

Biomes: Wild Arctic

Grade Level: 6-8

Subject: Ecology

Duration: Three class periods

Objectives

Students will

- learn key terms, including food web, zooplankton, and sea ice;
- discuss Arctic plants and animals;
- devise at least three Arctic food chains; and
- help create a food web showing connections among Arctic life.

Materials

- Computer with Internet access
- Paper and pencil

Procedures

1. After watching the program with students, review the terms below.
 - Arctic: region around the North Pole, including the Arctic Ocean and parts of North America, Asia, and Europe
 - food chain: hierarchy of organisms where each member eats the one below it
 - food web: the connected food chains within an ecological community
 - phytoplankton: microscopic single-celled plants that float in the ocean
 - zooplankton: microscopic animals that float in the ocean (including single-celled animals and tiny crustaceans such as copepods)
 - sea ice: a layer of ice formed from seawater; it changes with seasons and floats on the ocean, carried by winds and currents)
2. Ask students to describe how muskoxen, slugs, and the lungworm parasite make up a food chain. (*The parasite lives in the slug. When the muskoxen eat grass, they also eat the slugs living in it.*) How does this food chain endanger the muskoxen? (*The lungworm gets passed to the muskoxen and infecting them.*)
3. Tell students that they will examine different food chains that make up the Arctic food web. Ask them to consider the organisms featured in the program. Write their answers on the board, and make sure the list includes the following organisms:

phytoplankton	arctic cod
zooplankton	narwhal
algae	walrus
ringed seal	beluga
seabirds	bowhead whale
arctic tern	polar bear
thick-billed murre	caribou

4. Ask students to name the organism that makes up the foundation of the Arctic food web. (*phytoplankton*) Next, tell them that, working with a partner, they will devise at least three food chains from the list above. Each food chain should include at least three organisms and show directly links only, each organism to be followed by its predator. (Example: Arctic cod → ringed seal → polar bear)
5. Students may refer to the program or find information about Arctic wildlife at the following sites:

Canada's Arctic: Animals

<http://www.arctic.uoguelph.ca/cpl/organisms/birds/marine/puffins/thickbilled.htm>

<http://www.arctic.uoguelph.ca/cpl/organisms/birds/marine/gulls/arcticTern.htm>

<http://www.arctic.uoguelph.ca/cpl/organisms/fish/marine/gadidae/arctic.htm>

<http://www.arctic.uoguelph.ca/cpl/organisms/mammals/Terrestrial/caribou.htm>

<http://www.arctic.uoguelph.ca/cpl/organisms/mammals/Marine/walrus.htm>

<http://www.arctic.uoguelph.ca/cpl/organisms/mammals/Terrestrial/polarbear.htm>

<http://www.arctic.uoguelph.ca/cpl/organisms/mammals/Marine/ringed.htm>

<http://www.arctic.uoguelph.ca/cpl/organisms/mammals/Marine/bowhead.htm>

<http://www.arctic.uoguelph.ca/cpl/organisms/mammals/Marine/beluga.htm>

<http://www.arctic.uoguelph.ca/cpl/organisms/mammals/Marine/narwhal.htm>

Arctic Mission: Wildlife Articles

http://www.nfb.ca/sedna/arcticmission/ma_ressources/sc_faune.html

Arctic Wildlife

<http://www.mnh.si.edu/arctic/html/wildlife.html>

Bering Land Bridge National Preserve (National Park Service)

<http://www.nps.gov/bela/html/plantani.htm>

Animal Info Books (Beluga Whale, Polar Bear, Walrus)

<http://www.seaworld.org/animal-info/info-books/index.htm>

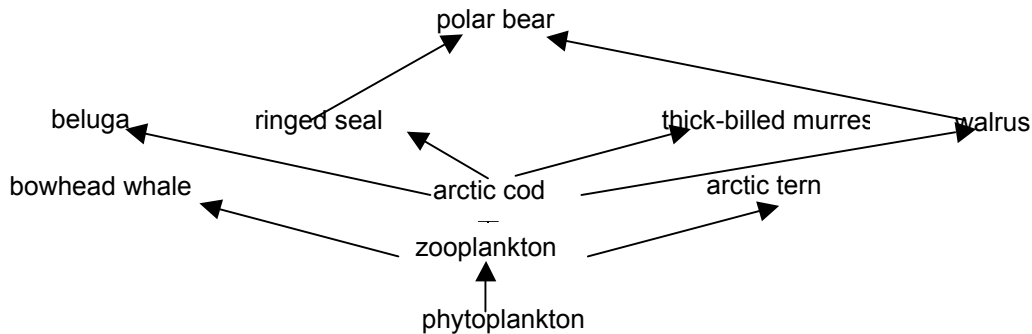
Enchanted Learning: Arctic Animals (for younger students)

