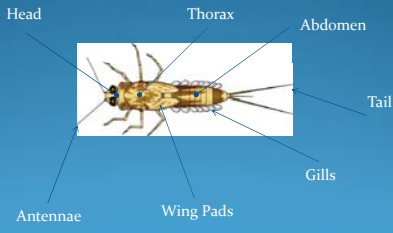




An Introduction to Benthic Macroinvertebrates

Macroinvertebrate	Fully	Count	Macroinvertebrate	Fully	Count
Hydra			Curculionidae		
Flat Worms			Water Bugs		
Leech			Beetles		
Caddisfly			Flies		
Stonefly			Dragonflies		
Trout			Water Penny		
Shrimp			Other Insects		
Amphipods			Land Snail		
Mayflies			Land Snail		
Crustaceans and Invertebrates			Clams		
Polychaetes, Flatfish, and Annelids			Other Invertebrate Macroinvertebrates		
TOTAL NUMBER OF ORGANISMS IN SAMPLE					

Body Parts



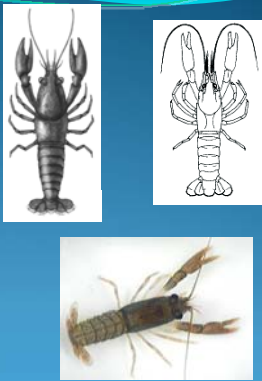
Crayfish

Order: Decapoda
Size: up to 5"

Tolerance: Somewhat sensitive, can withstand large ranges of pH and temperatures and is sensitive to toxic substances

Distinguishing Characteristics:

- Resembles a lobster
- Has 10 legs and the two front legs have large claws or pinchers



Clams and Mussels

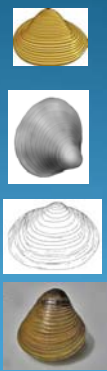
Class: Bivalvia
Size: up to 5"

Tolerance: Somewhat sensitive


Distinguishing Characteristics:

- Fleishy body enclosed between two clamped shells
- If alive, the shells cannot be pried apart
- When monitoring, do not count empty shells

Clams



Mussels



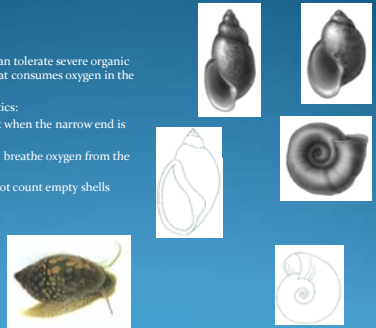
Lunged Snails

Class: Gastropoda
Size: up to 2"

Tolerance: Tolerant. They can tolerate severe organic or nutrient pollution that consumes oxygen in the water





Distinguishing Characteristics:

- Usually opens to the left when the narrow end is pointing upward
- Have no operculum and breathe oxygen from the air
- When monitoring, do not count empty shells







Gilled Snails
Class: Gastropoda
Size: 1/4"-1"
Tolerance: Sensitive
Gill breathing; therefore, they are more sensitive to low dissolved oxygen than lunged snails
Distinguishing Characteristics:

- Usually opens to the right when the narrow end is pointing upward
- Shell opening covered by a thick plate (operculum)
- When monitoring, do not count empty shells



Aquatic Worms
Class: Oligochaeta
Size: Usually 1" but up to 4"
Tolerance: Tolerant
Distinguishing Characteristics:

- Can be very tiny and slender or look similar to earthworms
- No legs, distinct head or any mouthparts
- Segmented body
- Aquatic worms can indicate organic pollution when they dominate the majority of the sample collection







Leeches
Class: Hirudinea
Size: 1/4" to 2"
Tolerance: Tolerant
Distinguishing Characteristics:

- Somewhat slimy, soft, segmented body
- Two suckers on the underside of the body, one in the front and one in the rear
- Can be confused with a flatworm, however flatworms have no suckers and leeches have fine lines (annuli) across the body






Flatworms
Class: Turbellaria
Size: 1/4" to 2"
Tolerance: Tolerant
Distinguishing Characteristics:

- Body flattened dorsally;
- 2-eyespot present giving the animal a cross-eyed appearance; head usually arrow shaped.






