

Stream Sampling Workbook

Loudoun Wildlife Conservancy
March 9, 2014






















Benthic Invertebrate Identification using VASOS



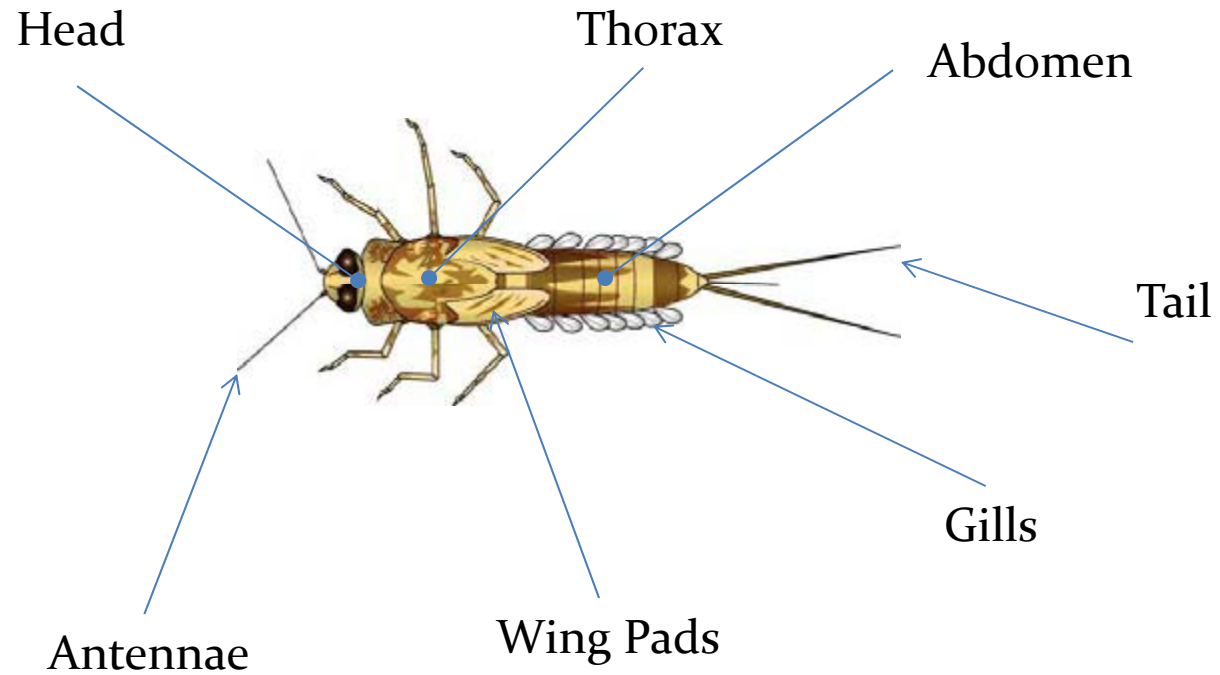
vasos.org

Tally Sheet

Macroinvertebrate	Tally	Count
Worms 		
Flat Worms 		
Leeches 		
Crayfish 		
Sowbugs 		
Scuds 		
Stoneflies 		
Mayflies 		
Damselflies and Dragonflies 		
Hellgrammites, Fishflies, and Alderflies 		

Macroinvertebrate	Tally	Count
Common Netspinner 		
Most Caddisfly 		
Beetles 		
Midges 		
Blackflies 		
Most True Fly 		
Gilled Snail 		
Lunged Snail 		
Clams 		
Other Subsurface Invertebrates		
TOTAL NUMBER OF ORGANISMS IN SAMPLE		