<http://www.EnchantedLearning.com/coloring/arcticanimals.shtml>

6. When students have completed their food chains, explain that will share their food chains to create a food web that shows connections among Arctic organisms. Examples follow:

phytoplankton → zooplankton → arctic cod
 phytoplankton → zooplankton → bowhead whale
 arctic cod → ringed seal (or walrus) → polar bear
 clams (or crabs) → walrus → polar bear
 phytoplankton → zooplankton → bowhead whale
 zooplankton (copepods) → arctic cod → ringed seal (or seabird, narwhal, beluga whale)
 zooplankton → arctic cod → thick-billed murre
 phytoplankton → zooplankton → arctic tern
 algae → copepods → arctic cod

7. To create the food web, write “phytoplankton” on the bottom of the classroom board. Ask students to share food chains that include phytoplankton. Write the name of the organism that eats phytoplankton above it on the food chain. Above that organism, write the name of the organism that eats it and draw an arrow from predator to prey. Every time you add a new organism, ask students to share their food chains that include that organism. Keep building the web until all students have contributed. When you're done, ask students if they can make additional connections. One part of your food web might look like this:



8. Now ask students to talk about how sea ice fits in this food web. (*Sea ice is the primary habitat for many species; for example, it is the primary hunting ground for polar bears.*) Then ask students to name ways that global warming is threatening this web. (*Global warming melts sea ice. Warmer temperatures are disrupting breeding and feeding cycles.*) Why is the Arctic food web fragile and susceptible to climate change? (*It does not have the diversity that other webs have.*)

Evaluation

Use the following three-point rubric to evaluate students' work during this lesson.

- **Three points:** Students recalled several key concepts and examples of Arctic wildlife from the program; devised three clear, accurate food chains, each with at least three organisms; participated actively in development of the Arctic food web; gave two or more examples of how global warming affects the food web.
- **Two points:** Students recalled one or two key concepts and examples of Arctic wildlife from the program; devised two or three satisfactory, accurate food chains, each with exactly three organisms; participated in development of the Arctic food web; gave one example of how global warming affects the food web.
- **One point:** Students recalled few or no key concepts and examples of Arctic wildlife from the program; devised one food chain, or food chains did not include three organisms; did not participate in development of the Arctic food web; gave no examples of how global warming affects the food web.

Vocabulary

Arctic

Definition: region around the North Pole, including the Arctic Ocean and parts of North America, Asia, and Europe

Context: The top predator in the Arctic is the polar bear.

food chain

Definition: a hierarchy of organisms where each member eats the one below it

Context: In one Arctic food chain, polar bears hunt seals, which eat cod, which eat smaller fish, which, in turn, eat plankton.

food web

Definition: all the connected or linked food chains within an ecological community

Context: The Arctic food web lacks diversity, which makes it much fragile and vulnerable to climate changes.

phytoplankton

Definition: microscopic single-celled plants that drift in ocean currents

Context: Phytoplankton is the foundation of the food web for Arctic animals.

sea ice

Definition: a layer of ice formed from seawater; it changes with seasons and floats on the ocean, carried by winds and currents

Context: Sea ice is the primary habitat for many Arctic species.

zooplankton

Definition: microscopic animals that float in the ocean

Context: Zooplankton can be single-celled animals, tiny crustaceans such as copepods, or other marine animals in a larval stage.

Academic Standards

Science

The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K–12. To view the standards, visit <http://books.nap.edu>.

This lesson plan addresses the following national standards:

- Life Science: Structure and function in living systems; Regulation and behavior; Populations and ecosystems; Diversity and adaptations of organisms
- Physical Science: Transfer of energy

Social Studies

The National Council for the Social Studies (NCSS) has developed national standards to provide guidelines for teaching social studies. To become a member of the NCSS, or to view the standards online, go to <http://www.socialstudies.org>.

This lesson plan addresses the following thematic standard:

- People, Places, and Environments
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Credit

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