

Polar bears are superbly adapted to the frozen Arctic environment. But can they survive in a warmer world?

Polar bears spend most of their lives on a frozen sea. This harsh environment is critical to their survival, because it is on the sea ice that they find the seals that are their main source of food.

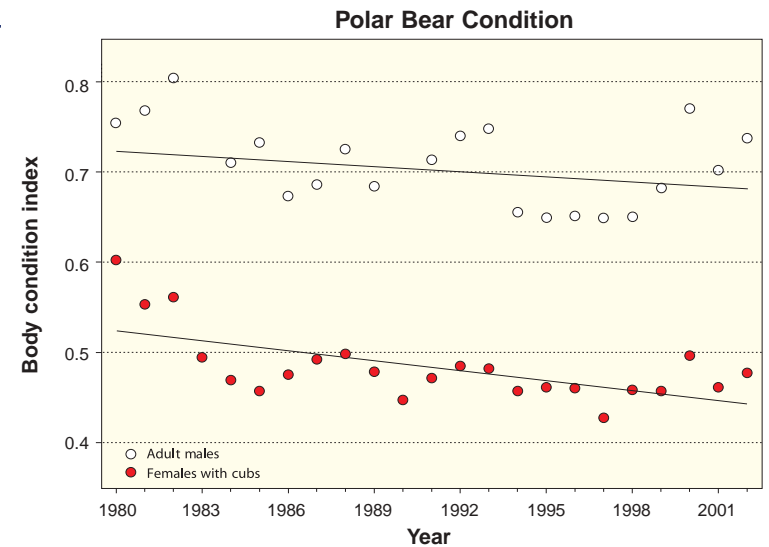
Climate change is expected to reduce the extent and thickness of sea ice in many parts of the Arctic and cause it to break up earlier. A shorter ice season would not only make it more difficult for polar bears to hunt but could also affect the abundance of their prey. These changes, if they continue, could eventually threaten the survival of polar bears in many, though not all, parts of Canada's North.

FOCUS: Western Hudson Bay

Polar bears in the northern Arctic can stay on the ice year-round, but on Hudson Bay the sea ice breaks up in the summer and is half gone by late June or mid-July. Although the bears stay on the ice as long as possible, they eventually come ashore, usually by late July or early August. While on land they eat very little, living mostly on fat reserves built up during their last few months on the ice. The later they leave the ice, the fatter they are, and the better their chances of survival. If the ice breaks up early, the bears must survive longer on less fat.

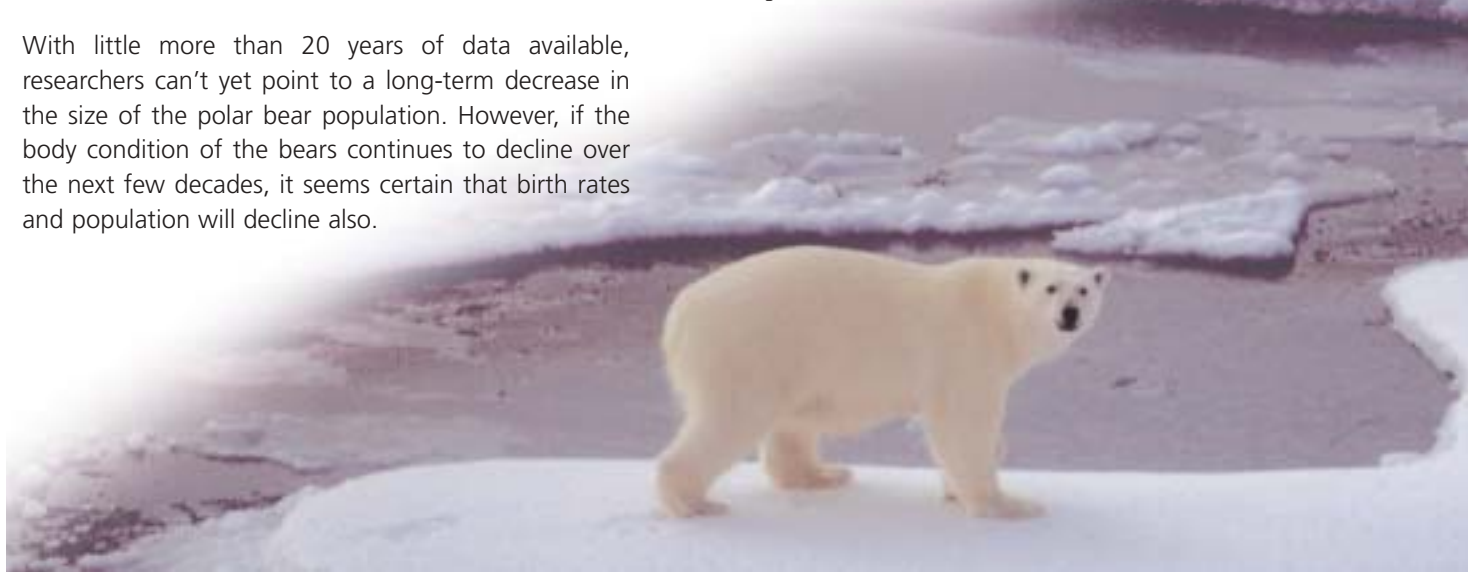
The timing of breakup varies considerably from one year to another, but by the late 1990s the ice on the western side of the bay was breaking up about two weeks earlier on average than it had in the late 1970s. According to scientists who have been studying polar bears in the region during those same years, the trend towards an earlier breakup has been matched by a decline in the physical condition of the bears. The animals have been getting thinner during their stay ashore and their birth rate has fallen. Although other factors can affect the health of polar bears, earlier breakup of the sea ice is the most likely cause of poorer health among the western Hudson Bay bears.