Body Parts



Crayfish

Order: Decapoda

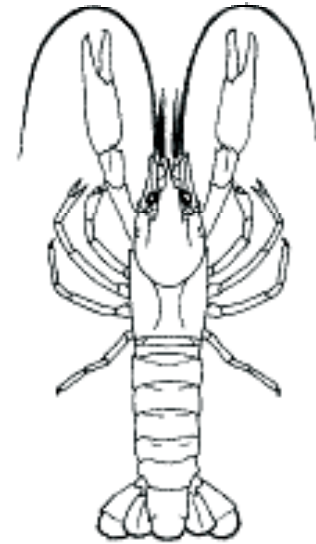
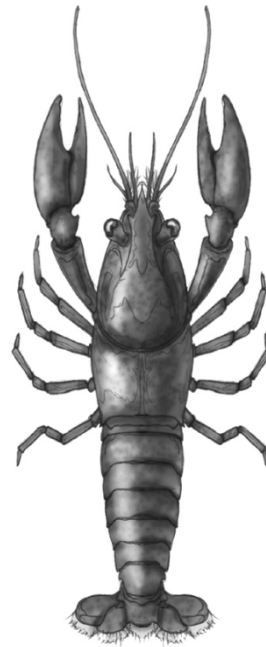
Size: up to 5"

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

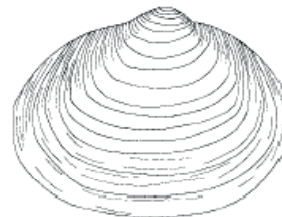
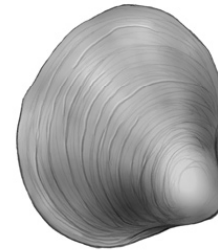
Size: up to 5"

Tolerance: Somewhat sensitive

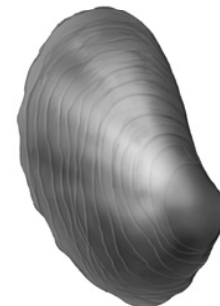
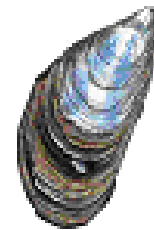
Distinguishing Characteristics:

- Fleshy 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

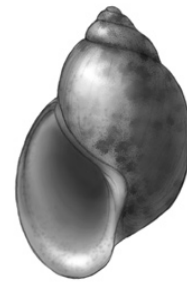
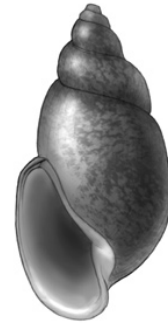
Class: Gastropoda

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

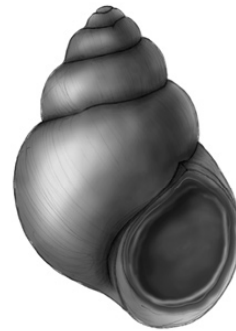
Size: ¼"-1"

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

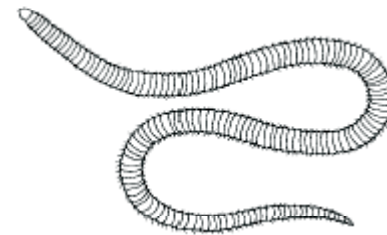
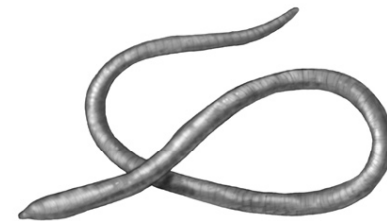
Class: Oligochaeta

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

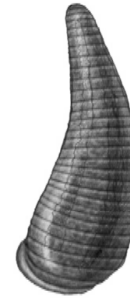
Class: Hirudinea

Size: ¼" 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: ¼" 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

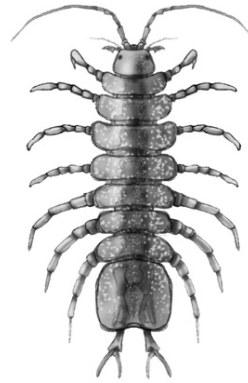
Order: Isopoda

Size: $\frac{1}{4}$ " - $\frac{3}{4}$ "

