

Biodiversity Activity 3: Relating Number of Insect Species to Water Quality

Scientific Background

Biodiversity, which means biological diversity, refers to the variety of life forms in any particular ecosystem. A healthy ecosystem will have large numbers of species and many individuals within those species (for example, 10 individuals from each of ten different species). Unhealthy ecosystems have fewer species, and often have a larger number of individuals from just one species (for example, 90 individuals from one species, and five individuals each from two other species). Taking a sample of the organisms living in an ecosystem can give clues to the health of the ecosystem and of the populations living in it.

Using samples of **Macroinvertebrates** from a freshwater stream or pond, scientists can draw conclusions about the level of pollution in the water. Macroinvertebrates are organisms that have no backbone and are large enough to be observed without a microscope. Many freshwater macroinvertebrates are insect larvae, while others are mollusks such as snails, clams and mussels, or worms such as leeches, flatworms and aquatic earthworms.

Scientists know that some organisms are very sensitive to pollution and survive only in clean water. Other organisms are somewhat sensitive to pollution and survive in moderately clean water. Still other organisms are tolerant of pollution and can survive even in heavily polluted water. A clean, healthy body of water will have many sensitive organisms as well as organisms that are somewhat sensitive, and organisms that are tolerant of pollution.

In *Biodiversity Activity 3: Relating Numbers of Insect Species to Water Quality*, students use the data from the collected samples in *Biodiversity Activity 1: Identifying Insects* to create bar graphs to represent the number of insect species that are sensitive to or tolerant of pollution in each of the three streams. Students interpret the bar graphs to draw conclusions about biodiversity and pollution in the three streams. This activity can be found by navigating to the **Blepharicerid Larva, Caddisfly, Dragonfly, Giant Water Bug, or Whirligig Beetle Screens** and then clicking the enamel dish icon at the bottom of the screen.

Vocabulary

- | | |
|-------------|---------------------|
| ▪ aquatic | ▪ biodiversity |
| ▪ diverse | ▪ environment |
| ▪ habitat | ▪ macroinvertebrate |
| ▪ mollusk | ▪ oxygenated |
| ▪ pollution | ▪ sensitive |
| ▪ species | ▪ tolerant |

*Vocabulary definitions can be found in the **Backyard Bugs** Glossary.*

Thinking Question

Suppose you wanted to determine the water quality of a freshwater stream that contained blepharicerid larvae. Would you need to collect a water sample from this stream? Why or why not?

Exploratory and Extension Activities

Additional Exploratory and Extension activities are available in the *Backyard Bugs Teacher's Guide*.

Biodiversity Field Trips

Visit a local habitat with a field guide and find out what type of plants and animals live there. Contact a national, state, local park agency, or a group such as the Audubon Society (<http://www.audubon.org>) and find out if they have naturalist programs for students.

Go to a local habitat (such as a wetland, forest, or meadow) with a professional or volunteer naturalist. Find out what plants and animals form the ecosystem and how they interact with each other.

Ask students to respond to questions such as:

- Have there been surveys of the area to inventory the species? (For example, for a wetland area, do they know what amphibians live there and how abundant they are?)
- Are there any threatened or endangered species in the area?
- What are the main threats to the area?
- What is being done to conserve the ecosystem?

Have students write a brief proposal that describes a plan to conserve a threatened species or ecosystem as a follow up activity to their field trip experience.

