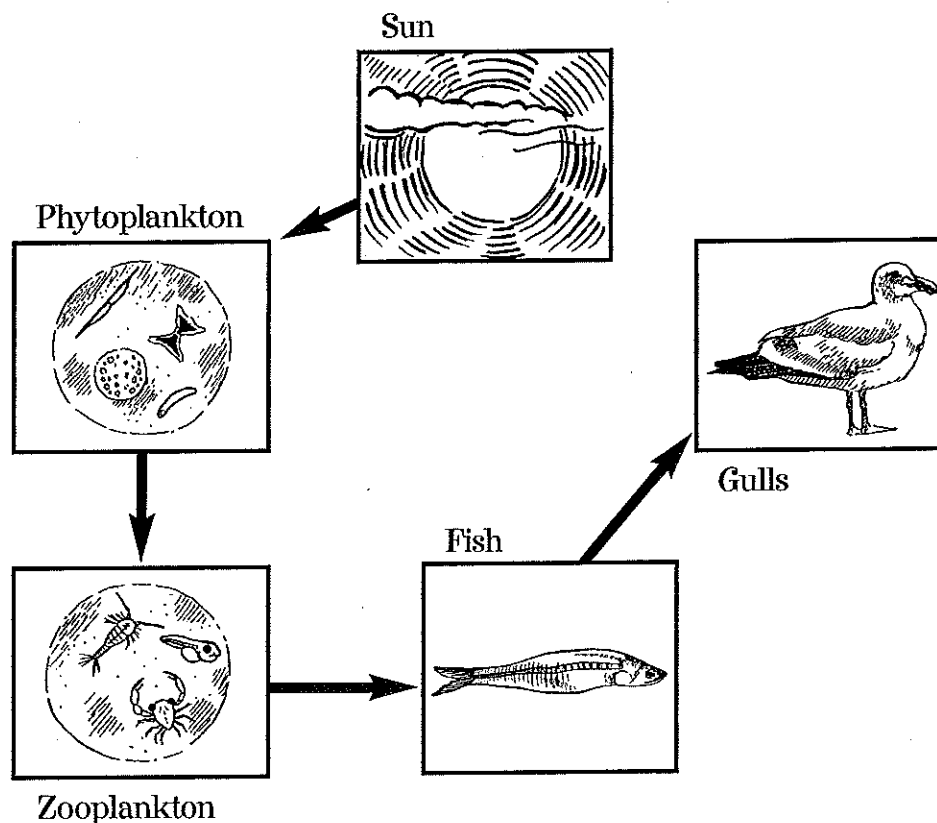


Name _____

Mapping a Food Web

You have learned that in photosynthesis, plants convert energy from the sun into organic material. This reaction is the first step in a **food chain**. Plants, called **producers**, begin the food chain when they provide organic material, or food, for other living things. Animals called **herbivores**, or **primary consumers**, eat green plants. Animals called **carnivores**, or **secondary consumers**, eat the herbivores. Other carnivores, called **tertiary consumers**, eat small carnivores. The final step in a food chain occurs when plants and animals die. **Decomposers**, which are usually bacteria, break down the remains of dead plants and animals, releasing molecules for other organisms to use. Each of these steps in a food chain is called a **trophic level**.

The following is an example of a simple marine food chain: The sun provides energy to phytoplankton, or tiny floating plants. The phytoplankton are eaten by zooplankton, or tiny floating animals. Zooplankton are eaten by small fish. Fish are eaten by shore birds.

