

9. Adventures in Climate and Health: Critter Climate Chronicles: How Animals Adapt



Student Objectives:

- The students will understand weather and climate and how they differ.
- The students will understand the role a region's climate plays within the community and environment.
- The students will make the connection between the effects of climate change in the Arctic and the polar bear's lives
- The students will describe the challenges of a polar bear's eating habits.
- The students will explain how a decrease in sea ice would affect polar bears and the seals, their main prey.

Materials Required:

Sticky note pad, map that shows the US and the Arctic Circle example at end, chart prepared for the students to complete about the winter and summer in the Arctic - see materials at end.

Key Vocabulary:

Climate: the weather found in a certain place over a long period of time

Climate change: a change in the typical weather for a region over a long period of time

Fossil fuels: a natural substance formed from ancient organisms that can be used as a source of energy

Greenhouse gasses: gases in the Earth's atmosphere that trap heat

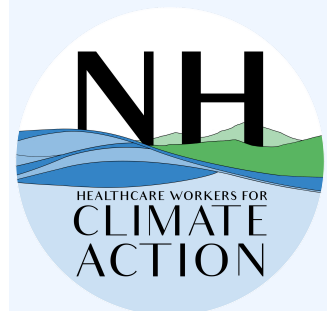
Positive climate feedback loop: the effects of global warming that amplify temperature rise

Weather: the state of the air and atmosphere at a particular time and place

habitat: the place where living things naturally live and grow



**Climate and Health Initiative
for Children
in Kearsarge & Sunapee**



Background Information:

Climate is changing and temperatures are increasing due to human-induced impacts.

The Arctic and its unique environment are particularly affected; this region is warming twice as fast as the rest of the planet. This is due to the positive feedback loop. Light colors reflect sunlight, and dark colors absorb sunlight. This same concept applies to sea ice.

Sea ice (a light color) is able to reflect sunlight back into the atmosphere, while oceans (dark) absorb it. When there is less sea ice, more sunlight gets absorbed into the ocean, causing increasing water temperatures. The warmer water temperatures, in turn, continue to melt sea ice. As long as climate change persists at the current rate, this cycle of increasing temperatures and disappearing sea ice will continue to generate the changing patterns.

In addition, the devastating effects of climate change in the Arctic are felt around the world. As glaciers and sea ice continue to melt, sea levels rise, threatening shorelines everywhere. Rising sea levels contribute to erosion on beaches and could eventually leave many coastal towns underwater.

Polar bear and seal information:

- Polar bears spend over 50% of their time hunting for food. In the harsh environment of the Arctic, sometimes meals are hard to come by. Polar bears require large amounts of fat to provide energy, especially during those months when food is scarce. Therefore, their primary food source is ringed and bearded seals.
- Seals, just like polar bears, rely on sea ice to breed and rest. They too need to reach the surface to breathe when not swimming. They typically maintain a network of ice holes that they keep open with the claws on their flippers to provide alternative breathing opportunities when polar bears take up position over one of the holes.
- Polar bears have a keen sense of smell and can sniff out these seal breathing holes. Upon discovering one, they sit motionless above it for hours, sometimes days, patiently waiting for a seal to surface. At this point, they will attempt to grab the seal and eat it. A large seal can provide enough energy for approximately eight days, but in order to store up reserves, a polar bear needs to eat far greater amounts of food.

Moose and Tick Information:

Climate change isn't just affecting animals in the Arctic, but New Hampshire animals are affected too. As temperatures increase and winters are shortened, ticks are able to be out for longer periods of time. This is dangerous to many animals and humans, but it is especially harmful to one species here in NH. Ticks have become the "primary mortality source for moose in northern NH". (Source) As ticks survive off of blood, and moose are very large animals, there will be so many ticks on a moose that it will ultimately die of blood loss. One moose in Vermont was found with 90,000 ticks on it! (Source)



Healthy Moose



Moose affected
by ticks

Procedure:

1. Fill out the K and W on the KWL chart.
2. Talk with the students about what they already know about weather and climate.
 - a. What is weather?
 - b. What is climate?
 - c. Have you heard the term climate change? What do you think it means?
 - d. Where do polar bears live?
3. Introducing the idea of climate change/timeline:
 - a. Ask the students to describe each season by the weather in NH. Use 4 sticky notes to record what the students say.
 - b. Ask the students to identify activities that they do in the summer, spring, fall and winter. Use sticky notes to categorize the activities by season.
 - c. Pick winter and switch the weather words with spring, ask the students if they would still be able to enjoy all of the same activities.
4. Introduce the Arctic and polar bears through a timeline activity:
 - a. Introduce this activity by showing the students a map of the United States that shows the Arctic. Have the students identify where NH is on the map.
 - b. Have the students brainstorm what they think the weather is like in the Arctic to fill in the top part of the chart (examples provided for you).
 - c. Have the students work together to fill in the bottom part of the chart with the cards provided.
 - d. Can they watch a time lapse video of sea ice cover? 46 seconds from NASA: <https://www.youtube.com/watch?v=AuwOwqzT6rk>
 - e. Explain to students that the climate is changing and temperatures are increasing due to human-induced impacts. Read the bold section of the background information.

4. Play Polar Bear Freeze

- a. Share the information from the background information about Polar Bears and seals with the students.
- b. Play polar bear freeze, a game similar to “statues”:

One student is a seal and stands at one end of the area with their back to the other students. The rest of the students are polar bears. The polar bears are trying to catch the seal for their next meal, however the polar bears do not want the seal to detect their motion. The polar bear that does the best job of getting to the seal will get their meal.

The polar bears move toward the seal and the seal may turn around at any point, the polar bears need to freeze and any polar bear seen moving needs to go back to start.

Let the students play as many times as they want

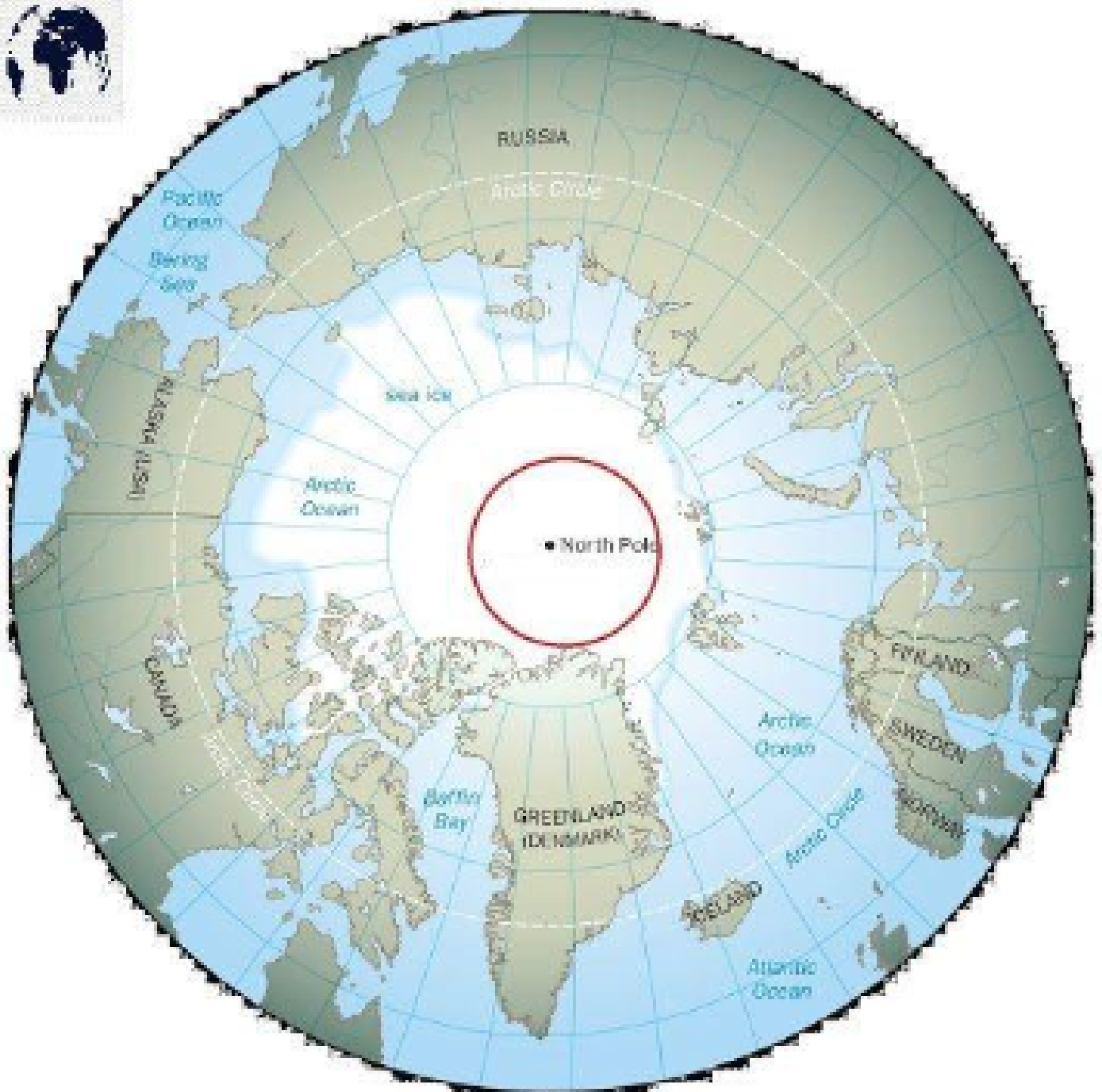
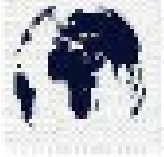
Recap the game by asking students to discuss the challenges. Which was more difficult-remaining motionless or being ready to move as soon as you saw a seal turn around? A polar bear’s life sometimes depends on this cat-and-mouse interaction, so its reaction speed and concentration are crucial. Be sure to inform students that unlike in the game, polar bears do not hunt seals in packs, and often have to walk or swim long distances to find food.

