

# Biotic sampling

## How can living organisms help to determine water quality?

Use the following practice samples to gain experience with macroinvertebrate identification and stream quality assessment before collecting real samples from real streams. Each practice sample includes macroinvertebrate specimens that might be collected from different streams with water quality that will rate from excellent to poor.

### Materials

- Practice samples
- Macroinvertebrate identification key
- Biodiversity index form
- Practice sample keys

### Directions

1. Choose one of the *practice samples* (1–4).
2. Use the *Macroinvertebrate identification key* to identify each specimen just as if it were real.
3. Go to the *Biodiversity index form* and record the macroinvertebrate data to determine the water quality rating for the sample stream.
4. Check your answers for your particular practice sample (1–4).

### Reflection

5. What does sensitive, somewhat sensitive, and tolerant mean in terms of water quality?
6. Can a pollution tolerant organism thrive in excellent water quality?

# Practice sample 1

10 Collected



8 Collected



4 Collected



3 Collected



6 Collected



2 Collected



4 Collected



2 Collected



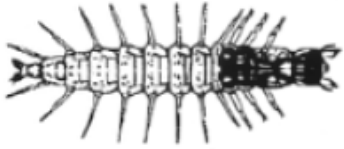







12 Collected



1 Collected

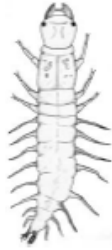


## Practice sample 2

<p>3 Collected</p> 	<p>2 Collected</p> 
<p>14 Collected</p> 	<p>2 Collected</p> 
<p>1 Collected</p> 	<p>4 Collected</p> 
<p>2 Collected</p> 	<p>10 Collected</p> 

### Practice sample 3

2 Collected



2 Collected



4 Collected



3 Collected



5 Collected



3 Collected



# Practice sample 4

5 Collected



2 Collected



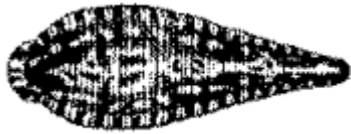
3 Collected



12 Collected



2 Collected



4 Collected



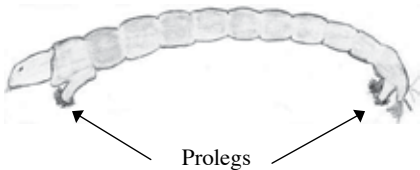
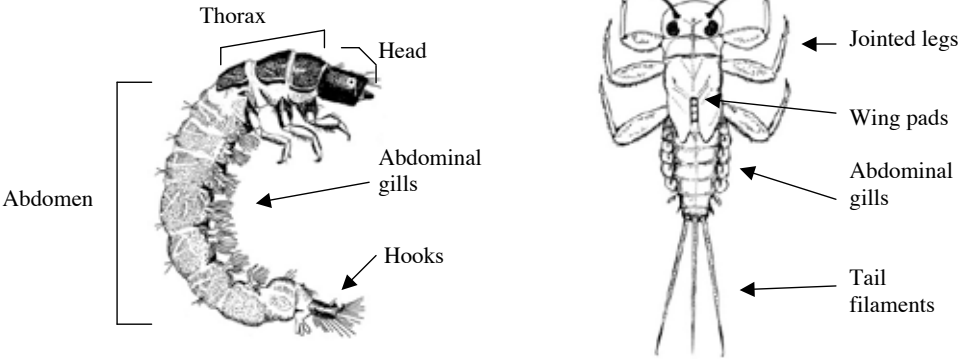
# Macroinvertebrate identification key

