

ON THIN ICE



The Arctic is warming so fast that by 2050 it may be largely ice free in summer. Without their frozen hunting platform, how will polar bears survive?



A polar bear rides a summer sea-ice raft off Norway's Svalbard archipelago. Sea ice provides crucial habitat for the Arctic's top predator, but warming temperatures are creating extended ice-free periods that tax bears.



A female polar bear nurses cubs (left) on late July sea ice off Svalbard. Ashore, a male investigates a whale's backbone. Fat reserves from hunting ringed and bearded seals, and sometimes walrus, must carry bears through lean summers.

BY SUSAN MCGRATH

PHOTOGRAPHS BY FLORIAN SCHULZ

In August 1881 the naturalist John Muir was sailing off Alaska aboard the steamer *Thomas Corwin*, searching for three vessels that had gone missing in the Arctic. 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.”

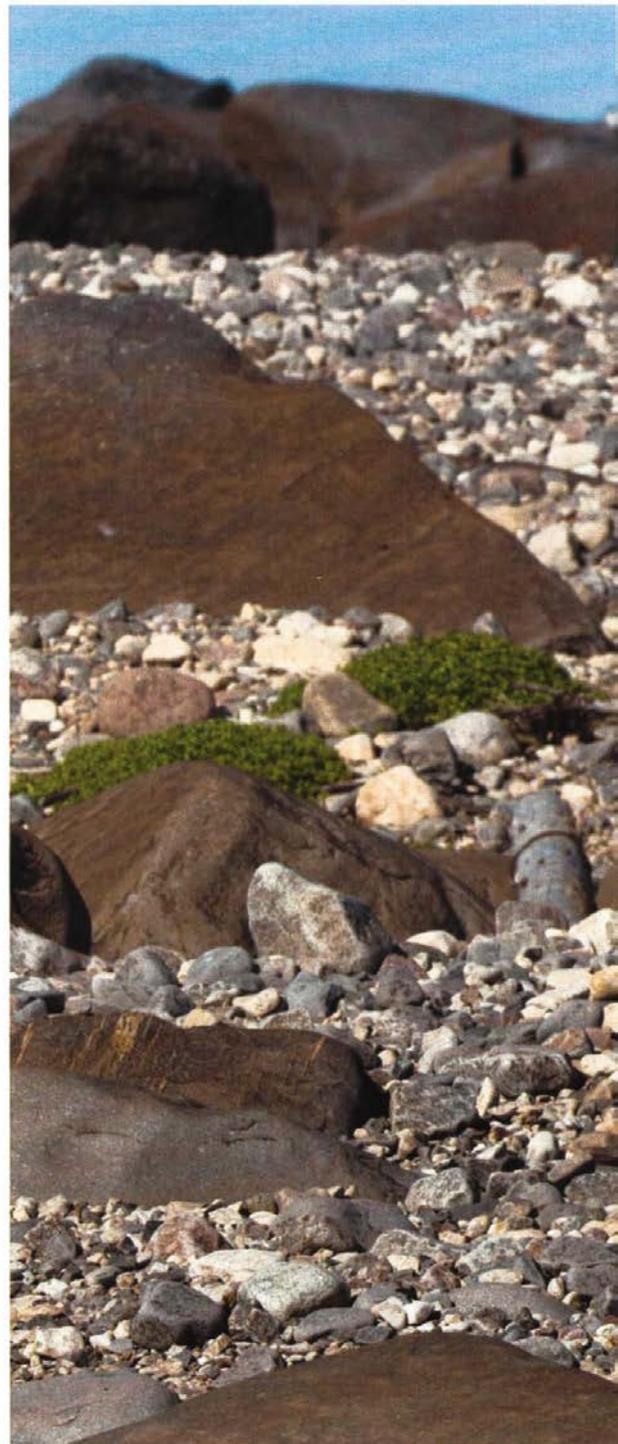
Were Muir to sail off Point Barrow in August today, any polar bears he’d see would not be living in a wilderness of ice but swimming through open water, burning precious fat reserves. That’s because the bears’ sea-ice habitat is disappearing. And it’s going fast.