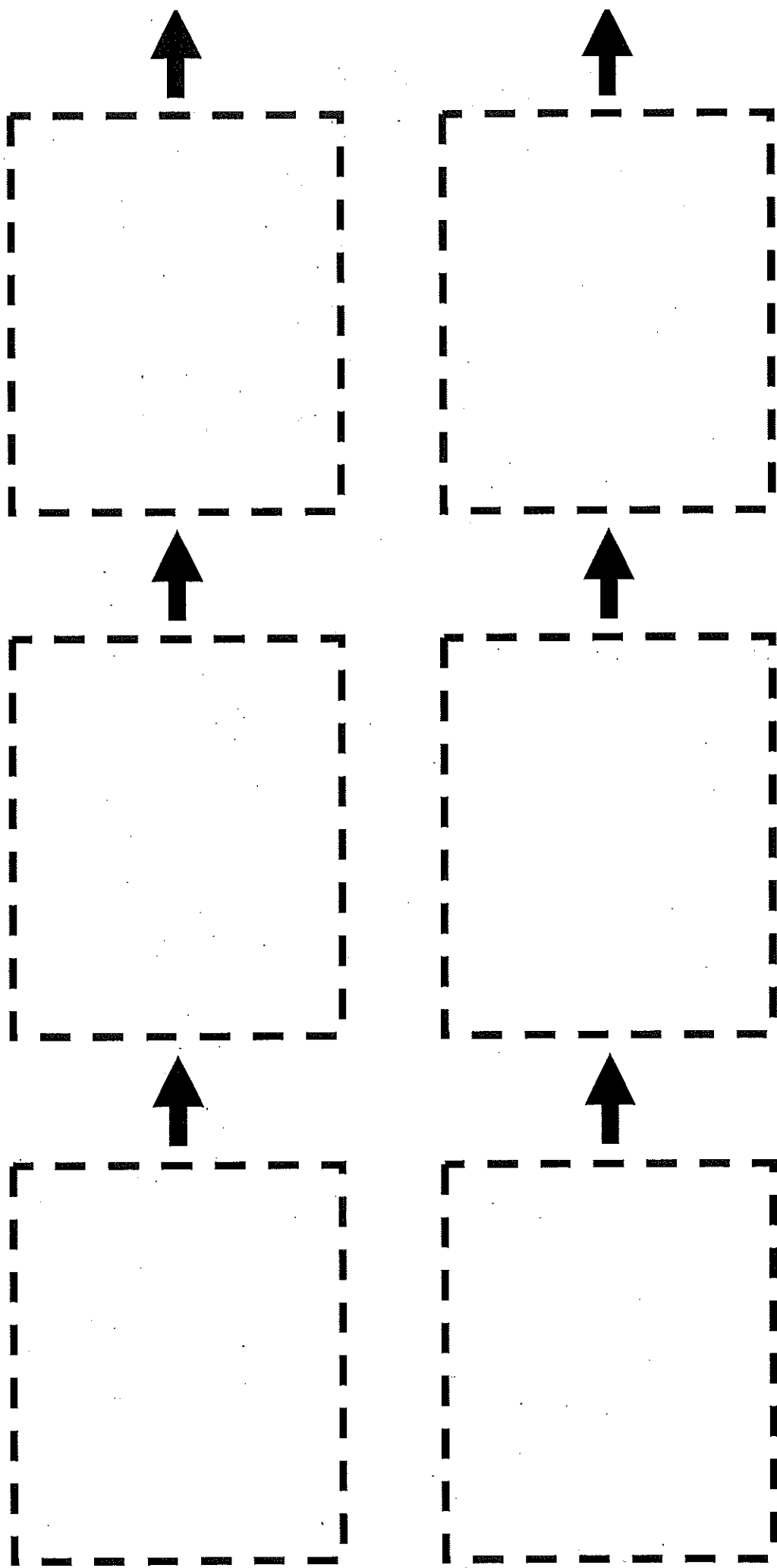


Most plants and animals belong to many different food chains. These food chains connect to form **food webs**. Some food webs include more than 100 different species! In this activity you will create a marine food web.



OCEAN
EXPLORIUM
at New Bedford Seaport

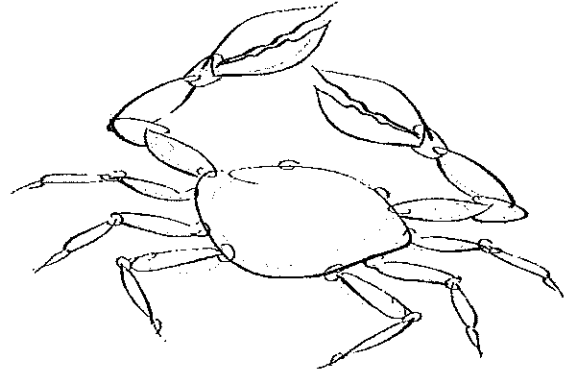
ARCTIC MARINE FOOD CHAINS



Challenges: Can you make a food chain that ends with a top predator?
Can you make a food chain that has more than 5 organisms?



Ringed Seal-Consumer- source of food for Native Alaskans, most common seal in the arctic, eats crustaceans and arctic cod.



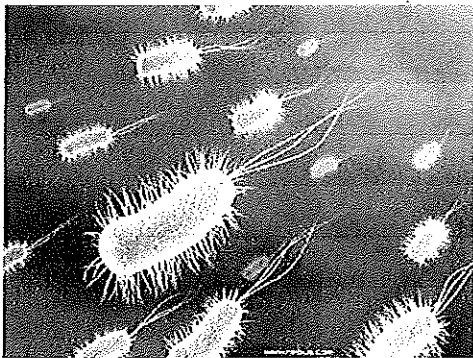
Crab- Consumer- feeds on animals in the sediments and dead organisms.



