Name: _____ Date: _____

On thin ice (1)

In August 1881 the naturalist John Muir was sailing off Alaska searching for three ships that had gone missing. Off Point Barrow he spotted three polar bears, "magnificent fellows, fat and hearty, rejoicing in their strength out here in the bosom of the icy wilderness."

Today any polar bears would not be living in a wilderness of ice but swimming through open water, using up stored body fat. That's because the sea-ice habitat is disappearing. And it's going fast.

Polar bears are superbly adapted to this harsh environment. Most spend their entire lives on the sea ice, hunting year-round, visiting land only to build dens to give birth. They prey mainly on ringed and bearded seals (it's been said that they can smell a seal's breathing hole from more than a mile away) but sometimes catch walruses and even beluga whales.

Sea ice is the foundation of the Arctic marine environment. Vital organisms live underneath and within the ice itself, which is not solid but pierced with channels and tunnels large, small and smaller. In spring, sunlight penetrates the ice, triggering blooms of algae. The algae sink to the bottom, and in shallower water they support a food web that includes clams, sea stars, Arctic cod, seals, walruses – and polar bears.

Experts estimate the world's polar bear numbers at 20,000 to 25,000. Bears in Svalbard (part of Norway), the Beaufort Sea and Hudson Bay have been studied the longest. Their predicament was first noticed in western Hudson Bay, where ice melts in the summer and freezes back to shore in the autumn.

Ian Stirling of the Canadian Wildlife Service has studied polar bears there since the late 1970s. He found that they gorged on seals in the spring and early summer, then retreated to land as the ice melted. In a good year they put on a thick layer of fat. Ashore, the bears began a 'walking hibernation', using little food to hoard their fat stores. "Until about the early 1990s at Hudson Bay," Stirling says, "bears could fast through the open-water season of summer and autumn because hunting on the spring sea ice was so good."

During later years Stirling and his colleague Andrew Derocher began to see an alarming pattern. They observed that, although the bears' population stayed the same, the animals were getting thinner. The western Hudson Bay bears were missing vital weeks of good seal hunting, and the later winter

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On thin ice (2)

freeze-up was extending their fast. By 1999 they recorded that the bears' health became worse as the sea ice reduced. Bears didn't grow as large, and some came ashore much skinnier. Females gave birth less often and had fewer cubs. Fewer cubs survived.

In 1999 Steven Amstrup, chief scientist at Polar Bears International, who had studied bears in the Beaufort Sea since 1980 for the US Geological Survey, said he hadn't yet seen the kind of changes Stirling had. Or had he? But then he said, "I realised the difficult time I'd been having getting out onto the ice for my autumn fieldwork was not just an odd year or two but a prolonged and worsening trend. We began to see the same biological changes in our bears as well."

The world didn't know it yet, but during the summer in the Arctic Ocean, sea ice had been melting earlier and faster, and the winter freeze had been coming later. Since 1979 the spread of summer ice has gone down by about 30 per cent. The longer summer melt could damage the whole Arctic food web, with polar bears at its top.

Data have supported the early warning signs. Since John Muir's time greenhouse gases have added to the average warming of the Earth of about one degree Fahrenheit. This may seem very little, but even one degree of warming can make a big difference to an environment of ice and snow. It's as if a giant hand has held a magnifying glass over the Pole.

The sea ice on shallow water provides the richest food source for polar bears, but recently the ice has been retreating far from those areas. This reduces the summer habitat that bears need most to survive. Whether a polar bear lives in Hudson Bay or the Beaufort or Barents Seas, it faces the same problem: sea ice to hunt on is there for a shorter and shorter time. So the bears fast for longer, and because winds and currents move thinner sea ice more easily, bears may be swept into strange territory, forcing them to make longer, more tiring swims in open water to find ice or to get to land.

Polar bears are strong swimmers, but swimming long distances in open water is tiring and can be fatal. In 2008 a radio-collared bear with a year-old cub swam an amazing 427 miles to reach the ice off northern Alaska.

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On thin ice (3)

The cub didn't make it. In September 2004 researchers spotted four dead polar bears in the Beaufort Sea after a storm. Scientists estimated that as many as 27 bears may have drowned in that storm.

Females face especially hard times. Hungry males may kill and eat cubs – and even their mothers. Scientists believe this may happen more with food becoming more scarce and as getting to their ancestors' places for dens on land gets very difficult. On one island in Svalbard, when the sea has frozen late in the year, scientists have seen hardly any dens the following spring – sometimes none. That's when they'd normally see twenty or more.

From childhood we create a picture of our physical world: the sky is blue, the Arctic is white. But before this century ends – and perhaps much sooner – most of the Arctic is predicted to be blue water every summer.

Can a blue Arctic support polar bears? Only in the short run, Amstrup and Stirling say.

Currents still cram drifting sea ice against the Canadian Arctic Islands and northern Greenland in summer, creating pockets that may retain enough ice to support polar bears through this century. If we can reduce the warming of the atmosphere, Amstrup says, it will not be too late for polar bears, but "if the world keeps warming, ultimately even those last refuges will fail to support this icon of the Arctic."

Adapted from an article by Susan McGrath