



## Macroinvertebrates

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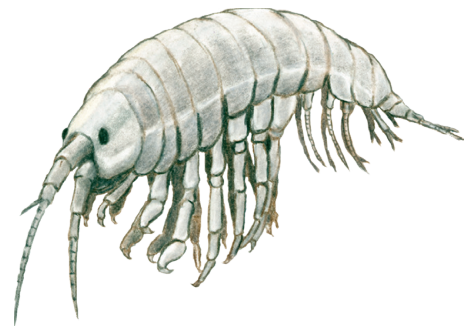
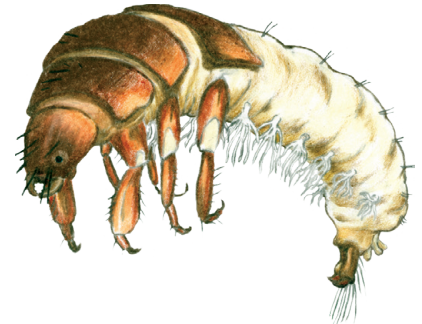
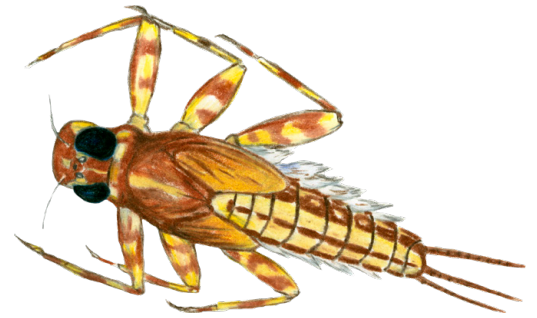
Under the water of many lakes and streams is the amazing world of the macroinvertebrate (MAC-row-in-VERT-ih-brate). Macroinvertebrates are often called macros. They are invertebrates (animals without a backbone) that you can see without using a microscope or magnifying glass. Slimy snails are macros, and so are crawly crayfish.

There are many different types of macros. Macros that live on or in the ground beneath the water are called benthic macros. Snails, mussels, crayfish, worms, and leeches are all benthic macros. Some larval, or young, insects are also benthic macros, though they live above the water when they're older.

Scientists survey benthic macros to measure a water body's water quality. Scientists know that certain types of macros can tolerate polluted water, while other types cannot. So as pollution increases in a water body, non-tolerant macros die. If scientists look along the bottom of a lake and only find tolerant benthic macroinvertebrates, they know a lake is polluted.

Because pollution tends to reduce the variety of organisms surviving in one place, healthy waters usually have many different kinds of macros. A variety of macros in one place is called diversity and is a sign of good water quality. For many aquatic insects, St. Johns River Water Management District scientists collect and study the young phase (nymph or larva) in the water.

Find out more about the St. Johns River Water Management District and macroinvertebrates at [www.sjrwmd.com/education/macroinvertebrates](http://www.sjrwmd.com/education/macroinvertebrates).



# VIDEO LESSON PLAN • Macroinvertebrates

## Vocabulary words:

aquatic insect	benthic macroinvertebrate
diversity	ecosystem
environment	gills
vabitat	larva
macroinvertebrate	nymph
pollution	pupa
sensitive organism	tolerant organism
moderately tolerant organism	somewhat sensitive organism

## Pre-assessment:

Pass out copies of the student page. Instruct students to fill out all of the boxes in the column titled “What you already know about this word.” Visualize the connection of the words with macroinvertebrates. Understand the definition of macroinvertebrate. Begin to understand how macroinvertebrates assist scientists in determining the health of a water body, how pollution occurs and how to prevent it. Learn the difference between point and nonpoint pollution sources; learn ways to reduce both.

## Engage: (3–5 minutes)

Tell the students they are going to learn more about macroinvertebrates and water quality. Ask them the following questions:

- Describe what your mind sees (what colors, what motions, etc.) when you hear the words “water pollution.”
- Is pollution something you can always see, smell or touch?
- What is pollution?
- How does pollution affect our ecosystems?

## Explore/Explain: (20 minutes)

Watch the video “Critters in the Water and What They Tell Us” and instruct students to write down what they hear and learn about the vocabulary words.

## Next Generation Sunshine State Standards

SC.3.N.3.2–SC 4. N. 3.2: Recognize that scientists use models to help understand and explain how things work.

SC.4.E.6.6: Identify resources available in Florida (water, phosphate, oil, limestone, silicon, wind, and solar energy).