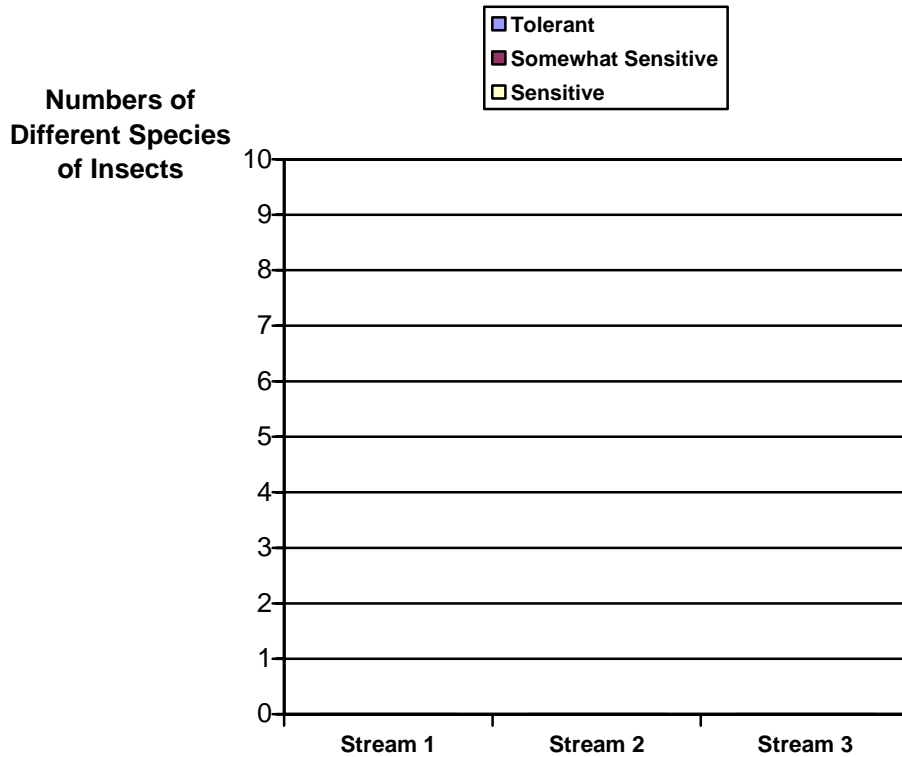
Name: _____

Biodiversity Activity 3: Relating Number of Insect Species to Water Quality Part 1

Make a bar graph showing the three streams' biodiversity. Use data from *Biodiversity Activity 1: Identifying Insects* to show the number of *insect species* with each level of water sensitivity that appear in the three streams.

For each stream, how many <i>insect species</i> are:	Stream 1	Stream 2	Stream 3
Tolerant			
Somewhat Sensitive			
Sensitive			

Stream Biodiversity Table 2



Name: _____

**Biodiversity Activity 3:
Relating Number of Insect Species to Water Quality
Part 2**

Compare the insect populations in the three streams.

Which stream has the greatest number of *insect species*?

Does this indicate excellent water quality or poor water quality? Why?

Which stream has the fewest number of *insect species*?

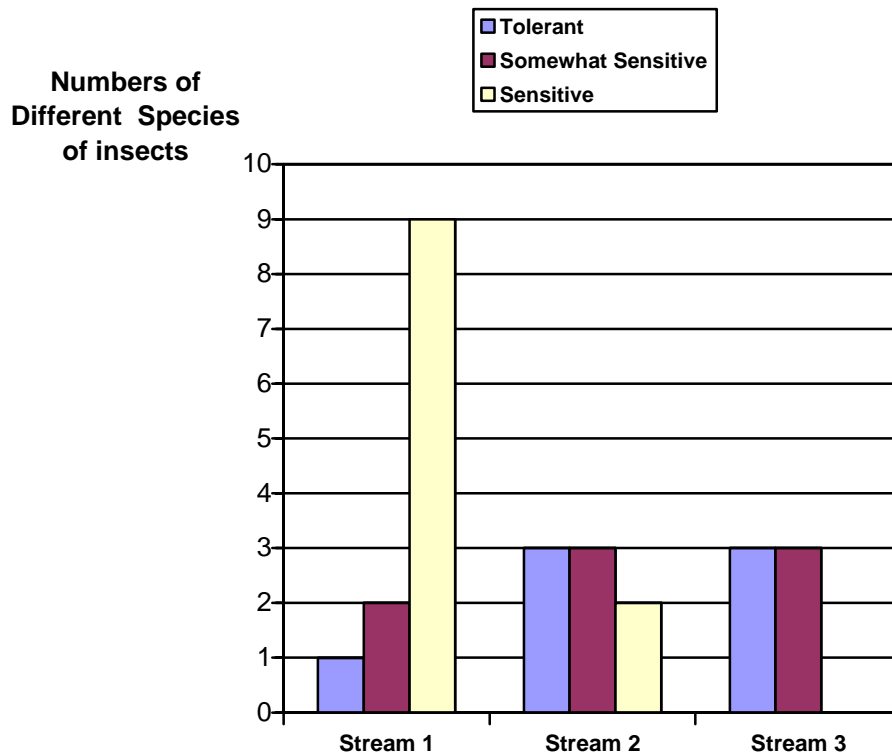
Does this indicate excellent water quality or poor water quality? Why?

Answer Key
Biodiversity Activity 3:
Relating Number of Insect Species to Water Quality
Part 1

Make a bar graph showing the three streams' biodiversity. Use data from *Biodiversity Activity 1: Identifying Insects* to show the number of *insect species* with each level of water sensitivity that appear in the three streams.

For each stream, how many <i>insect species</i> are	Stream 1	Stream 2	Stream 3
Tolerant	1	3	3
Somewhat Sensitive	2	3	3
Sensitive	9	2	0

Stream Biodiversity Table 2



Answer Key
Biodiversity Activity 3:
Relating Number of Insect Species to Water Quality
Part 2

Compare the insect populations in the three streams.

Which stream has the greatest number of *insect species*?

Stream 1. It has 12 different species living in it.

Does this indicate excellent water quality or poor water quality? Why?

This indicates that stream 1 has excellent water quality, because it allows the greatest number of insect species to live in it. This stream also has the greatest number of insect species that are sensitive to water quality living in it.

Which stream has the fewest number of *insect species*?

Stream 3. It has only 6 different species living in it, the smallest number of species of all three streams.

Does this indicate excellent water quality or poor water quality? Why?

This indicates that stream 3 has poor water quality, because only a small number of species are able to live in it. Only species that are tolerant or somewhat sensitive to pollution live in stream 3. There are no sensitive species living in stream 3.