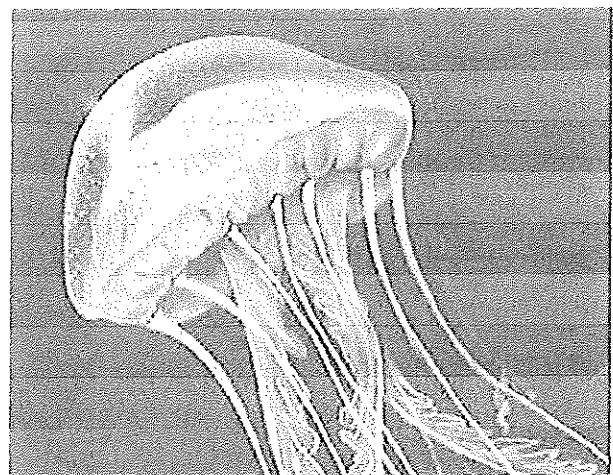
Walrus-Consumer- Can remain underwater up to 10 minutes, eats benthic (on the bottom) clams, dives no more than 80m.



Polychaete Worm-Consumer- Feeds on phytodetritus, bacteria in the water or the sediments.

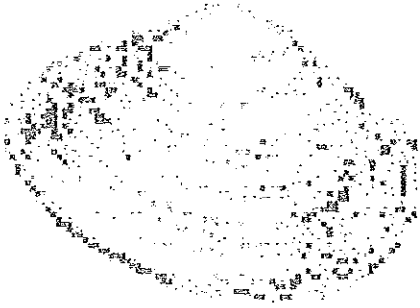


Bacteria- Decomposer- Breaks down and recycles dead organisms.

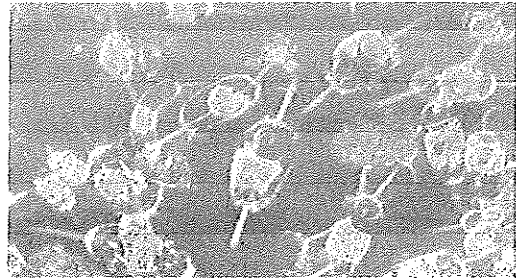


Jellyfish- Consumer- Feeds on small plankton and fish

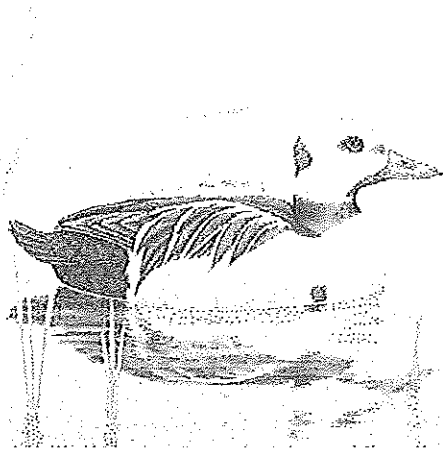
Picture Cards of Arctic Marine Animals



Clam- Consumer- Found on the bottom (benthic), filters phytoplankton and zooplankton



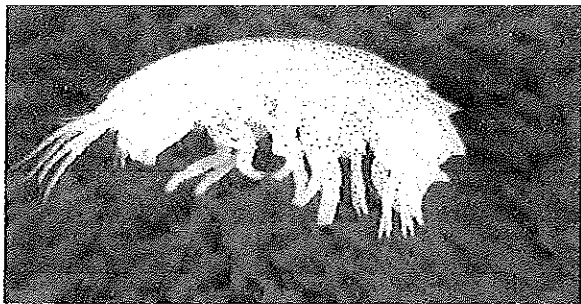
Phytoplankton- Producer- Use sunlight for photosynthesis may be in the water or benthic.



Spectacled Eider- Consumer- large diving sea duck, eats benthic crustaceans and clams.



Native Alaskan Hunter- Consumer- eats whales, walrus, fish, and seals.