## Major Characteristics of Aquatic Larvae

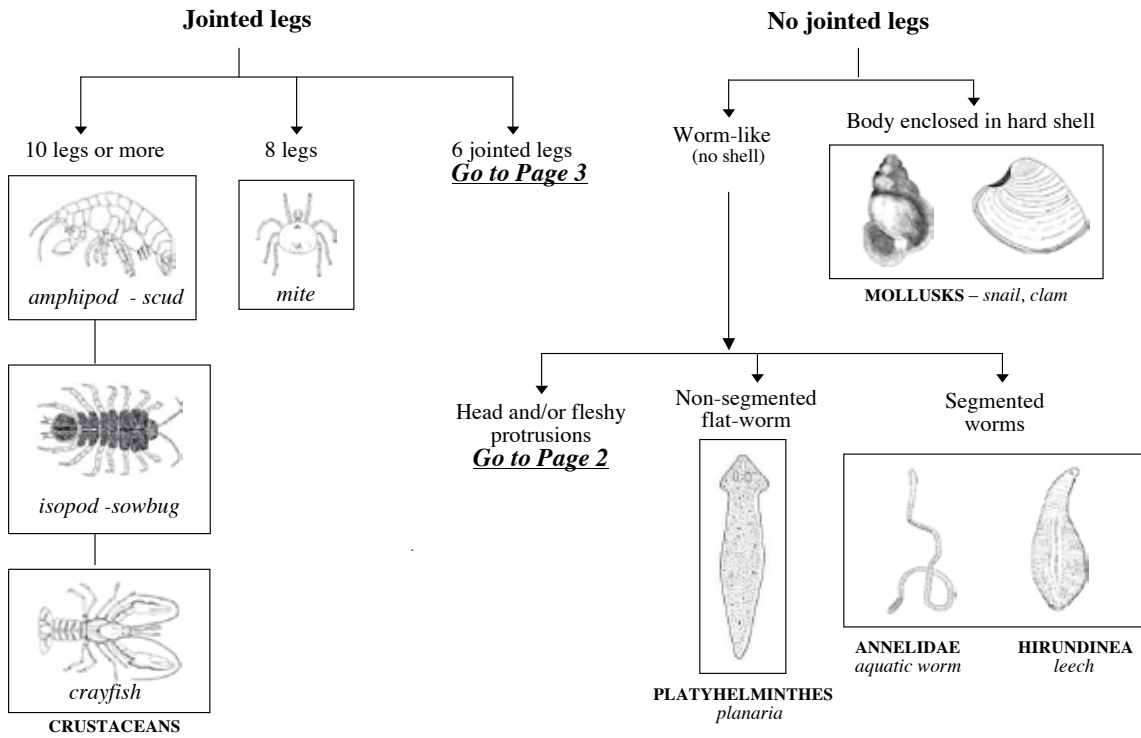


### Glossary

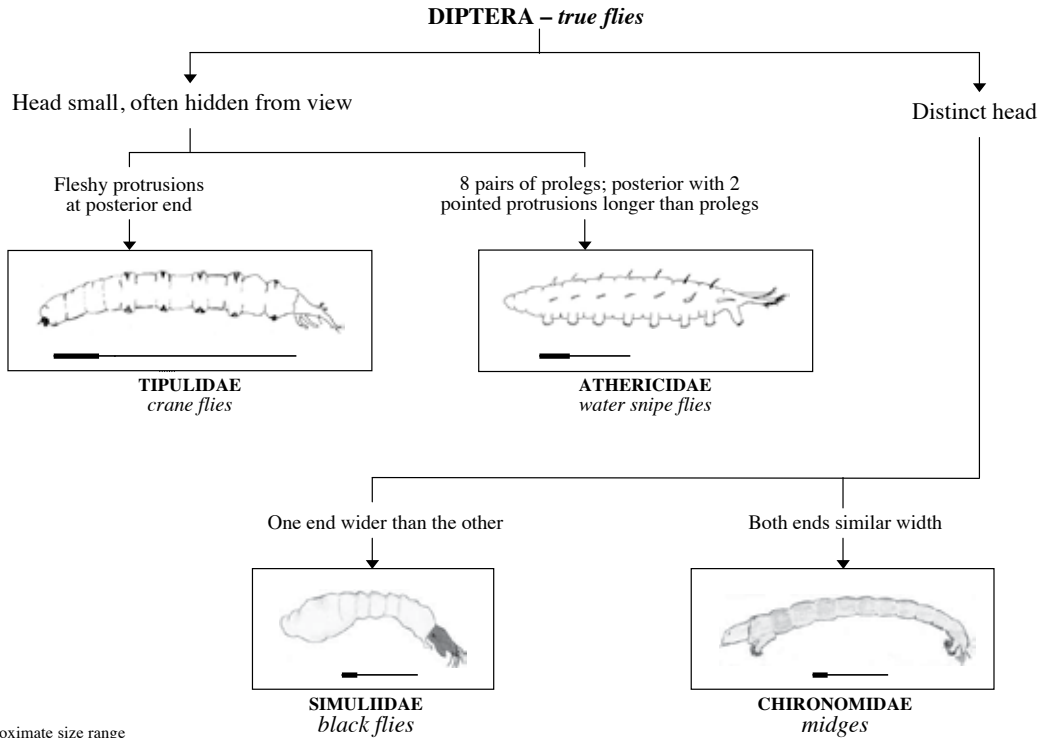
- Abdomen:** posterior body segment of insect
- Filaments:** hair-like structures
- Jointed leg:** true legs, legs capable of bending
- Lateral:** at the side
- Portable case:** structure made of leaves, twigs, or sand that some caddisfly larvae carry with them
- Posterior:** tail end of the body
- Prolegs:** short, stumpy leg-like structures (not jointed)
- Protrusion:** part of the body that sticks out
- Segment:** a section of body
- Ventral:** underside
- Wing pads:** developing wings, often W in shape