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

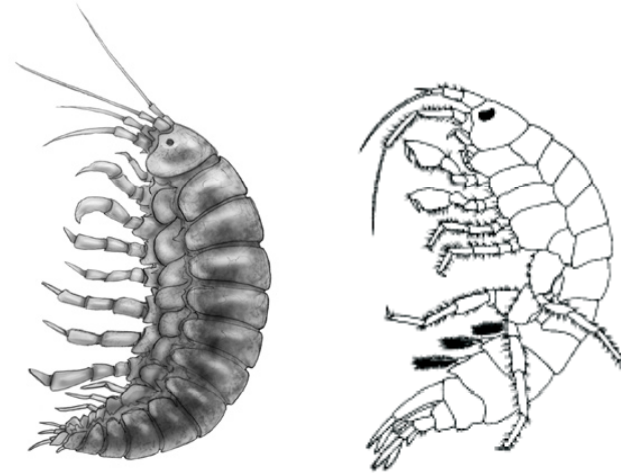
Order: Amphipoda

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 ¼"

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

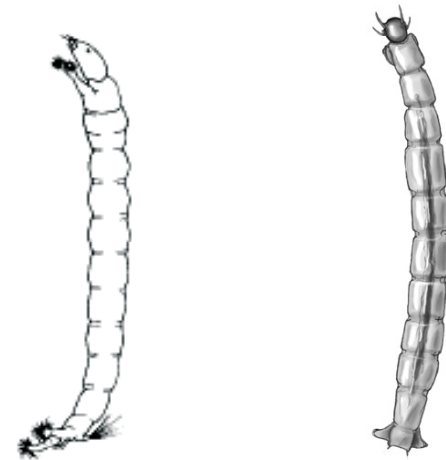
Order: Diptera

Size: up to ¼"

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

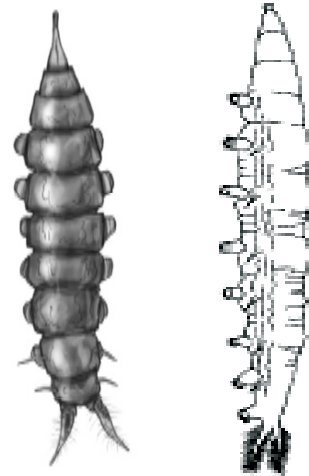
Order: Diptera

Size: ¼" 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



Crane Flies

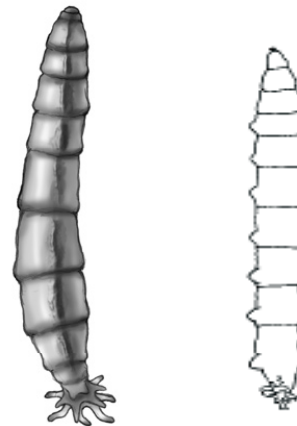
Order: Diptera

Size: ⅓" to 2 ½"

Tolerance: Somewhat sensitive

Distinguishing Characteristics:

- Worm-like plump body
- Can be found in a variety of colors (clear, white, brown, and green)
- Segmented body with finger-like projections (gills) at the back end
- Head is usually pulled back into the front of the body



Hellgrammites and Alderflies

Order: Megaloptera

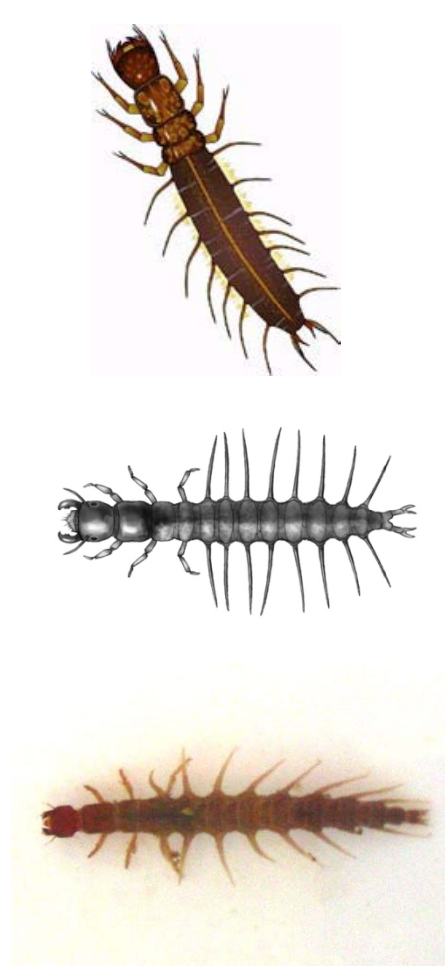
Size: $\frac{3}{4}$ " to 4"