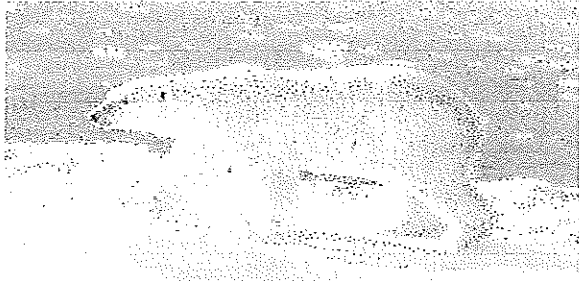


Amphipod- Consumer- Shrimp-like crustaceans, primary food for the gray whale, omnivorous (eats plants and animals).

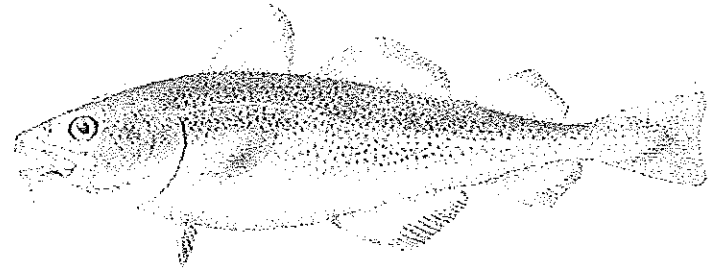


Photo courtesy Doug Allen, Change in Arctic Marine Production (CAMP) Project.

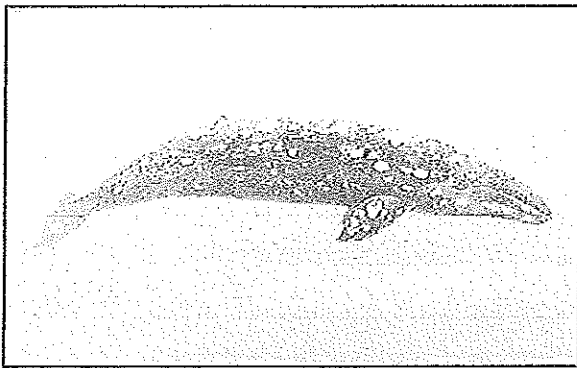
Ice Algae- Producer- Uses sunlight for photosynthesis, found on the undersurface of sea ice.



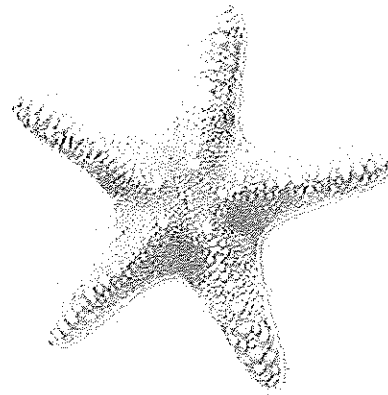
Polar Bear- Consumer- top predator, semi-aquatic and depends on sea ice, primarily eats seals, sometimes eats baby walrus



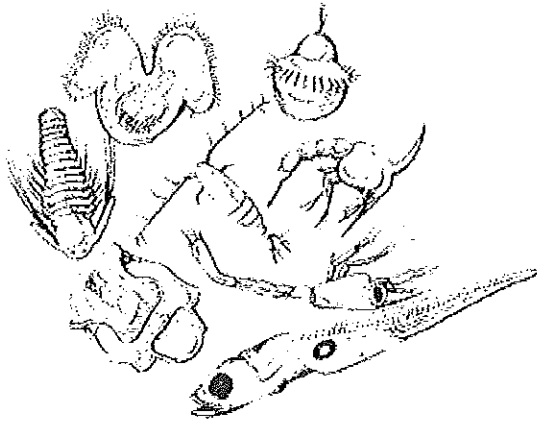
Arctic Cod-Consumer-found at depths up to 1000m, frequently found under the ice, eats crabs, clams, and smaller fish.



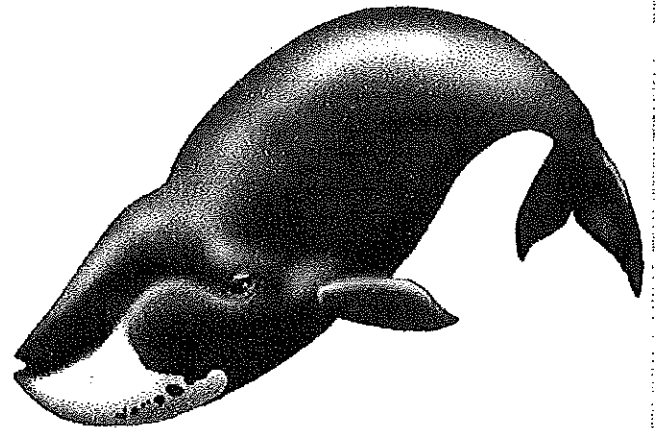
Gray Whale- Consumer- Feeds on benthic crustaceans (amphipods), scoops up sediment from sea floor to feed.