Polar bears ply the Arctic niche where air, ice, and water intersect. Superbly adapted to this harsh environment, most spend their entire lives on the sea ice, hunting year-round, visiting land only to build maternal birthing dens. 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 walrus 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. Trillions of diatoms, zooplankton, and crustaceans pepper the ice column. In spring, sunlight penetrates the ice, triggering algal blooms. The algae sink to the bottom, and in shallow continental shelf areas they sustain a food web that includes clams, sea stars, arctic cod, seals, walrus—and polar bears.

Experts estimate the world’s polar bear numbers at 20,000 to 25,000, in 19 subpopulations. Bears in Svalbard (the Norwegian archipelago where Florian Schulz made most of these photographs), the Beaufort Sea, and Hudson Bay have been studied the longest. It was in western Hudson Bay, where ice melts in the summer and freezes back to shore in the fall, that the creatures’ predicament first came to light.

Ian Stirling, now retired from the Canadian Wildlife Service, has monitored polar bears there since the late 1970s. He found that they gorged on seals in the spring and early summer, before breakup, then retreated to land as the



Impervious to a dive-bombing arctic tern, a hungry bear on the shore of Hudson Bay uses up energy prowling for tern eggs. Summers dry-dock bears around the bay, where biologist Ian Stirling has linked shrinking sea ice to skinnier bears and smaller litters.



ice melted. In a good year, breakup found bears packing a thick layer of fat. Ashore, the bears entered a state known as walking hibernation, their metabolisms on idle to hoard their fat stores. “Until about the early 1990s at Hudson Bay,” Stirling says, “bears were able to fast through the open-water season of summer and fall because hunting on the spring sea ice was so good.”

During subsequent years of bear-watching, Stirling and a colleague, Andrew Derocher,

began to see an alarming pattern. They observed that although the bears’ population held steady, the animals were getting thinner. The western Hudson Bay bears were missing vital weeks of peak seal hunting, and the later winter freeze-up was extending their fast. By 1999 the biologists had correlated a steady decline in most measures of polar bear health with a decline in sea ice. Bears didn’t grow as large, and some came ashore notably skinnier. Females gave birth less

often and had fewer cubs. Fewer cubs survived.

When that same year Stirling and his colleagues published their findings, it was still possible to doubt that warming in the Arctic had already affected polar bears. In a 1999 interview Steven Amstrup, chief scientist at Polar Bears International, who had studied bears in the Beaufort Sea since 1980 for the U.S. Geological Survey, said he hadn't yet seen the kind of changes Stirling had. Or had he? "My aha! moment," Amstrup recalls, "was when I realized the difficult time I'd been having getting out onto the ice to conduct my autumn fieldwork was not just an odd year or two but a prolonged and worsening trend. Shortly thereafter 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. In the three decades since 1979 the extent of summer ice has declined by about 30 percent. The lengthening period of summer melt threatens to undermine the whole Arctic food web, atop of which stand polar bears.

Data have since bolstered the early warning signs. Since Muir set out in the *Corwin*, greenhouse gases have contributed to an average warming of the Earth of about one degree Fahrenheit. This may seem negligible, but even one degree of warming can noticeably disrupt an environment of ice and snow. It's as if a giant hand has trained a magnifying glass over the Pole.

The sea ice above the shallow continental shelves provides the richest sustenance for polar bears, but recently the ice has been retreating far from those areas, reducing the summer habitat 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 on which to hunt is available for progressively shorter periods, forcing bears to fast for longer periods. And because thinner sea ice is more easily shifted by winds and currents, bears may be swept into strange territory, forcing them to make longer, more arduous swims in open water to find favorable sea ice or to get to land.

Polar bears are strong swimmers, but swimming long distances in open water is draining and can be fatal. In 2008 a radio-collared bear with a yearling cub swam an astounding 427 miles to reach the ice off the northern Alaska coast. The cub didn't make it. Researchers counting bowhead whales in September 2004 spotted four dead polar bears afloat after a storm in the Beaufort Sea. Scientists estimated that as many as 27 bears may have drowned in that one storm.

