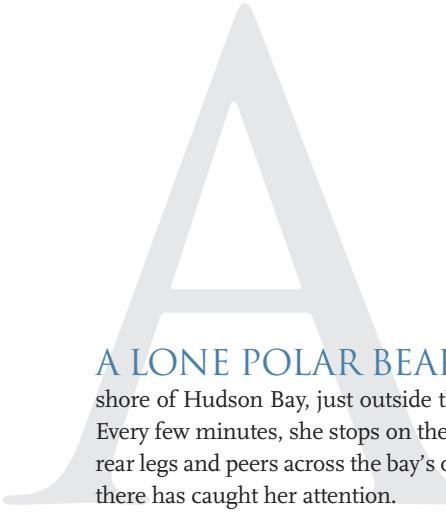


A photograph of two polar bears in a snowy, Arctic landscape. Both bears are standing on their hind legs, facing each other in what appears to be a social interaction or play-fight. The bear on the left has its front paws raised, while the bear on the right has its front paws slightly lower. They are surrounded by snow-covered ground and some low-lying Arctic vegetation in the background.

GAME OF THRONES

As the climate in Canada's Far North changes, polar bears are being affected. One impact — the increasing presence of killer whales in Arctic waters — may just unseat the King of the North.

BY SHARON OOSTHOEK



A LONE POLAR BEAR ambles along the western shore of Hudson Bay, just outside the town of Churchill, Man. Every few minutes, she stops on the rocky beach, stands on her rear legs and peers across the bay's open waters. Something out there has caught her attention.

It's late August. Months will pass before the increasingly unpredictable sea ice forms, providing a platform to hunt seals and fatten up after several lean months on land. It is not ice, however longingly anticipated, that has her scanning the cold, grey water. About 300 metres from shore, seven triangular dorsal fins betray the position of a group of unusual visitors to the bay: killer whales.

Perhaps the polar bear is just as surprised to see the whales as the tourists whose Zodiac idles a stone's throw from the pod. Certainly the boat's driver with Sea North Tours — a lifelong Churchill resident — is astonished. "Oh man, I can't believe I'm looking at orcas!" Remi Foubert-Allen shouts over the noise of an outboard motor. "Look at the male's dorsal fin. It must be seven feet!" His eyes widen as he gestures excitedly toward the pod. Foubert-Allen knows something most people don't: until recently, killer whales have been a rare sight in Hudson Bay.

Jobie Attitaaq, an Inuit hunter in Arctic Bay, Nunavut, has noticed the same thing on the northwest coast of Baffin Island. "In the late 1990s, we started to notice killer whales were coming around to Admiralty Inlet and even into Adam Sound and right here into Arctic Bay," says Attitaaq, chair of the hamlet's Hunters and Trappers Organization. "We never experienced this before. Now we get them often."

In fact, killer whale sightings in Hudson Bay and the wider eastern Canadian Arctic have increased since the year 2000, leading Arctic scientists to muse about the rise of a new apex predator



in the North. They say disappearing sea ice is opening up new hunting grounds for killer whales. At the same time, they say, it's narrowing habitat for the North's long-reigning monarch: the polar bear.

Steve Ferguson, a biologist with Fisheries and Oceans Canada, is among those trying to figure out exactly why the whales are there and what their presence means for the Arctic ecosystem. He believes the whales are moving north as climate change opens up previously inaccessible hunting areas that are rich in belugas, bowheads, narwhals and seals. Ferguson's research indicates that sea ice in Hudson Strait was once a choke point, preventing orcas from accessing Hudson Bay. Killer whales generally avoid ice because they can injure their tall dorsal fins as they swim underneath. But declines in the area covered by summer sea ice in the strait beginning in the 1960s are likely responsible for killer whales from the northwest Atlantic finding their way into the bay.

Figures from the Canadian Ice Service support that conclusion. Researchers there say that since 1968, summer sea ice concentrations in Hudson Bay and in Hudson and Davis straits have declined by 15 to 20 per cent per decade. In Baffin Bay, they've dropped by 10 to 15 per cent per decade.