Starfish-Consumer- feeds on clams and polychaete worms.



Zooplankton-Consumer-copepods are often the dominant members of the zooplankton. They feed on phytoplankton.



Bowhead whale- Consumer-feeds on zooplankton.

Student Sheet

Name _____

Period _____

Title: Analyzing Arctic Marine Food Webs

Introduction: Most organisms that live and thrive in Polar Regions are marine in nature. They range in size from microscopic to the largest animals on earth. Polar oceans can be among the richest on Earth in terms of the abundance and variety of plants and animals. All living things in and on these cold waters have adapted to the extreme conditions in a multitude of ways. Despite their adaptations, polar organisms today are facing significant changes to their environment. Today you will explore some of these changes and the impact they may have on the food webs of the Polar Regions.

Procedures:

- 1) Arrange the set of picture cards into a food web on top of a large sheet of butcher paper. Use the descriptions on the bottom of each card to help you arrange the organisms.
- 2) Once your group agrees on the arrangement of the food web, use the markers to draw lines on the butcher paper that represent producer, consumer, or decomposer relationships between the different organisms.
- 3) Pick an environmental factor card and read it aloud to your group.
- 4) Discuss how the environmental change might impact the populations of organisms in the food web. After you discuss it, record your environmental impact and the changes you think it would cause in the data table. Then have someone in your group write this information on an overhead to present to the class.
- 5) You will present your information to the class. As other groups present, record their data in the chart. Feel free to write in new ideas other groups may give you into your section of the chart as well.
- 6) Answer your analysis questions.

Data:

Environmental Impact	Changes it would cause

Analysis:

- 1) Can all of these environmental impacts be traced to humans? Explain your answer.
- 2) What happens to a food web if you increase the amount of producers?
- 3) What happens to a food web if you decrease the number of large predators?
- 4) Why do we need decomposers in a food web?

Environmental Factor Cards:

The sea ice in the polar regions is melting.



How will this impact the different organisms of the food web?

The seawater is getting warmer.



How will this impact the different organisms of the food web?

Increasing the amount of freshwater in the ocean (due to melting sea ice and glaciers).



How will this impact the different organism of the food web?

There is an Increased amount of sunlight



How will this impact the different organisms of the food web?

The amount of land is shrinking due to rising ocean levels.



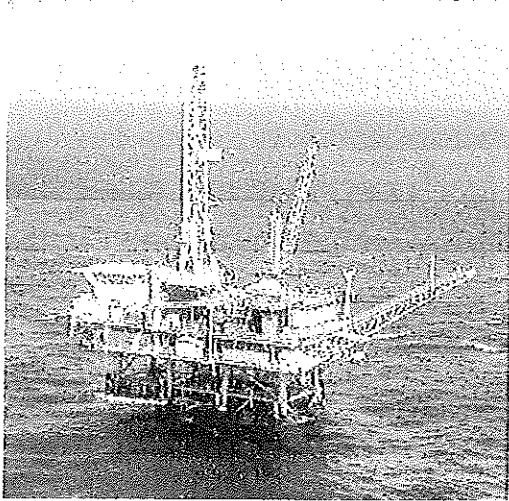
How will this impact the different organisms of the food web?

The number of days of winter weather is declining, making the winter season shorter.



How will this impact the different organism of the food web?

Humans are drilling more for oil in these regions on land and in the ocean.



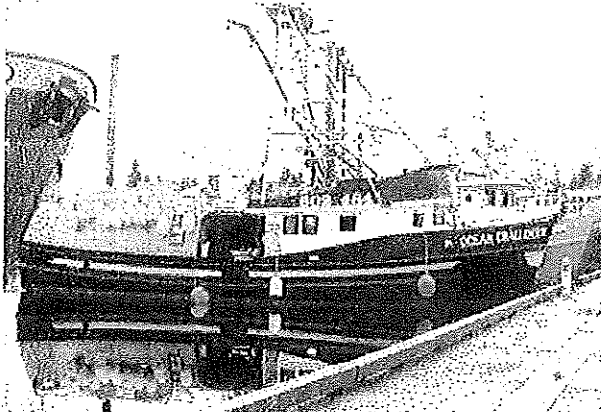
How will this impact the different organism of the food web?

More people are touring the Polar Regions than ever before.



How will this impact the different organism of the food web?

Humans are fishing more in these regions.



How will this impact the different organism of the food web?