Tolerance: Somewhat sensitive

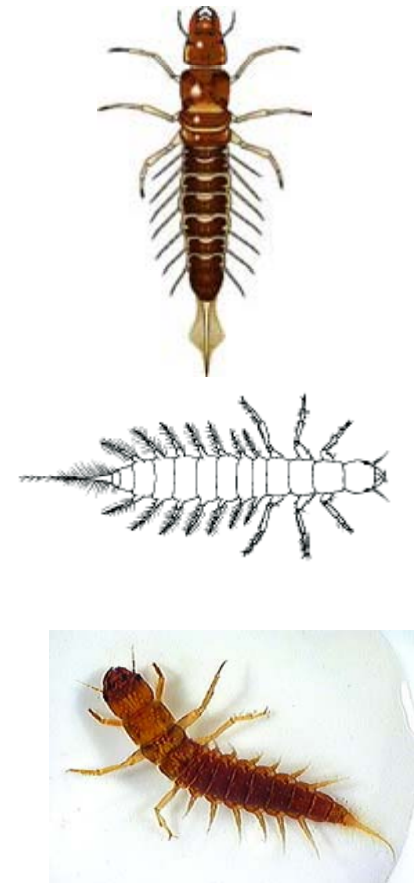
Distinguishing Characteristics:

- 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

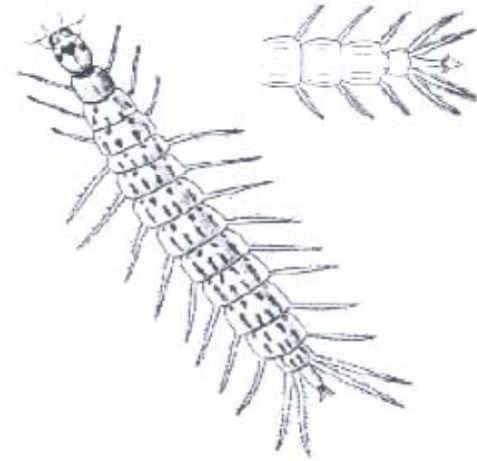


Whirligig Beetle
Order: Coleoptera

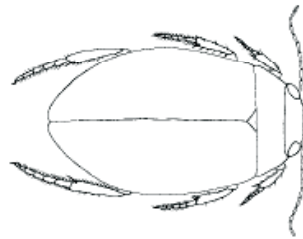
Adult



Larvae



Predaceous Diving Beetle
Order: Coleoptera



Water Pennies

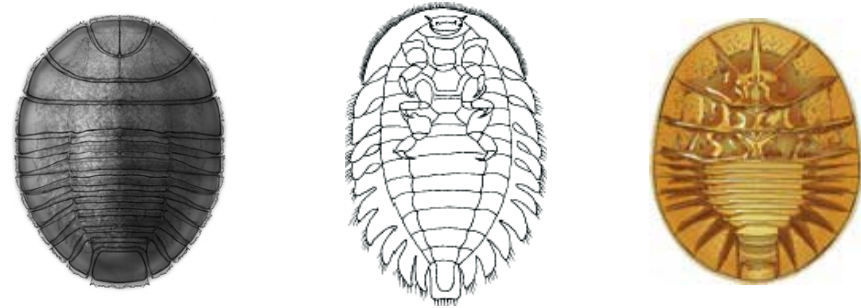
Order: Coleoptera

Size: up to ½"

