



Impacts on Northern Marine Life

As our planet warms up, there will be many changes in our northern environments, including ocean (marine) environments. For example, the oceans are getting warmer and the sea ice is getting thinner.

These changes are already having some significant impacts on animals that live in or by the oceans. This backgrounder describes how the lives of these animals are being affected.

The Marine Food Chain

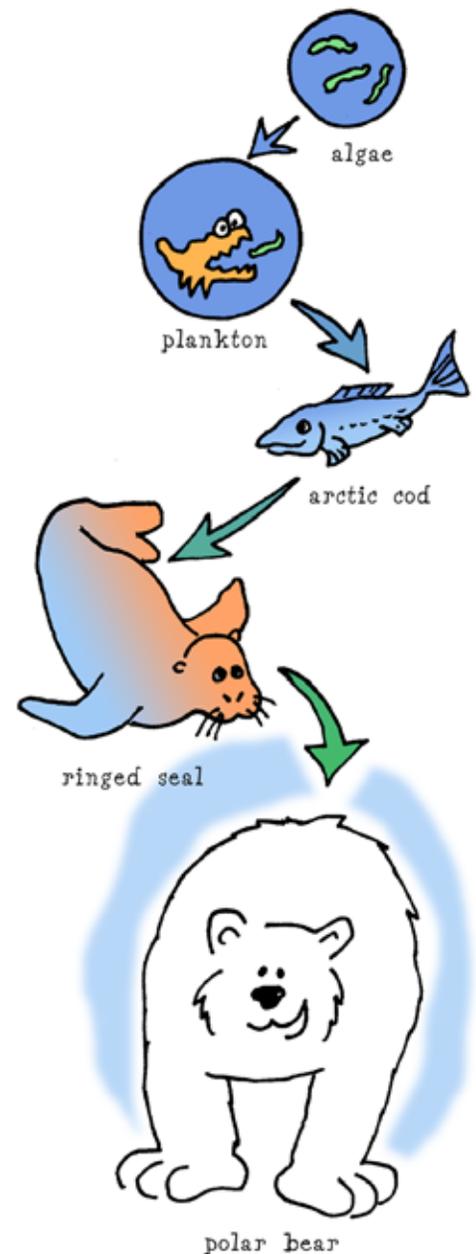
In the Arctic Ocean, tiny plants called algae grow under the sea ice. The algae are food for small floating organisms called plankton. The plankton, in their turn, are food for Arctic codfish. Ringed seals like to eat cod, and polar bears chow down on ringed seals. This set of links – between eaters and eaten – is called a food chain.

In warmer parts of the world, food chains are usually much more complex as there are more plants and animals to make links in the chain. But the Arctic food chain is short and simple.

Because there are fewer links in the Arctic food chain, any changes to one link in the chain can have a serious impact on the rest of the chain.

In this example, the polar bears are at the top of the chain. So if there were less plankton, then there would be less food for the cod and their numbers would decrease. Then the seals would suffer. And if seal numbers went down, the polar bear would start to get pretty hungry. So the polar bears' survival is dependent on every other link in the food chain staying strong.

A marine food chain:





A strong food chain also needs the connections between the links to be strong. For example, if there were a lot of seals hanging out on the sea ice, but the polar bears couldn't get out to the sea ice, then the chain would be weak. There would be no direct connection between the seals and the polar bears. It would be like having your dinner waiting for you on the table but not being able to get to it because you are locked out of the house!

In a way, this is what is happening to polar bears in the Hudson Bay area. There are a lot of seals in Hudson's Bay for these polar bears to eat, but the bears are having a harder time getting to where the seals hang out in order to chow down!

Read on to see what is making it hard for these polar bears to get to their dinner table.

Polar Bears on a Diet

Polar bears are well suited to living on snow and ice. For instance, a polar bear's very large paws spread out like natural snowshoes and distribute the bear's weight over a large area. These big feet allow polar bears to walk on ice that a person might fall through. Polar bears are also white like the snow and ice, which makes it harder for their prey – mainly ringed seals – to see them coming.

In other words, polar bears are adapted to a specific climate. If the climate changes, they either have to adapt, or move to other places where the climate fits their physical nature.

Polar bears live in many northern countries around the world. The ones that live near Churchill, Manitoba, in the Western Hudson Bay area, are at the southern edge of where polar bears are found in the world.



The Hudson Bay Polar Bear

Ian Stirling, a wildlife biologist from the University of Alberta, has been studying polar bears in the Hudson Bay area for almost 30 years. His studies help us to understand how these large bears might be affected by climate change.

In the Hudson Bay area, polar bears are at their lowest weight in March. The bears start packing on the weight in April by eating young seal pups that are born out on the sea ice.



The seal pups are 50% fat when they are just six weeks old so they are a huge source of energy for hungry polar bears!

The bears keep eating the seal pups until the annual sea ice breaks up in the early summer. The bears hunt the seals when the seals are in the birth lairs (their dens) in the ice, at the holes in the ice where the seals come up to breathe, or when the seals are lying out on the sea ice.



But something has been changing and these polar bears are not able to get as fat as they used to in the spring. Since 1981, the weight of the Hudson Bay polar bears has been decreasing. Studies show that these polar bears are about 90 kilograms lighter than they were 15 years ago.

Seal populations have not really changed during this time. So there are still lots of seal pups for the bears to munch on.