With little more than 20 years of data available, researchers can't yet point to a long-term decrease in the size of the polar bear population. However, if the body condition of the bears continues to decline over the next few decades, it seems certain that birth rates and population will decline also.



Source: Adapted from N. Lunn and I. Stirling, Environment Canada

The body condition index (which measures the relationship between weight and body length) provides good evidence of the general health of polar bears. The higher the index number, the healthier the bears. The decline in body condition since the early 1980s appears to be caused by a trend towards earlier breakup of the sea ice. That trend, in turn, is related to an increase in spring air temperature, which has risen at an average rate of 0.2–0.3°C per decade since 1950.



THE BIGGER PICTURE

There are as many as 25,000 polar bears in the world, and most of them, about 15,000, are in Canada. None, however, have been studied as long as those of western Hudson Bay. As a result, not much is known about how bears in other regions may have been affected by changes in climate. Nevertheless, the Hudson Bay evidence does raise concerns about the possible fate of

other populations in the southern Arctic if the tendency towards shorter ice seasons continues.

Seals also depend on the sea ice, especially as a place to raise their young until they are old enough to swim and feed on their own. A study by scientists and Inuit hunters in the Beaufort Sea area has shown that seal pups born

during short ice seasons are in poorer than average condition, perhaps because of later birth or earlier weaning. A trend towards shorter ice seasons could therefore result in a declining seal population. That, in turn, could create further survival problems for polar bears.

CHANGING ECOSYSTEMS

As climate changes, different plants and animals are affected in different ways. Some may benefit and expand their range and population. Others may migrate to areas where the environment is more favourable. If they don't, or can't, they face a more difficult existence or even extinction. As a result, changes in climate are altering and reshaping many of Canada's ecosystems. These changes are most evident in the North, but they are happening in other parts of the country too.

- New species are being seen in the western Arctic. Salmon have recently been reported in the Mackenzie River, while robins have been sighted on Banks Island. The bird is so rare in the area that there is no name for it in the local Inuvialuit dialect.
- Until recently, ring-necked ducks ranged no farther north than central B.C. In 1980 they were sighted in the northern Yukon and are now frequently seen in the area.
- The arctic fox can be found from Ellesmere Island to James Bay, but it is disappearing from the southern part of its range. Meanwhile, its southern cousin, the red fox, is advancing northwards.
- Until the 1980s, the Virginia opossum was unknown in southern Ontario. Milder winters now allow it to thrive as far north as Georgian Bay.
- Milder winters are also keeping long-tailed ducks in southern Ontario throughout the year. Because their feeding areas ice over less often, they now winter on the Lake Ontario shore instead of migrating further south.
- A comparison of fish surveys done in southern Ontario's Grand River watershed in 1983 and 1996 shows that many warm-water species are now colonizing the upper portions of the system, while many coldwater species have become less common.
- Since the mid-1990s, the explosion of the mountain pine beetle population in B.C. has resulted in the devastation of billions of dollars worth of timber. Warmer temperatures may be making it easier for the beetles to survive and multiply.
- In Manitoba, butterflies are appearing up to 12 days earlier in spring than they did 30 years ago.
- Red squirrels in southwestern Yukon now breed 18 days earlier on average than they did 10 years ago.



An arctic fox in its winter coat.