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



Adult

Larvae

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

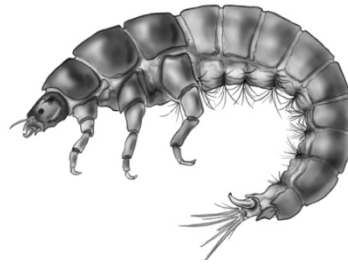
Family: Hydropsychidae

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

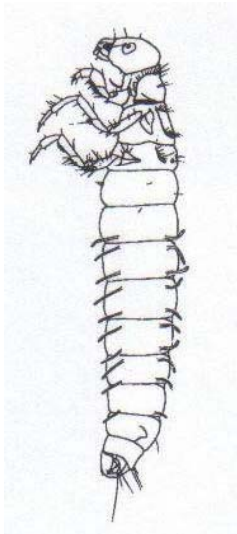
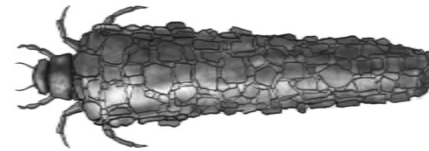
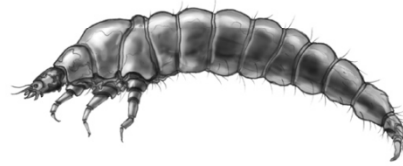
Order: Trichoptera

Size: ½" to 1 ½"

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

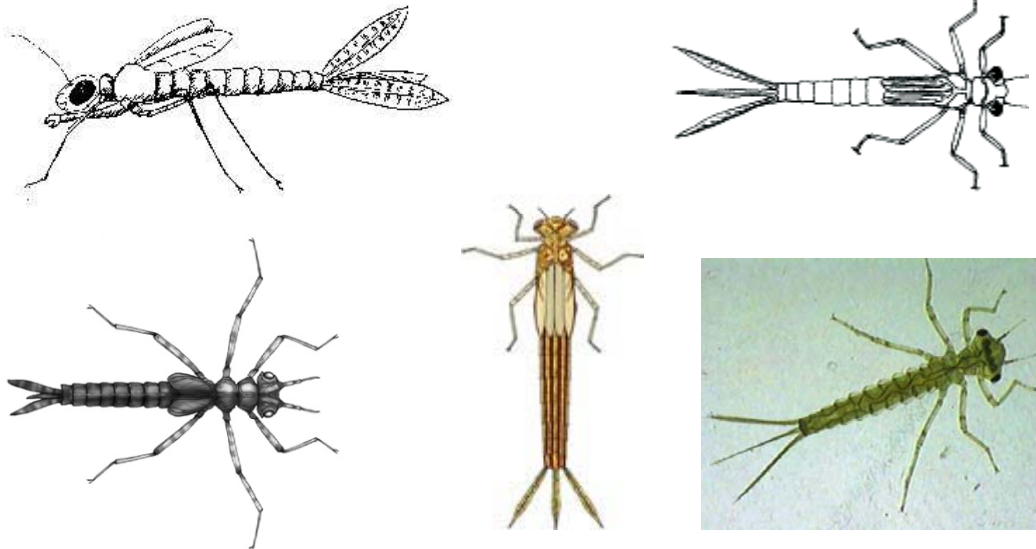
Size: ½" to 2"

Tolerance: Somewhat sensitive

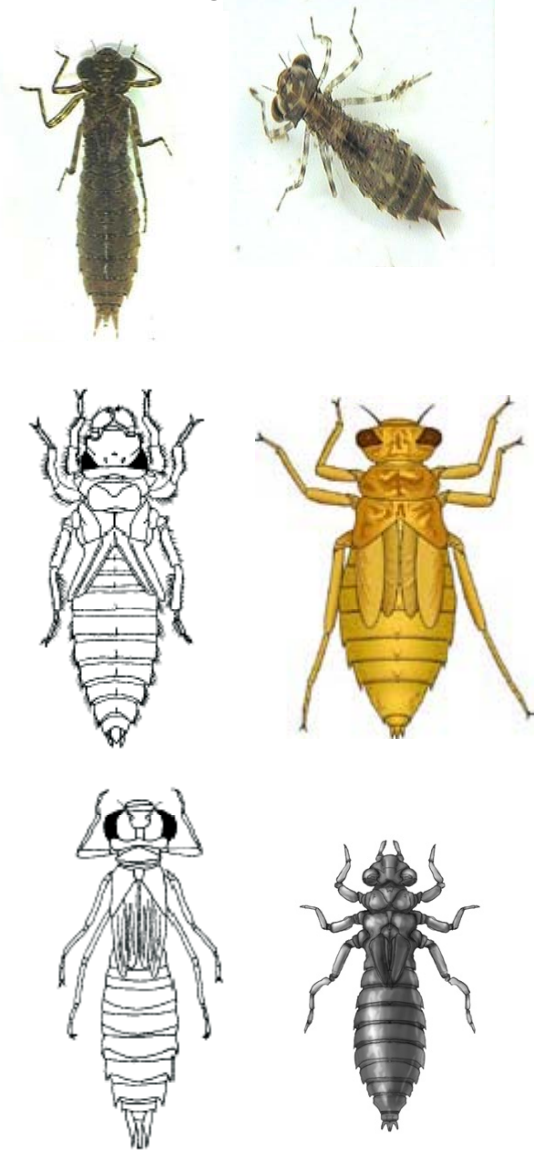
Distinguishing Characteristics:

