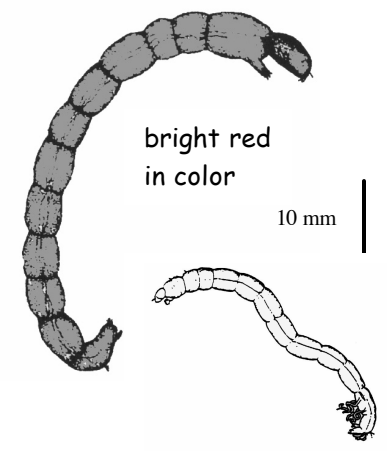
Group 4 ~ Very Tolerant to Pollution

(Average Actual Size)

Aquatic worms

Phylum	Annelida
Class	Oligochaeta
Where to find	Silty sediment, organic debris
Body shape	Long, thin, cylindrical, segmented
Size	1 – 70 mm
Feeding groups	Shredder, collector, grazer
Distinguishing Characteristics	Often similar to earthworm in appearance Red, tan, black, or brown in color **Distinguished from leeches, midges, and planarians by long, thin body and worm-like movement (stretching and pulling body along)*

Blood Midge larva



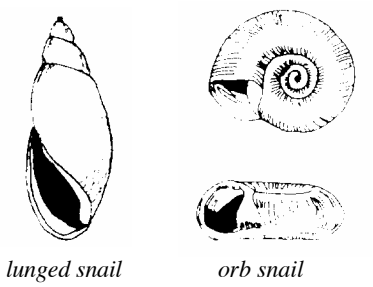
Order	Diptera (True Flies)
Family	Chironomidae
Where to find	Silty sediment, often in organically polluted water
Body shape	Cylindrical, thin, soft, and often curled
Size	2 - 20 mm
Feeding group	Collector gatherer
Lifecycle	Complete metamorphosis
Distinguishing Characteristics	Red in color No true legs, but very small anterior and posterior prolegs Hardened head capsule **Distinguished from red aquatic worms with small, but visible head and prolegs*

Group 4 ~ Very Tolerant to Pollution

(Average Actual Size)

Left-Handed (Lunged) snail

50 mm



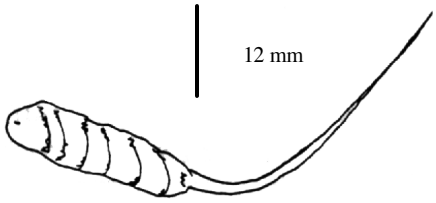
lunged snail *orb snail*

also, limpets

Phylum	Mollusca
Class	Gastropoda
Order	Prosobranchia
Where to find	Grazing on a variety of substrates
Body shape	Hard shell usually spiral, but may be flattened
Size	2 - 70 mm
Food source	Grazer
Distinguishing Characteristics	With point held up and shell opening facing you, opening is on your left Snails with shells coiling in one plane (orb snail) are also counted as Left-Handed No plate-like covering over shell opening Respire via lung-like structures, so not dependent on dissolved oxygen in the water – they can obtain oxygen from the atmosphere Only **live** snails may be counted on Biological Monitoring Data Sheet

Rat-tailed maggot

12 mm



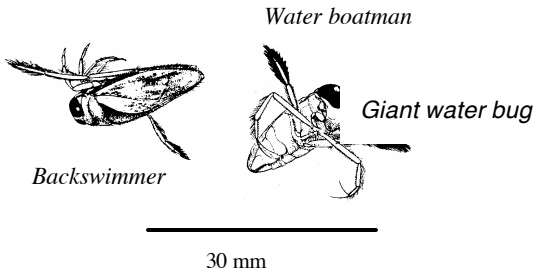
Order	Diptera (True Flies)
Family	Syrphidae
Where to find	Silty sediments of organically enriched water
Body shape	Soft, worm-like with long tail
Size	Usually 4 - 14mm, may exceed 70mm
Feeding group	Collector
Lifecycle	Complete metamorphosis
Distinguishing Characteristics	Maggot-like, wrinkled body Anglers call them "mousies" Long tail (can be 3 – 4x body length), which is actually a snorkel-like breathing tube Tail is extended above surface of the water allowing rat-tailed maggot to obtain oxygen from the atmosphere

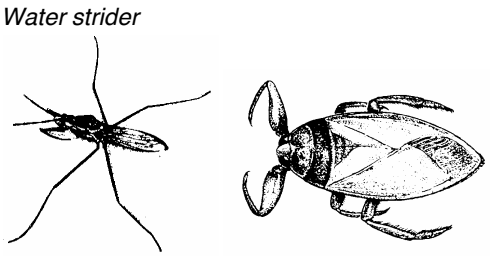
Other Organisms

There is a possibility that you will discover insects and other organisms that are not listed on the Pollution Tolerance Index (e.g., adult dragonflies, water striders, water bugs). They are not counted in the PTI. These organisms are not as useful as indicators of water quality because they are less dependent on local stream conditions for habitat requirements.

True bugs

(Backswimmer, Giant water bug, Water boatmen, Water strider)





Order	Hemiptera
Where to find	Often seen skimming or walking along water surface
Body shape	Hard, oval, and somewhat flattened
Size	1 – 65 mm
Feeding group	Predator. Injects chemicals that dissolve the internal parts of prey.
Lifecycle	Incomplete metamorphosis, adults and larvae are quite similar
Distinguishing Characteristics	Head and eyes often well developed 3 pairs of legs may be dissimilar (hindlegs may be flattened and hinged) Forewings, when at rest, are held close over the back and overlap Because adults are mobile, they are not a good indicator of water quality **May be confused with adult water beetle, but beetle's wings do not overlap*

Waterboatman - swims right side up, back is black

Backswimmer - swims on back, back is white

Water Strider - lives on surface, walks on water

Giant Water Bug - grasping front legs, up to three inches in length

Information in this section was modified from the following sources:

An Introduction to the Aquatic Insects of North America, Second Ed., Edited by R.W. Merritt and K.W. Cummins
Aquatic Entomology, Patrick McCafferty
Clinton River Watershed Council *Teacher Training Manual*, Michigan, Meg Larson
Field Manual for Water Quality Monitoring, 10th Ed., Mark K. Mitchell and William B. Stapp
Macroinvertebrate Identification Flash Cards, GREEN/Earth Force, Ann M. Faulds, et al.
Pond and Stream Safari, Karen Edelstein, Cornell Cooperative Extension
Save Our Streams Monitor's Guide to Aquatic Macroinvetebrates, Loren Larkin Kellogg