The likely reason for the decrease in the polar bears' weight is that they can't get to the seal pups. Polar bears need to be able to travel on the sea ice in the spring because that is where the fat little seal pups are found. But records show that the sea ice in the Hudson Bay area has been breaking up earlier and earlier in the year. This means that the bears can't get to their dinner table for as many weeks as they used to. Their mealtime is being cut short by the early break-up of the ice and the bears aren't getting as much hunting time to fatten up.

After the ice melts, and the bears can't get to the seals, these Hudson Bay polar bears travel inland and basically do not eat. They hang out, trying not to overheat in the warmer summer weather. The fat the bears pack on from feasting on the seal pups helps them get through this time.



Although the Hudson Bay polar bears are losing weight because of the earlier break-up of the ice, researchers have not noticed a significant decrease in the actual number of polar bears in this area since 1981.

However, Ian Stirling believes the condition of these bears will continue to go downhill if climate change continues to make the ice melt earlier every year. He doesn't think the



bears will be able to survive if that happens. He worries that this population of polar bears he has studied for so long may not be around the Hudson Bay area in 30–50 years.

And as this population of polar bears gets hungrier, they might increase their trips into nearby camps and towns in search of food. No one likes to have a hungry polar bear barging into their tent or wandering the streets of their town!

Not all polar bears stop eating during the summer months like the Hudson Bay polar bear. But polar bears everywhere in the north spend most of their hunting time on the ice. As global temperatures increase, this will mean less and less ice. What people are now seeing with the Hudson Bay polar bear could also happen to other polar bear populations in the north.

Limited accommodation?

Female polar bears used to den in snow banks near Coral Harbour on Southampton Island in Nunavut. However, people who live in Coral Harbour have noticed that permanent ice and snow on the hills to the east of town have gone. The bears don't use this area any more as there is not enough permanent snow to make their dens.

In the north Yukon, 75% of Yukon polar bears make their dens on drifting pack ice. Sometimes these dens are found up to 550 kilometres offshore. Thinning and smaller pack ice could reduce the number of places they have to make their dens.

It is expected that warmer winters will mean heavier snowfalls in some northern areas. Too much snow (or even rain) in the late winter could cause polar bear dens across the north to collapse. This could trap mothers and cubs that might be hibernating at that time.



Other Life in the Sea

Seals

- Thinning sea ice will likely have a negative impact on seal populations as seals mate and have their babies on the sea ice. They also use the ice as a place to rest and a platform to hunt from. As the ice thins, there will be less ice surface for the seals to use.
- Seals make their lairs (their dens) in the sea ice along the coast (which is also called land-fast ice). After they are born, the seal pups nurse for about six weeks. However, this important nursing period could be shortened when the land-fast ice breaks up earlier in the year. If the seal pups don't get to nurse for as many weeks as they used to, this will lower their chance of survival.

Walrus

- Walrus can weigh up to two tons each! As the sea ice thins, some areas may not be able to support the weight of the walrus, especially when they hang out in a group. This means the walrus will lose important habitat because they need ice to rest on and have their young.
- Walrus feed mostly on mollusks (clams and mussels) and other spineless creatures (invertebrates) that live on the sea floor. Warmer weather will cause the sea ice to melt and retreat farther from land so the edge of the ice will end up being over deeper water. This means nursing mothers and their young will have to swim farther to reach their food.



Other marine animals

- Less ice could benefit beluga and bowhead whales. Their populations should stay the same or even possibly increase. This is because the whales should have more open water to move around in which means they should have more access to food.
- Some large breeding colonies of sea birds like the Common Murre and Northern Gannets in Newfoundland will be threatened by rising sea levels. Increased storms could destroy nests, chicks and eggs.



No One Knows for Sure, But You Can Find Out More!

This backgrounder highlights some of the impacts that climate change might have on animals that live on or by the ocean. A lot is still unknown and uncertain. Many people continue to study and observe animals across the north to see how they are being affected by climate change.

You can read about the impacts to animals that live on land – like caribou, moose or even ground squirrels – in Backgrounder 8. To read about those that have scales or feathers (fish or ducks), check out Backgrounder 9. To learn more about how the world of water and ice is changing, look for Backgrounder 7.



Key Points

- ★ The food chain in the Arctic is short. Each link in the chain is important and the connections between the links need to be strong.
- ★ Polar bears in the Hudson Bay area are losing weight as they have fewer weeks in the spring to fatten up on seal pups. This is because the sea ice is breaking up earlier in the year.
- ★ Thinning and shrinking sea ice is affecting seals and walrus.
- ★ Some ocean species like whales may benefit from climate change, as there will be more open water so they can move about more and have access to more food.



Want to Know More?

Here are some websites to take you further in your research on the impact of climate change on marine wildlife in the north:

- **CBC TV (The Shrinking Polar Bears):**
<http://www.tv.cbc.ca/national/pgminfo/warming/bears.html> – Documents the effects of climate change on the polar bears of Churchill, Manitoba.
- **Polar Bears & Ice Backgrounder:**
Refer to Student Handout 3 in lesson plan Polar Bears and Ice in this resource for more information on polar bears and shrinking arctic ice.
- **Climate Change Connection:**
<http://www.climatechangeconnection.org/pages/wildlife.html#closetohome> – Check this Manitoba-based website for a list of linked articles about the effects of climate change on wildlife in the Arctic and around the world.
- **Defenders of Wildlife:**
<http://www.defenders.org/wildlife/new/threatspb.html> – Learn more about threats to the polar bear.
- **Polar Bear Tracker:** <http://www.panda.org/polarbears/> – Track Lena and Yana, two polar bears, as they journey through the Arctic. Be sure to click on 'Polar Bears at Risk' (top bar) and 'Impact of climate change' (right section) for more background information.