## Extend:

1. Download coloring/info sheets about the following macroinvertebrates from our website [www.sjrwmd.com/education/macroinvertebrates](http://www.sjrwmd.com/education/macroinvertebrates)
  - Caddisfly
  - Damselflies
  - Dragonflies
  - Dobsonflies
  - Mayflies
  - Stoneflies
  - Crayfish
  - Mussels
  - Gill-breathing snails
  - Scuds
2. Draw your own macroinvertebrates. Using the macroinvertebrate poster in this package, draw and identify three different species of macros.
3. Watch the video “Macroinvertebrates: Understanding water quality through the creatures that live in waterways.”
4. Get outside and conduct a study of the macroinvertebrates in a local pond or stream.
  - a. Gather materials needed:
    - i. Dip nets
    - ii. Shallow pans
    - iii. Plastic spoons
    - iv. Clear plastic cups
    - v. Reference book such as “A Guide to Freshwater Invertebrates of North America,” by J. Reese Voshell

# VIDEO LESSON PLAN • Macroinvertebrates

## Evaluate: (5 minutes)

Instruct students to choose three or four of the vocabulary words and write down all the new things they learned about the word.

## Vocabulary words with definitions:

<b>aquatic insect</b>	An insect that spends part or all of its life cycle in the water.
<b>benthic macroinvertebrate</b>	Bottom dwelling aquatic animals, without a backbone, that can be seen with the naked eye.
<b>diversity</b>	Number of different types of organisms that can live together in a certain habitat.
<b>ecosystem</b>	The sum of all plants, animals, and other living things, plus their surroundings (soil, climate). Living things within an area are dependent upon each other and the resources available. Example: a pond with its bottom soil and plant growth that feeds fish, and other fish that feed on each other. Each member of the system provides support for other parts.
<b>environment</b>	The total conditions that affect an organism such as climate, soil, water, and other living things.
<b>gills</b>	Structures that organisms that live in water use to get oxygen.
<b>habitat</b>	The place where animals and plants live. In a stream it includes pools, riffles, deep water, undercut banks, vegetation, gravel and rocks or sand.
<b>larva</b>	The immature form of an insect that transforms through complete metamorphosis.
<b>macroinvertebrate</b>	Animals that lack a backbone and can be seen with the naked eye.
<b>moderately tolerant organism</b>	Organism that can survive with some pollution.
<b>nymph</b>	The immature form of an insect that transforms through incomplete metamorphosis.
<b>pollution</b>	Any substance that changes our environment in a harmful way and stresses living things. The quality of the environment is impaired.
<b>pupa</b>	In insects with complete metamorphosis, a stage where the immature insect is enclosed in a tissue-like cocoon, where reorganization occurs and an adult emerges (usually an immobile stage).
<b>sensitive organism</b>	An organism that dies with exposure to a low level of pollution.
<b>somewhat sensitive organism</b>	Organism that can survive with some pollution.
<b>tolerant organism</b>	Organism that can survive in polluted conditions.

# VIDEO LESSON PLAN • Macroinvertebrates

## Answers to questions:

**Directions:** Answer the following questions using information you learned watching the video.

1. What is a macroinvertebrate?

*An animal without a backbone that you can see without magnification.*

2. What do macroinvertebrates tell us about water quality?

*The presence/absence of certain groups of invertebrates indicate water quality conditions. Macroinvertebrates respond to levels of dissolved oxygen, nutrients, and suspended material in the water.*

3. Where are macroinvertebrates found?

*In the benthic, or bottom environment/habitat, in rivers, lakes and coastal waters.*

4. Healthy water bodies will have (circle your answer): **Answer is “c”**

*c.) a diverse variety of macros*

5. Name some of the aquatic habitats where macroinvertebrates are found.

*Vegetation, bottom sediment, wood, hard surfaces (rock, concrete).*

6. Give the names of three macros that scientists determine as “good for the water body.”

*1. Mayfly nymph*

*2. Stonefly nymph*

*3. Caddisfly larva*

7. Name three macros that designate poor quality?

*1. Chironomid midge larva*

*2. Aquatic worm*

*3. Air-breathing snail*

# MACROINVERTEBRATES

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Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Directions:** Answer the following questions using information you learned watching the video.

1. What is a macroinvertebrate

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2. What do macroinvertebrates tell us about water quality?

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3. Where are macroinvertebrates found?

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4. Healthy water bodies will have (circle your answer):

- a.) no macros
- b.) one variety
- c.) a diverse variety of macros

5. Name some of the aquatic habitats where macroinvertebrates are found.

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# MACROINVERTEBRATES

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6. Give the names of three macros that scientists determine as "good for the water body."

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7. Name three macros that designate poor quality?

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# MACROINVERTEBRATES

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Name: \_\_\_\_\_

Date: \_\_\_\_\_

Vocabulary word	What you already know about this word	What new things/ideas you found out
Aquatic insect		
Benthic macroinvertebrate		
Diversity		
Ecosystem		
Environment		
Gills		
Habitat		
Larva		
Macroinvertebrate		
Moderately tolerant organism		
Nymph		
Pollution		
Pupa		
Sensitive organism		
Sensitive organism		
Somewhat sensitive organisms		
Tolerant organism		