- 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

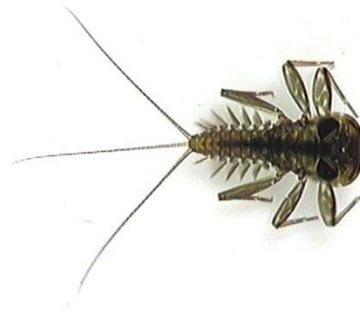
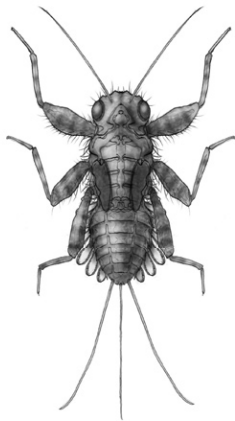
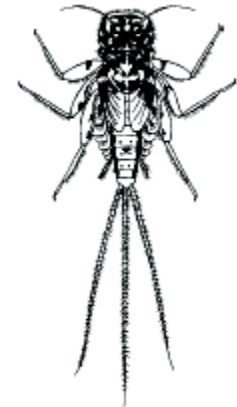
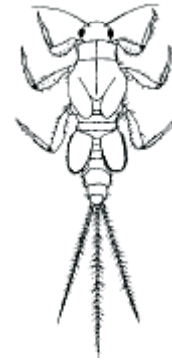
Order: Ephemeroptera