Females face especially hard times. Malnourished males may kill and eat cubs—and even their mothers—behavior scientists believe may become more common as food diminishes. Increasingly, getting to ancestral denning places on land can be an ordeal. On one island in Svalbard, when the sea has frozen late in the year, scientists have seen few, if any, dens the following spring. That's when they'd normally see 20 or more, Jon Aars, of the Norwegian Polar Institute, says. Whether females find other sites or skip a year of breeding, Aars can't say.

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.

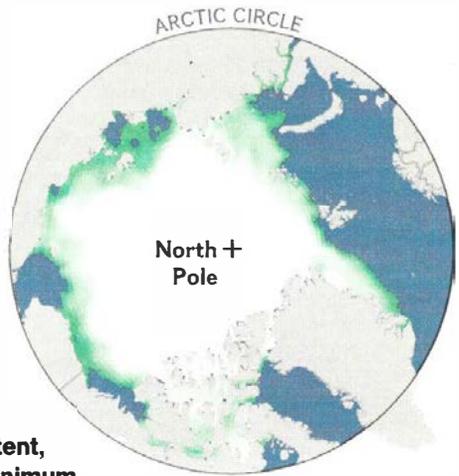
Currents still cram drifting sea ice against the Canadian Arctic Islands and northern Greenland in summer, creating pockets that may retain enough ice to support polar bears through this century. If we can reduce the warming of the atmosphere, Amstrup says, it will not be too late for polar bears, but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

Susan McGrath is a contributing editor at Audubon. Florian Schulz accompanied the MacGillivray Freeman Films team making To the Arctic, a 3-D, IMAX-theater film to be released worldwide this winter. A companion book of Schulz's work in the Arctic will be published by Braided River.

Bears at sea

The minimum extent of sea ice in summer has declined by about 30 percent since regular satellite monitoring began in 1979; even in winter the ice doesn't fully recover. In some areas females returning to denning sites in autumn face daunting expanses of open water. The Canadian high Arctic and northern Greenland could be the last refuges for polar bears, and even in these areas the ice will disappear if greenhouse gases aren't curbed.

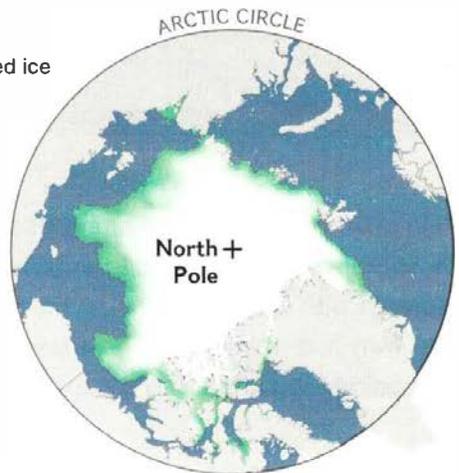
1979-1981



Sea-ice extent,
summer minimum



2008-2010



Sea-ice extent, 2008-2010

- Summer minimum
- Winter maximum
- Polar bear denning area
- Polar bear range



SCALE VARIES IN THIS PERSPECTIVE.
VIRGINIA W. MASON AND
LISA R. RITTER, NGM STAFF;
INTERNATIONAL MAPPING

SOURCES: NATIONAL
SNOW AND ICE DATA
CENTER; UNIVERSITY
OF ALASKA FAIRBANKS;
UNIVERSITY OF
ALBERTA, EDMONTON;
USGS; WILDLIFE
RESEARCH DIVISION,
ENVIRONMENT CANADA



JENNY E. ROSS

Male polar bears may eat young bears (above), so mothers are ever vigilant. Photographer Florian Schulz watched a Svalbard male (below, background) stalk a female with two cubs. “When the female saw him, she huffed at her cubs, and then they just pinned their ears back and ran.” Leaping over floes (right), they kept going long after they’d made good their escape.