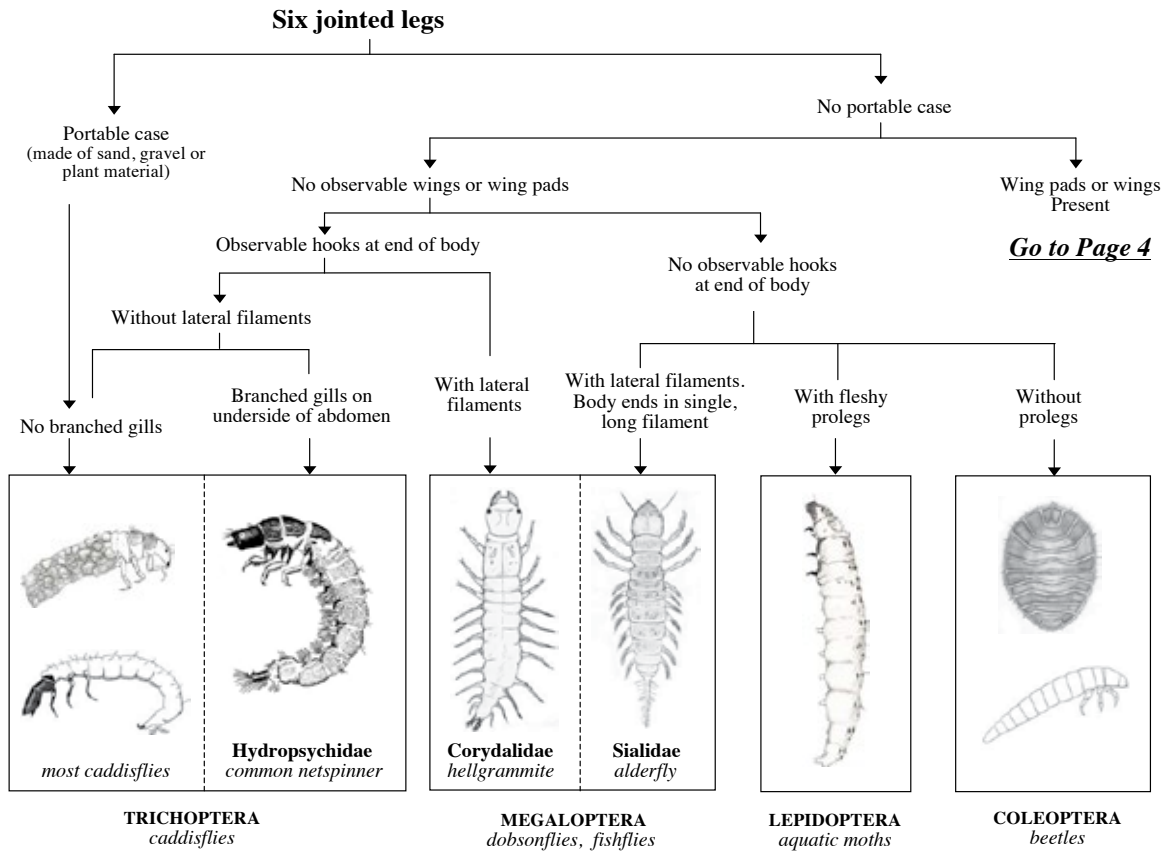
# Identification Guide to Freshwater Macroinvertebrates



