

Biomagnification in the Ecosystem

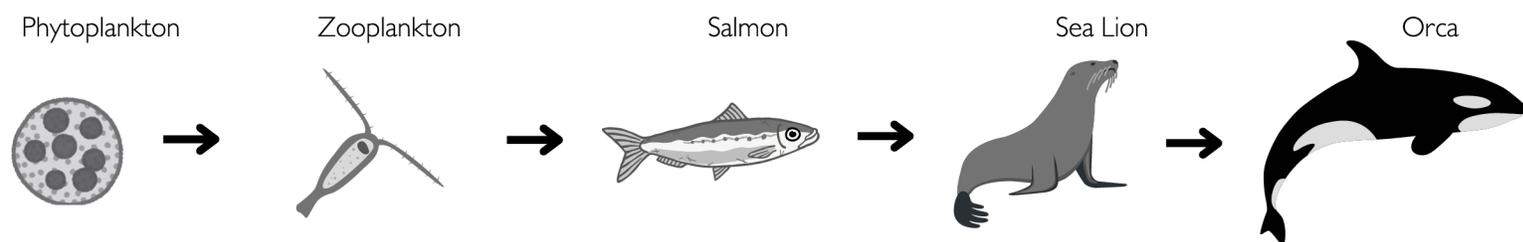
Read the passage and answer the following questions on the back or another sheet of paper.

Trophic level refers to an organism's place in the food web. Biomagnification refers to the increased amount of a pollutant or toxin in animals at higher trophic levels. One of the most common examples is mercury, a toxic metal. Mercury is found naturally in the environment from volcanoes, but increased concentrations in the environment come from human-based, or **anthropogenic**, sources. Anthropogenic sources of mercury include mining, the burning of coal, cement production, and waste from manufacturing. Mercury pollution is usually made airborne by combustion or found dissolved in water. Most mercury found in the environment is found in water sources like lakes, rivers, and oceans. In humans, mercury can cause many negative health impacts, including harming brain growth in children and babies and toxicity in adults. The Food and Drug Administration and Environmental Protection Agency recommend limiting fish at higher trophic levels, like tuna, to one serving per week and fish at lower trophic levels, like cod, to twice a week.

In the ocean, mercury is often absorbed by the **autotrophs**, like phytoplankton, that make their own food via **photosynthesis**. Autotrophs are any creature that does photosynthesis to make their own food. Autotrophs usually have the lowest concentration of pollutants in their bodies, as they only absorb it from the environment. **Primary consumers**, like zooplankton, get more pollutants in their bodies as they eat many phytoplankton. **Secondary consumers**, like small fish and crustaceans, have even higher concentrations in their bodies as they eat many zooplankton. The highest amounts of bioaccumulation in the ocean usually occur in **tertiary consumers** or apex predators like orcas. **Bioaccumulation** refers to the buildup of pollutants in one organism; **biomagnification** is how the pollutants are transferred between trophic levels within the food web.

Questions:

1. What is biomagnification?
2. What is a trophic level?
3. Which animal is most impacted by biomagnification in the food chain below? Why?



4. Suppose each phytoplankton has 1 unit of mercury and each zooplankton eats 100 phytoplankton. Each salmon eats 90 zooplankton. Each sea lion eats 50 salmon. Each orca whale eats 10 sea lions. How many units of mercury are found in the orca? Show your work by writing the units of mercury in each trophic level in the diagram above.

5. How can biomagnification impact humans?

Biomagnification in the Ecosystem **Key**

Questions:

1. What is biomagnification?

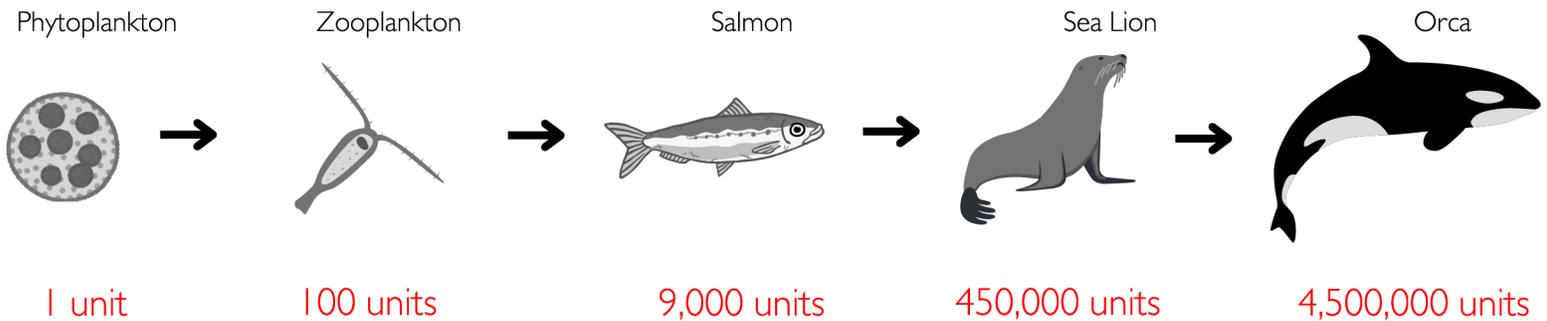
Biomagnification is how the pollutants are transferred between trophic levels within the food web.

2. What is a trophic level?

A trophic level is an organism's position in the food chain.

3. Which animal is most impacted by biomagnification in the food chain below? Why?

The orca whale because the most amount of pollutants or toxins (ok to say mercury) bioaccumulates in their body because each level of the food chain has more pollutants or toxins in it.



4. Suppose each phytoplankton has 1 unit of mercury and each zooplankton eats 100 phytoplankton. Each salmon eats 90 zooplankton. Each sea lion eats 50 salmon. Each orca whale eats 10 sea lions. How many units of mercury are found in the orca? Show your work by writing the units of mercury in each trophic level in the diagram above.

4,500,000 units of mercury would be found in the Orca.

5. How can biomagnification impact humans?

Humans are part of food chains too, especially when it comes to fish. Pregnant women are asked to limit consumption of some kinds of fish because mercury is particularly dangerous for babies. Many health issues can come from the bioaccumulation of toxins in human bodies.

