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**Aquatic Macroinvertebrates:** Intolerant or Tolerant?

**Level:** 6th-12th

**Time:** 30-60 minutes

**Objectives:**

* Learn about freshwater aquatic macroinvertebrates
* Learn about bio-indicators
* Learn connection between macroinvertebrates as bio-indicators and water quality
* Learn interconnectedness of macros, water quality, and salmon habitat

**Materials:**

* This activity worksheet

Date: Name:

How can we tell if a water system is healthy or unhealthy? Clean or polluted? Aquatic insects and other invertebrates in a particular section of a stream act as “**bio-indicators**,” or living organisms, whose presence or absence can **tell us the current condition of the stream**. Because aquatic macroinvertebrates are unable to migrate or easily move to another area of the stream, they indicate changes to that stream over time—for better or worse.

In this activity, you are going to **determine the health of these streams** by the aquatic macroinvertebrates listed and then answer some questions about macroinvertebrate ecology.

Pollution Intolerant (Highly sensitive)

If you find many of these macros, they are indicators of a healthy stream. These macros are highly sensitive to pollution.

Optimal levels: *Dissolved oxygen* above 7 ppm, *neutral pH* around 6.5 to 8 on the pH scale, and cool or cold water *temperature* around 65 degrees to below 50 degrees Fahrenheit.

Mayfly nymph Dobsonfly larvae

Stonefly nymph Water penny beetles

Caddisfly larvae Adult riffle beetles

Somewhat Tolerant to Pollution (Moderately sensitive)

These organisms can tolerate a wider range of water quality conditions. If these are found in larger numbers, they indicate fair to good water quality.

*Dissolved oxygen* might be between 6 ppm and 8 ppm, *pH* between 5 and 9, and water *temperature* above 50 degrees Fahrenheit.

Dragonfly nymph Damselfly nymph

Cranefly larvae Aquatic sowbug larvae

Crayfish Scud

Pollution Tolerant (Insensitive)

This next list of organisms is particularly adept at living in poor water quality conditions. *Dissolved oxygen* might be between 6 ppm and 3.5 ppm, *pH* between 5 and 9, and *water temperature* above 65 degrees Fahrenheit.

Midge larvae Black fly larvae

Leeches Aquatic worms

Striders Boatman beetles

**A. List three macroinvertebrates you would find in each of these streams. Indicate the water quality of the streams as either *healthy*, *fair to good*, or *poor quality*.**

1. Knapp Creek

Dissolved oxygen: 9 ppm pH: 7.5 Temperature: 50 degrees Fahrenheit

1.

2.

3

Water quality \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Yahoo River

Dissolved oxygen: 7 ppm pH: 6 Temperature: 62 degrees Fahrenheit

1.

2.

3.

Water quality \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. Dragon Stream

 Dissolved oxygen: 4 ppm pH: 9 Temperature: 70 degrees Fahrenheit

1.

2,

3.

Water quality \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**B. Macroinvertebrate Ecology**

Answer the following in complete sentences:

1. List two reasons why aquatic macroinvertebrates are important?
2. What does it mean for water quality if an aquatic macroinvertebrate is “intolerant”?