## Worm-like with distinct head or fleshy protrusion



Approximate size range  
 Minimum                      maximum





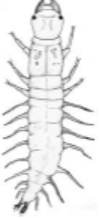









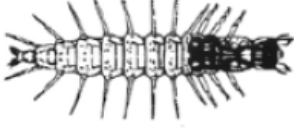







## Biodiversity index form

<b>Sensitive</b>	<b>Somewhat sensitive</b>	<b>Tolerant</b>
<input type="checkbox"/> Caddisfly Larvae <input type="checkbox"/> Hellgramite <input type="checkbox"/> Mayfly Larvae <input type="checkbox"/> Gilled Snails <input type="checkbox"/> Rifle Beetle Adult <input type="checkbox"/> Stonefly Larvae <input type="checkbox"/> Water Penny Larvae	<input type="checkbox"/> Beetle Larvae <input type="checkbox"/> Clams <input type="checkbox"/> Crane Fly Larvae <input type="checkbox"/> Crayfish <input type="checkbox"/> Damselfly Larvae <input type="checkbox"/> Dragonfly Larvae <input type="checkbox"/> Scuds <input type="checkbox"/> Sowbugs <input type="checkbox"/> Fishfly Larvae <input type="checkbox"/> Alderfly Larvae <input type="checkbox"/> Watersnipe Larvae	<input type="checkbox"/> Aquatic Worms <input type="checkbox"/> Blackfly Larvae <input type="checkbox"/> Leeches <input type="checkbox"/> Midge Larvae <input type="checkbox"/> Lunged Snails
boxes checked × 3 = _____ index value	boxes checked × 2 = _____ index value	boxes checked × 1 = _____ index value
<b>Water Quality Rating</b> <b>Total Index Value = _____</b>	Excellent (> 22) Good (17-22)	Fair (11-16) Poor (< 11)







# Practice sample key 1

<p>Stonefly Larva (3 Points)</p>  A detailed line drawing of a stonefly larva, showing its segmented body, three pairs of legs, and two long antennae.	<p>Mayfly Larvae (3 Points)</p>  A detailed line drawing of a mayfly larva, showing its segmented body, three pairs of legs, and two long antennae.
<p>Caddisfly Larva (3 Points)</p>  A detailed line drawing of a caddisfly larva, showing its segmented body, three pairs of legs, and a dark head.	<p>Water Penny Larva (3 Points)</p>  A detailed line drawing of a water penny larva, showing its segmented body and three pairs of legs.
<p>Hellgramite (3 Points)</p>  A detailed line drawing of a hellgramite (amphipod), showing its segmented body and many pairs of legs.	<p>Riffle Beetle Larvae (2 Points)</p>  A detailed line drawing of a riffle beetle larva, showing its segmented body and three pairs of legs.
<p>Crayfish (2 Points)</p>  A detailed line drawing of a crayfish, showing its body, two large claws, and three pairs of legs.	<p>Gilled Snail (3 Points)</p>  A detailed line drawing of a gilled snail, showing its shell and body.
<p>Midge Larva (1 Point)</p>  A detailed line drawing of a midge larva, showing its segmented body and three pairs of legs.	<p>Scud (2 Points)</p>  A detailed line drawing of a scud, showing its segmented body and many pairs of legs.





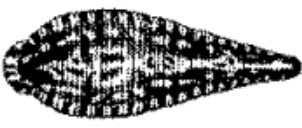
## Practice sample key 2

<p>Fishfly Larva (2 Points)</p> 	<p>Stonefly Larva (3 Points)</p> 
<p>Midgefly Larva (1 Point)</p> 	<p>Cranefly Larva (2 Points)</p> 
<p>Caddisfly Larva (2 Points)</p> 	<p>Water Penny Larva (3 Points)</p> 
<p>Crayfish (2 Points)</p> 	<p>Aquatic Worm (1 Point)</p> 

### Practice sample key 3

<p>Dobsonfly Larva (3 Points)</p>  A detailed black and white line drawing of a dobsonfly larva, showing its segmented body, numerous pairs of legs, and a prominent head with large mandibles.	<p>Stonefly Larva (3 Points)</p>  A detailed black and white line drawing of a stonefly larva, characterized by its long, segmented body, three pairs of legs, and long antennae.
<p>Midgefly Larva (1 Point)</p>  A detailed black and white line drawing of a midgefly larva, showing its segmented body and a pair of long, curved appendages at the posterior end.	<p>Damselfly Larva (2 Points)</p>  A detailed black and white line drawing of a damselfly larva, showing its segmented body, three pairs of legs, and a pair of long, thin antennae.
<p>Crayfish (2 Points)</p>  A detailed black and white line drawing of a crayfish, showing its segmented body, two large pincers (chelae), and several pairs of legs.	<p>Aquatic Worm (1 Point)</p>  A detailed black and white line drawing of an aquatic worm, showing its segmented body and a pair of long, thin antennae.

## Practice sample key 4

<p>Midgefly Larva (1 Point)</p> 	<p>Cranefly Larva (2 Points)</p> 
<p>Lunged Snail (1 Point)</p> 	<p>Blackfly Larva (1 Point)</p> 
<p>Leech (1 Point)</p> 	<p>Aquatic Worm (1 Point)</p> 