

## Details



**Completion Time:** About one period

**Permission:** Download, Share, and Remix

## Arctic Smörgåsbord!

### Overview

Students discover how different organisms that live in the Arctic depend on each other and what might happen to the food web if one or more organisms disappears from it. Students will build an arctic food web.

### Objectives

Students will learn that organisms are part of a global food web and linked to each other and their physical environments through the transfer and transformation of energy. All animals must eat other organisms to obtain energy for processes such as cell growth, reproduction, movement, and respiration. Most animals do not eat just one thing, or are eaten by only one thing. The result is a food web – a complex feeding relationship among organisms that interconnects all organisms in a community. New vocabulary students will learn: primary producers, primary consumers, herbivore, secondary consumers, carnivores, tertiary consumers, predators, and decomposers.

### Lesson Preparation

Photocopy/print copies of the arctic food web cards, one set for each group of students. Optional: cut out cards prior to class.

### Procedure

1. Review the concepts of food webs and food chains with the students.
2. Divide students into groups and give each group a set of cards.
3. Have students build food webs, using the information on the cards. They should start with the producers and work up to the top consumers. Remind them to study the relationships carefully.
4. When they are satisfied with the placement of the organisms, they should secure their cards onto the poster board/construction paper with the tape and draw ar-

## Materials

- Arctic food web cards
- Small poster board or construction paper
- Tape
- Markers

rows showing the direction of the energy flow.

5. Have student groups play the food web game with another group to see how well they understand the feeding relationships of the community. These are the instructions for the game:

- The purpose of the game is to “crash” your opponents’ food web by removing as many cards as possible from their food web in 3 turns.
- In this game, you cannot eliminate the primary producer – only consumers.
- Start the game by removing an organism from your opponents’ food web. Your group will keep the card and discuss what happened to the food when you eliminated that organism. If there are any animals that feed ONLY on the organism you took out (i.e. they have no other food source) you may take those cards too.
- The other team then removes one (or more) cards from your food web.
- The winning team is the one who gets the most cards from their opponents in three turns.

### **Assessment**

1. Which organism depicted in this food web is a primary producer? Where do the producers obtain their energy?
2. Which organisms in this food web are primary consumers? Which one is the top consumer and why?
3. How do you think tiny krill provide enough energy to sustain whales?
4. What would happen if krill were to disappear from the ecosystem?
5. Which organisms have the most selective diets? Is this an advantage or disadvantage?

### **Extension**

1. Have students add humans to the web and discuss their role.
2. Have students research “substitution” prey items (i.e. sculpin for Guillemots, smooth and rayed nut clams for Eiders) and discuss the ramifications of substitutions for the predators.

### **Credits**

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## **National Science Education Standards**

### **Content Standards, Grades 9-12**

Content Standard C: Life Science

- a. Matter, energy, and organization in living systems
- b. Behavior of organisms

### **Other Standards**

Alaska State Standards:

SC3 Students develop an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy.

[10] SC3. 2 exploring ecological relationships (e.g., competition, niche, feeding relationships, symbiosis)(L)



## ARCTIC FOOD WEB CARDS



Photo: Patti Virtue

**Algae** convert solar energy into chemical energy.

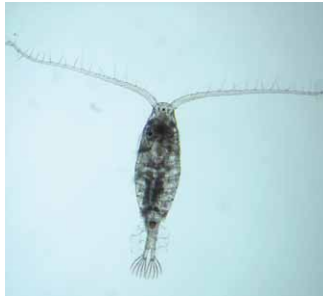


Photo: NOAA

**Copepods** and other invertebrates (animals without a backbone) feed on microscopic algae.



Photo: Sandra Zicus

**Polar bears** prefer to eat ringed and bearded seals, but will also eat arctic fox, walrus and beluga whales.



Photo: Merrick Peirce

**Arctic fox** eat ringed seal pups.

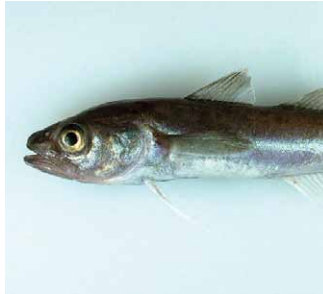


Photo: NOAA

**Arctic cod** eat krill and other aquatic invertebrates.



Photo: Sandra Zicus

**Ringed seal** eat arctic cod, as well as other fish.



Photo: Sandra Zicus

**Walrus** eat bottom-dwelling organisms such as clams.



Photo: NOAA

**Beluga whales** eat primarily fish, such as Arctic cod.



Photo: Fisheries and Oceans Canada

**Clams** eat algae.



BBC

**Eider ducks** are benthic feeders. Some eiders (like spectacled eiders) are endangered or threatened species. Common eiders are harvested by humans.



[www.arcodiv.org](http://www.arcodiv.org)

**Sea ice amphipods** feed on ice algae and are food to seals and birds



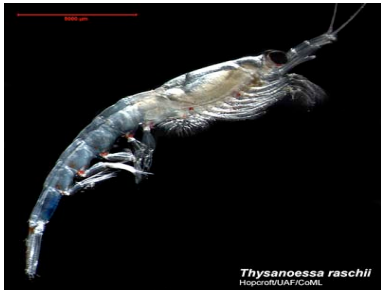
[www.arcodiv.org](http://www.arcodiv.org)

**Bowhead whales** are feeding on euphausiids and crustaceans in the plankton.



<http://www.oceanriver.org/GeorgeDivokyLoriWark.php>

**Black Guillemots** feed mainly on fish and have been studied for decades on Cooper Island. Their main food is Arctic cod.



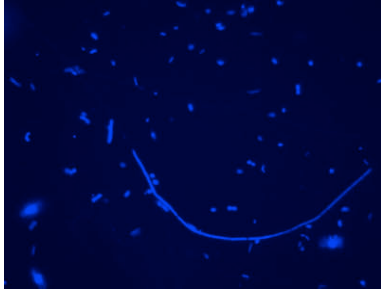
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**Euphausiids** are pelagic crustaceans that feed on phytoplankton. They are important food to fish and to bowhead whales in the Arctic.



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**Jellyfish** (Scyphozoa) occur in all parts of the world's ocean. They eat zooplankton and small fish.



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**Bacteria** are important decomposers in all Arctic marine habitats. The breakdown of dead organic material and organic material released from phytoplankton and are important food for protozoans.



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**Chaetognaths** (also called arrowworms) are important planktonic carnivores. They live at all water depths in the Arctic Ocean and are ambush predators on copepods.



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**Pteropods** are pelagic snails. While most species feed on phytoplankton and bacteria, some species are predators. They are important food for fish and birds.



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**Sculpins** are benthic fish. They eat benthic invertebrates like worms and clams. They are important food for other fish species and birds.



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**Polychaetes** are benthic worms. They eat either detritus (including bacteria) or invertebrates like worms and clams. They are important food for other fish species, grey whales and walrus.



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**Isopods** are benthic crustaceans. Their feeding strategy varies widely including herbivory, carnivory and scavenging. They are important food for other fish species, grey whales and walrus.





[www.arcodiv.org](http://www.arcodiv.org)

**Decapods** are benthic crustaceans. They are scavenger and/or predators on other benthic animals like polychaetes and clams. Some are commercially harvested.