Size: ¼" 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

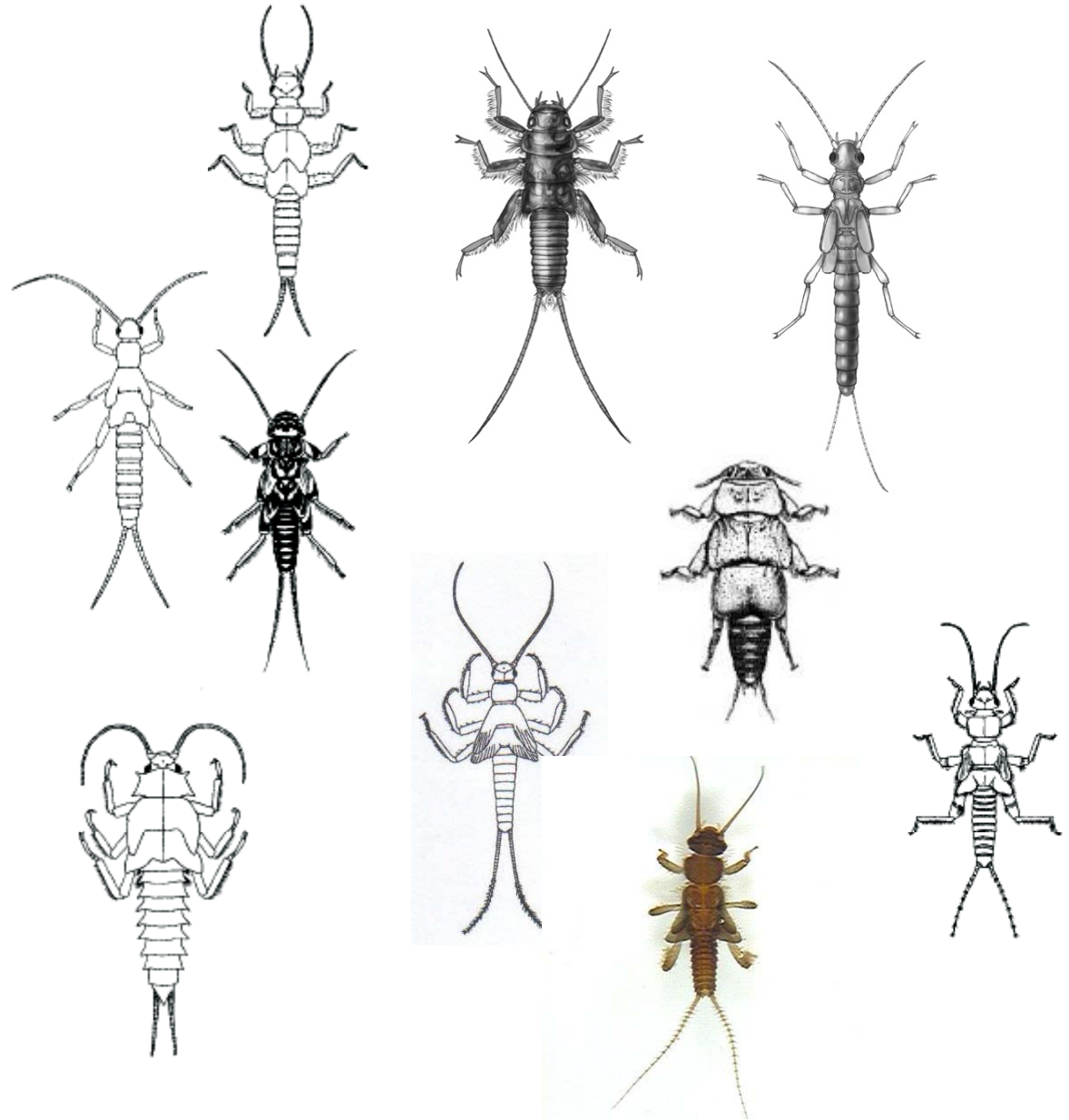
Order: Plecoptera

Size: ½" to 1½"

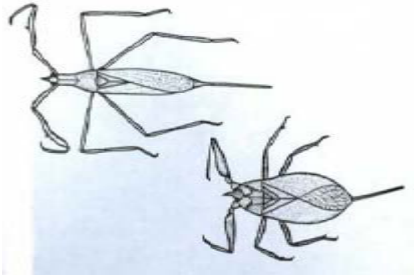
Tolerance: Sensitive

Distinguishing
Characteristics:

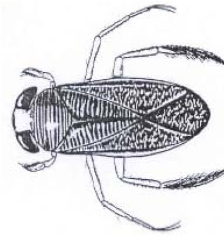
- Two hair-like tails
- No gills on rear half of body
- Structurally similar to mayfly nymphs, but have two tails instead of the usual three in



Other Non-Benthic Stream Invertebrates



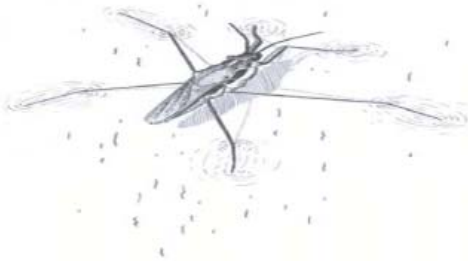
Water Scorpion (Order Hemiptera)



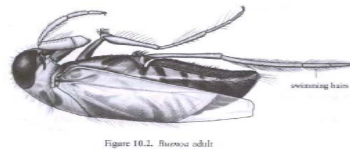
Water Boatman (Order Hemiptera)



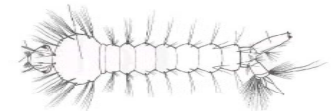
Water Mites (Arachnids)



Water Striders (Order Hemiptera)



Backswimmer (Order Hemiptera)



Mosquito Larvae (Order Diptera)