5. Conclude the lesson by completing the L on the KWL chart.

Adapted from: https://www.worldwildlife.org/teaching-resources/toolkits?utm_campaign=wild-classroom&utm_medium=cpc&utm_source=ad&Src=Googleadsadvo&Subsrc=Wildclassroom&gclid=CjwKCAjwvdajBhBEEiwAeMh1Up8dYavoXyalSbvcxqWlmGcypX7_IZADh7RUysO6_ze9lyETKLLUhoCihMQAvD_BwE

	SUMMER in the ARCTIC	WINTER in the ARCTIC
Climate	short warmer dry grassy	long very cold snowy icy
Events	sea ice melts ocean drilling for oil/gas shipping traffic walrus haul out tourist season fishing season	sea ice forms polar bear breeding polar bear feeding seal breeding/nursing

Chart should be empty when you present to the students. You work with them to fill in the top section, they as a group can use the cards provided below to finish the rest.





Arctic Events

SEA ICE FORMS

When sea ice freezes and covers large areas of the Arctic

SEA ICE MELTS

When sea ice melts and retreats

POLAR BEAR BREEDING

Polar bears gather on sea ice to mate

POLAR BEAR FEEDING

Polar bears patiently hunt for seals off sea ice

SEAL BREEDING/NURSING

Seals stay on sea ice to give birth to and nurse their pups

OCEAN DRILLING FOR OIL AND GAS

Less sea ice means more open areas to drill deep below for oil and gas

SHIPPING TRAFFIC

With less sea ice, there's more room for ships to navigate through Arctic waters

WALRUS HAUL OUT

Large groups of walruses gather on the shore when sea ice melts, many times hurting each other in the process

TOURIST SEASON

Less sea ice provides more room for cruise ships to travel through the Arctic, allowing people to visit

FISHING SEASON

The Arctic has 4 of the world's top 10 major fisheries and the world's appetite for fish continues to grow