



## Bioaccumulation: The Pesticide Connection

**TOPIC:** Understanding the ecosystem effects of pesticides

**SUBJECTS/THEMES:** Ecology, ecosystem, food chains/webs, agriculture, pest management, pesticides, pollution, toxics and bioaccumulation

**MATERIALS:** Beans (minimum of 6), scissors, bioaccumulation diagram and activity cards (available for download at [www.wwf.ca/teachers](http://www.wwf.ca/teachers))

### OUTCOMES:

- > To demonstrate an understanding of the functions of an ecosystem
- > To explain how pesticides bioaccumulate
- > To identify the ways in which humans can minimize the use of pesticides and their effects on natural ecosystems

### DISCUSSION:

A lake and the people, animals and plants that live around it make up one big ecosystem. An ecosystem is an area in which living and non-living things interact. What we do will affect every other part of our ecosystem. For example, sometimes people use pesticides to kill plants or animals that they consider pests such as weeds and insects. When a pesticide is sprayed in a park or on a farm, some of it runs off into nearby sewers or streams. Eventually it might find its way into the lake.

Although pesticides can't be seen, they don't disappear. Some pesticides (called "persistent" because they don't go away) are absorbed by plankton: tiny water plants called phytoplankton, and by tiny animals that live in the water called zooplankton. Plankton are food for bigger

animals such as small fish, which are food for bigger fish and so on. Some of the pesticides absorbed by the plankton get into the bodies of the bigger animals when they eat the smaller ones. This process is called "bioaccumulation".

### ACTIVITY: Bioaccumulation game

> Give each student a card from the on-line illustrations, representing a creature that lives in a lake ecosystem. There are twelve cards: 1 hunting bird (such as an eagle), 2 big fish (such as lake trout), 4 small fish (such as lake herring), and 5 plankton. This activity can be adapted for up to 12 students or more, ensuring that there are more of the small animals than bigger ones.

> Have students playing plankton roles sit in the area where the game is to be played. Explain that a pesticide has been sprayed and some of it has run off into the lake. Give a bean to each student who is playing a plankton to represent pesticide that has been absorbed.

> Ask the students to identify which animals in the group would eat the plankton. When they have identified the small fish, have the students who are playing the small fish pretend to eat the plankton until they are all gone. When each plankton is eaten, he/she gives his/her bean to the small fish. The plankton then moves aside and the students playing the small fish stay in the game. They should each have one bean, and one student should have two. The amount of pesticide in the small fish that ate two plankton is greater than the amount that was in each individual plankton. In nature, each small fish would eat many plankton.

> Repeat the process with the big fish eating the small fish, then the eagle eating the big fish, passing the beans along at each stage. The Eagle should end up with all the beans.

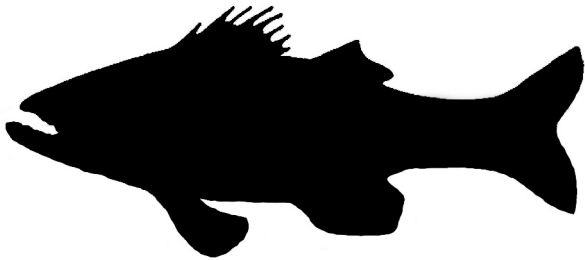
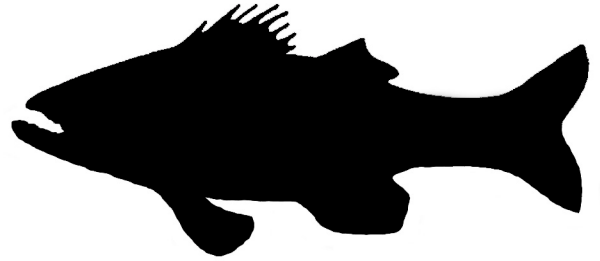
### POST ACTIVITY DISCUSSION:

Ask the students to identify how many fish the eagle ate. Although the eagle ate only two big fish, it was as if it had eaten the small fish and plankton as well. Therefore, the eagle has consumed all the pesticides that each of the other animals collected. This is called bioaccumulation. Display the bioaccumulation diagram that shows how big animals end up with more pesticides in their bodies than small animals. This happens because everything in an ecosystem is connected to everything else.

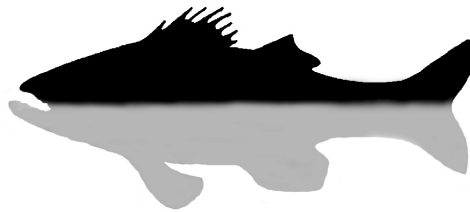
### WHAT YOU CAN DO:

- > Encourage your family to minimize their use of pesticides and herbicides in and around the yard and garden.
- > Investigate what food products in your home may have come into contact with pesticides. Write to your favourite food companies and ask them about their pesticide use policies.









■ Contaminant level