Aquatic Sow Bugs
Order: Isopoda
Size: 1/4" - 3/4"
Tolerance: Somewhat sensitive
Distinguishing Characteristics:

- Flat, segmented body
- Has an "armored" appearance
- Seven pairs of legs
- Can be confused with scuds, however they are flattened top to bottom





Scuds
Order: Amphipoda
Size: 1/8" to 1/4"
Tolerance: Somewhat sensitive
Distinguishing Characteristics:

- Resemble a small shrimp
- Translucent body with silvery-gray or tan coloration
- Seven pairs of legs
- Unlike sow bugs, scuds are flattened side to side





Black Flies
Order: Diptera
Size: up to 1/4"
Tolerance: Tolerant
Distinguishing Characteristics:

- The body is larger at the rear end similar to the shape of a bowling pin
- The distinct head contains fan-like mouth brushes
- Often curl into a "u" shape when held in your hand




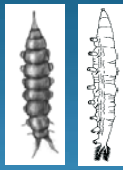
Midge Flies
Order: Diptera
Size: up to 1/4"
Tolerance: Tolerant, they can indicate poor stream health caused by pollution if found in large numbers
Distinguishing Characteristics:



- Often whitish to clear, but occasionally bright red
- Segmented body
- Has distinct head with two small prolegs in the front of the body
- Display a spastic squirming action in the water



Aquatic Snipe Flies
Order: Diptera
Size: 1/4" to 1"
Tolerance: Sensitive
Distinguishing Characteristics:


- Body is pale brown to green color
- Mostly cylindrical, with the front tapering to a cone-shaped point
- Larva have a number of mostly paired caterpillar-like prolegs
- Two stout, pointed tails with feathery hairs at back end





Dance Flies

Horse Flies



Hellgrammites and Alderflies
Order: Megaloptera
Size: 1/4" to 4"
Tolerance: Somewhat sensitive
Distinguishing Characteristics:

- Stout body with large pinching jaws
- Eight pairs of pointed lateral appendages
- On the rear end of the body a pair of stubby, unjointed legs (prolegs), each with a pair of claws
- Dobsonflies/Hellgrammites have paired cotton-like gill tufts, fishflies lack these
- Fishflies have two short tube-like structures on the tail end

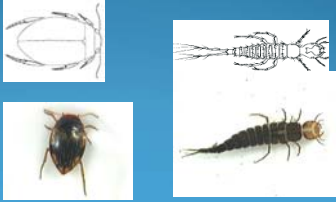


Hellgrammites

Alderflies


Whirligig Beetle
Order: Coleoptera




Predaceous Diving Beetle
Order: Coleoptera




Water Pennies
Order: Coleoptera
Size: up to 1/2"
Tolerance: Very sensitive
Distinguishing Characteristics:

- Looks like a flat, oval disc
- Plates extend from all sides
- Cannot survive on rocks covered with excessive algae or inorganic sediment







Riffle Beetle
Order: Coleoptera
Size: 1/16" to 1/8"
Tolerance: Sensitive
Distinguishing Characteristics:

- Very small
- Dark colored
- Adult riffle beetle will be found walking on the bottom of the stream
- algae or inorganic sediment







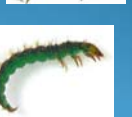







Common Net Spinning Caddisflies
Order: Trichoptera
Family: Hydropsychidae
Size: up to 1"
Tolerance: Somewhat sensitive
Distinguishing Characteristics:

- Body is caterpillar-like with three pairs of legs and is strongly curved
- Dorsal plates (sclerites) on all three thoracic segments
- Branched gills on the ventral surface of the last two thoracic segments and most of the abdominal segments
- Usually have a bristle-like, setal tuft at the end of each anal proleg
- Color varies from bright green to dark brown



Most Caddisflies
Order: Trichoptera
Size: 1/2" to 1 1/2"
Tolerance: Sensitive
Distinguishing Characteristics:





- Larva is caterpillar-like with three pairs of legs and tends to curl up slightly
- Two claws at posterior (rear) end
- May be found in a stick, rock, or leaf case with its head sticking out









Damselflies and Dragonflies
Order: Odonata
Size: 1/2" to 2"
Tolerance: Somewhat sensitive
Distinguishing Characteristics:

- Both have large eyes, six legs, and a large lower lip that covers much of the bottom of the head
- Damselflies are slender and have three oar shaped tails (gills)
- Dragonflies have a stocky body without tails

Damselflies












Dragonflies










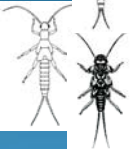



Mayflies
Order: Ephemeroptera
Size: 1/4" to 1"
Tolerance: Sensitive
Distinguishing Characteristics:

- Usually three long, hair-like tails (but sometimes only two)
- Gills present on the rear half of body
- 1 hook on each foot




Stoneflies
Order: Plecoptera
Size: 1/2" to 1 1/2"
Tolerance: Sensitive
Distinguishing Characteristics:


- Two hair-like tails
- No gills on rear half of body
- Structurally similar to mayfly nymphs, but have two tails instead of the usual three in mayflies
- 2 claws on each foot




Other Non-Benthic Stream Invertebrates




Water Scorpion (Order Hemiptera)




Water Boatman (Order Hemiptera)




Water Mites (Arachnids)



Water Striders (Order Hemiptera)



Backswimmer (Order Hemiptera)



Mosquito Larvae (Order Diptera)