Working with Ferguson, Winnipeg-based wildlife biologist Jeff Higdon has pored through old whaling logs and interviewed Inuit hunters to create a database of killer whale sightings in the region. He says European whalers kept detailed records starting in the 1600s, with no mention of these awesome predators in Hudson Bay until well into the 1900s. "The first record I know of for Hudson Bay was in the 1940s," says Higdon.

But sightings picked up starting in the late 1960s, with seven reported that decade. Records for the 1970s show 12. Ditto for the 1980s. Then a slight rise in the 1990s to 16 before sightings soared to 84 in the decade from 2000 to 2009. From 2010 to 2014, there were 24. Scientists with Fisheries and Oceans started paying closer attention in 2005, which probably boosted recent numbers, but a trend is clear.

A similar pattern is evident in the wider eastern Canadian Arctic. Killer whales have been summertime visitors to Baffin Bay and Davis Strait since at least the late 1800s, but Inuit hunters say



An orca leaps from the water (ABOVE) near Churchill, Man. Polar bears (PREVIOUS PAGES), long considered the Arctic's top predator, have been seen feeding on the remains of an orca's kill (OPPOSITE).

Inuit hunters say they now see killer whales more regularly and in larger numbers.

they now see them more regularly and in larger numbers. This region has gone from 25 reported sightings in the 1960s to 79 in the decade from 2000 to 2009. From 2010 to 2014, there were 62.

The fact killer whales are coming back year after year, and in greater numbers, tells Ferguson the hunting must be good. "They are doing well and reproducing," he says, adding that he wouldn't be surprised to see sightings continue to increase.

Polar bears, on the other hand, appear to be facing a less promising future.

FOR SEVERAL HUNDRED thousand years, polar bears have reigned supreme as the Arctic's top predator. They are uniquely suited to a frigid world, expert in using sea ice as a platform for hunting ringed and bearded seals. But the Arctic is warming at twice the rate of lower latitudes, and their habitat is changing drastically.

Polar bears have survived warming periods in the past — even to the point of crossbreeding with barren ground grizzlies whose territory overlaps theirs in the southern Arctic. Charlotte Lindqvist, an evolutionary biologist at the State University of New York, Buffalo, published a study in 2012 showing grizzlies and polar bears have swapped DNA over the course of five million years. Lindqvist suspects crossbreeding was more frequent during warmer periods as polar bear populations plummeted and grizzlies moved north. In fact, a handful of polar bear-grizzly hybrids have been confirmed in the Arctic over the last decade. But this time, even hybridizing is unlikely to have much of an impact on their survival, says Andrew Derocher, a polar bear researcher at the University of Alberta. Simply put, climate change is happening too fast for them to adapt, he says.

"The concern over polar bears stems from the fact the worst is yet to come," says Gregory Thiemann, a polar bear researcher at York University. "We haven't seen catastrophic declines yet, but based on a clear understanding of the relationship between greenhouse gas emissions, sea ice and polar bears, this is coming."

Current estimates peg the global population of polar bears at between 20,000 and 25,000 — a relatively healthy number. But scientists generally agree the polar bear's future is not bright.

A U.S. Geological Survey study released in July confirms that the most significant threat is declining sea ice. It also predicts polar bear numbers will drop whether greenhouse gas emissions are reduced or not. While

the study suggests the heavily iced Canadian Arctic Archipelago could be a last refuge, that's only if global average temperatures increase by just 2 C.

According to another study published in the November 2014 issue of the journal *PLOS ONE*, business-as-usual climate projections mean polar bears could face mass starvation and reproductive failure across the entire Arctic Archipelago by the year 2100.

"If we can't keep them in the Canadian High Arctic and northern Greenland, we are not going to have them in the wild," says Derocher, one of the study's co-authors. The issue is that polar bears are adapted to hunt seals from ice platforms. "I've seen them try for seals in open water," he says. "I've never seen them succeed."

They can supplement their diet while on land during the summer with seabirds, eggs and the odd caribou carcass. And even when summertime pickings are slim, polar bears are able to tolerate long months without food. But here's the crux: scientists believe the bear's survival depends on its ability to feed on high-calorie seals when the ice returns.

