, Dissolved oxygen levels, Flow rates, and Water depth

### BIOTIC CHANGES

Loss of a food source, competition, and predation



### CULTURAL CHANGES

Changes in upstream land use by humans

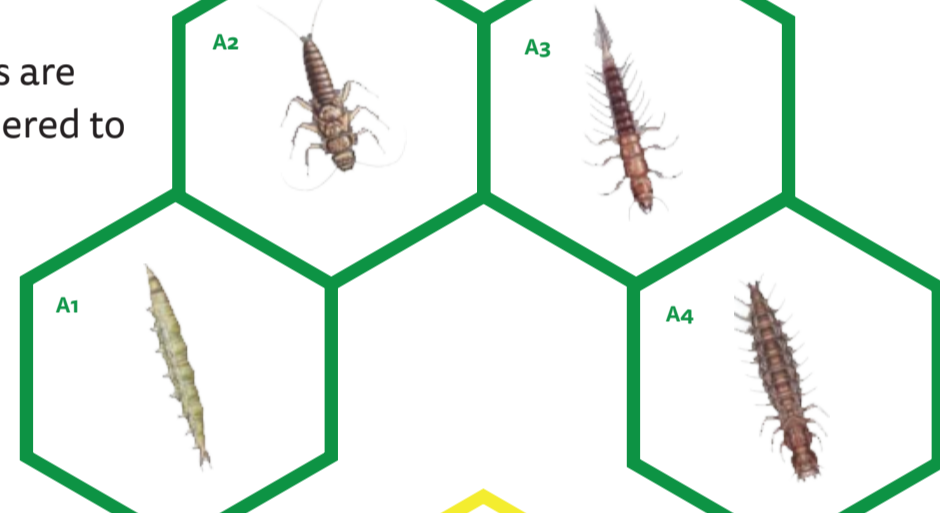


## WHY BIOMONITORING WORKS

Based on the species that are found in a sample, the number of each species found, and each species tolerance for pollution, a general assessment of watershed health can be determined.

### GROUP A

These organisms are generally considered to be intolerant to pollution



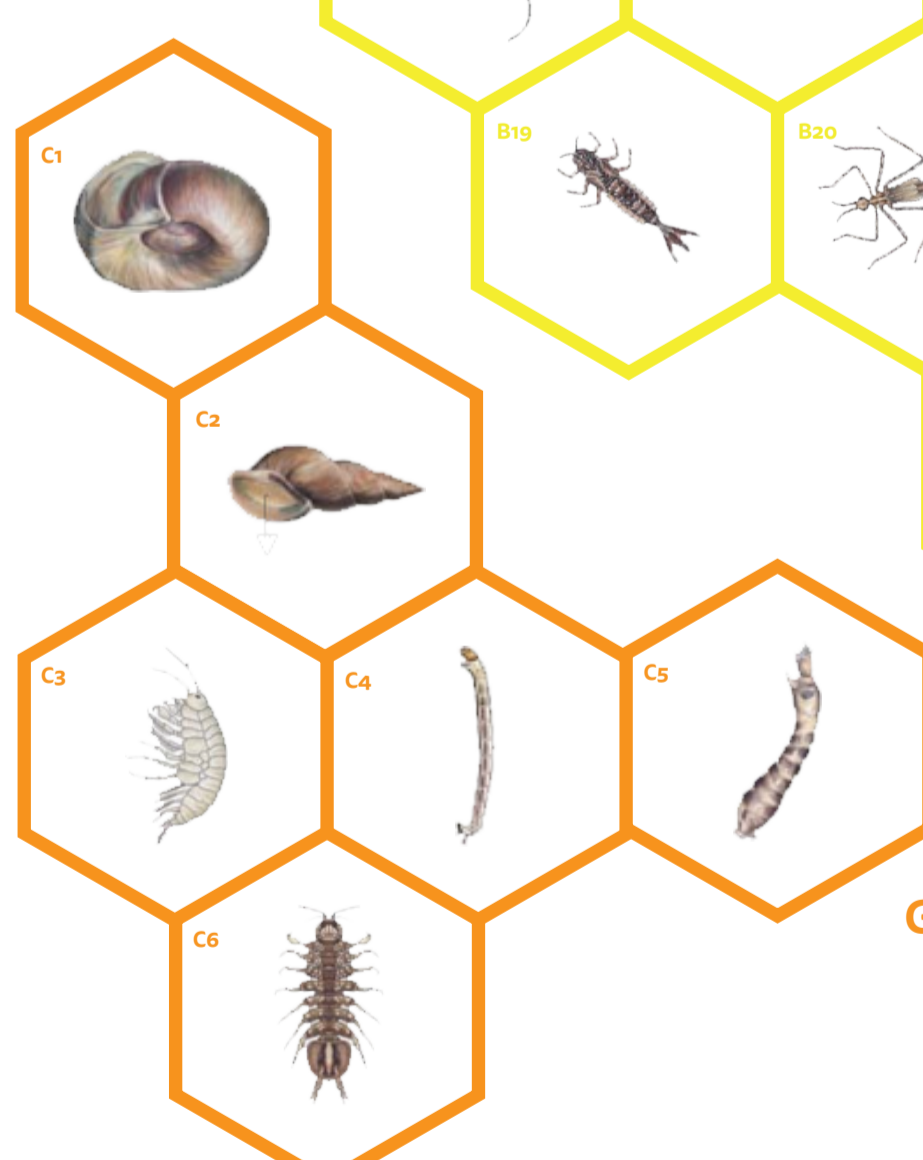
### GROUP B

These organisms are generally considered to be moderately intolerant to pollution



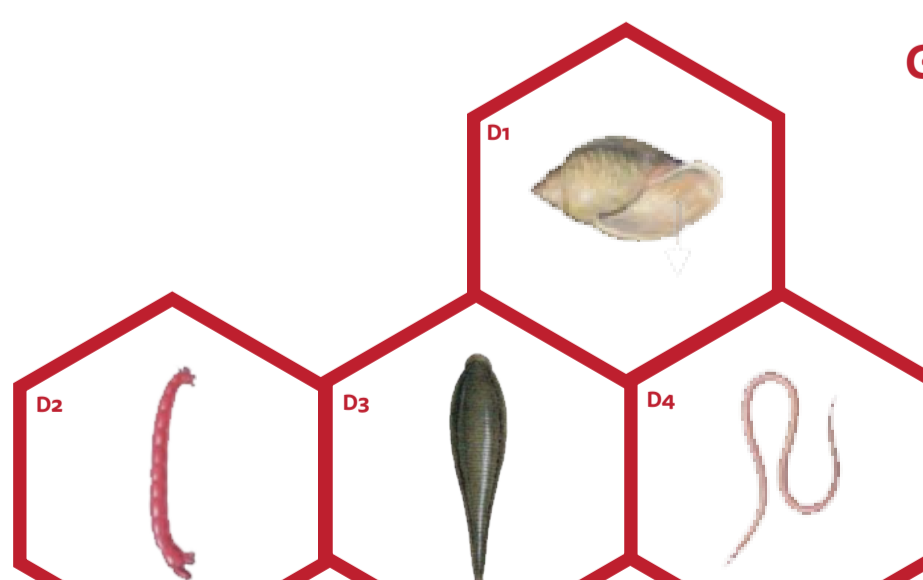
### GROUP C

These organisms are generally considered to be fairly tolerant to pollution



### GROUP D

These organisms are generally considered to be very tolerant to pollution



## MACROINVERTEBRATE KEY

### GROUP A

- A1. Snipe Fly Larva
- A2. Stonefly Larva
- A3. Alderfly Larva
- A4. Dobsonfly Larva

### GROUP C

- C1. Orb Snail
- C2. Right-Handed Snail
- C3. Scud
- C4. Midge Larva
- C5. Black Fly Larva
- C6. Sowbug

### GROUP D

- D1. Left-Handed Snail
- D2. Bloodworm Midge Larva
- D3. Leech
- D4. Aquatic Worm

### GROUP B

- B1. Caddisfly Larva
- B2. Caddisfly Larva
- B3. Case Maker
- B4. Water Penny
- B5. Fingernail Clam
- B6. Caddisfly Larva
- B7. Freeswimming Caddisfly Larva
- B8. Asiatic Clam
- B9. Zebra Mussel
- B10. Riffle Beetle Larva
- B11. Mayfly Larva
- B12. Crayfish
- B13. Cranefly Larva
- B14. Mussel
- B15. Broadwinged Damselfly Larva
- B16. Mayfly Larva
- B17. Damer Dragonfly Larva
- B18. Riffle Beetle
- B19. Mayfly Larva
- B20. Skimmer Dragonfly Larva
- B21. Skimmer Dragonfly Larva
- B22. Skimmer Dragonfly Larva

## SOURCES

1. <https://wikiwatershed.org/>
2. <https://www.macroinvertebrates.org/>
3. <https://leafpacknetwork.org/>
4. [https://scioly.org/wiki/index.php/Water\\_Quality/Macroorganism\\_List](https://scioly.org/wiki/index.php/Water_Quality/Macroorganism_List)
5. <http://www.gmcg.org/wp-content/uploads/2018/08/Litcurriculum.pdf>
6. <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/water/>
7. "Macroinvertebrate Monitoring." Macroinvertebrate Monitoring (n.d.). n. pag. Newman Boston. The Newman School. Web. 29 Mar. 2016.
8. Macroinvertebrates Chart, Pollution metal print by Spencer Sutton.