The *PLOS ONE* study suggests polar bears in the archipelago may have to survive serious increases in ice-free conditions by the end of 2100. While healthy adult males may make it through up to six months of fasting, juveniles, cubs and lactating females will struggle. Already, some populations are experiencing declining weight and increased mortality linked to disappearing sea ice.





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Ferguson, Thiemann and Derocher all agree. Besides, they point out, orcas hunt during open-water months, high-tailing it out of the Arctic before the ice returns and polar bears begin their hunting season.

For the short term, the whales may even be a boon for polar bears. Orcas are messy eaters, leaving behind large chunks of carcass after a kill. Polar bears have been seen feasting on the

The polar bear (ABOVE) faces an uncertain future in a warming Arctic, where it hunts seals from ice platforms. One scientist says he's never seen a polar bear successfully hunt seals in open water.

remains that wash ashore. That's not to say killer whale appetites won't have an impact on the Arctic ecosystem. University of Manitoba PhD student Cory Matthews analyzed stable nitrogen isotopes from the teeth of two killer whales found dead in Hudson Bay. His results suggest they are eating belugas, bowheads and narwhals.

A new predator — and one that is especially skilled — may leave its mark on these already threatened species. Belugas in eastern Hudson Bay and nearby Ungava Bay are classified as endangered by the Committee on the Status of Endangered Wildlife in Canada. The local bowhead population has recovered well from commercial whaling, but it's listed by COSEWIC as "special concern," meaning it's not in imminent danger but could be if circumstances change. Narwhals are also considered to be of special concern.

While all three species know a predator when they see it, they have little practice in evading one that moves fast and hunts in pods. Killer whales' preferred technique is ramming prey from below, but they're highly adaptable. They have been observed covering bowhead blowholes and keeping mothers down long enough to take their calves. They've also been seen biting off tails and fins before going in for the lethal blow.

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Under normal circumstances, belugas, bowheads and narwhals take refuge in sea ice. But circumstances are not normal in the Arctic, and their hiding places are fast disappearing. When ice is not available, they head for shallow water, perhaps hoping the fear of beaching will dissuade orcas from following.

While Ferguson can't predict what impact killer whales will have on any one of these whale species, that doesn't stop him from worrying: "I think they are going to be in trouble," he says. "We want to monitor this carefully."

Ferguson also worries what fewer belugas, bowheads and narwhals could mean for the subsistence hunt in Inuit communities. While nobody is getting rich hunting these whales, they are an important part of Inuit culture. That includes the sense of community that comes from hunting together and sharing the kill.

The whales' blubber and skin are also significant sources of nutrients that are otherwise hard to come by in the Arctic. They

Killer whales (**ABOVE**) may already be having an impact on the Arctic ecosystem. Scientific analysis suggests that they are eating bowhead whales, narwhals and endangered beluga whales (**BELOW**).

contain high levels of retinol (a form of vitamin A), vitamin B, vitamin C, polyunsaturated fats and protein. Plus, the whales' muscle is high in iron and zinc.

While technically Inuit could substitute with orca blubber, people know what they like to eat, and it's not killer whales. "We'd rather taste narwhal," says Arctic Bay's Attitaaq. Besides, he says, "killer whales are good hunters. They will never forget who made the bad choice to harm them and they'll come back to harm you. So we don't hunt them."

For now, anyway, Attitaaq doesn't believe the traditional hunt is threatened by killer whales. In fact, the opposite may be true. Killer whales tend to herd their prey to shallow water, where Inuit hunters can more easily make a kill.

Certainly the killer whales swimming around Remi Foubert-Allen's Zodiac near Churchill were having exactly that effect on the belugas. Their smooth white bodies could be seen plainly beneath the surface as they crowded close to shore. Maybe the orcas weren't hungry, or maybe they were distracted by the boatload of enthralled tourists bouncing across the waves. Whatever the case, on that day at least, no one witnessed a demonstration of the animal's potential as the North's new top predator.

Yet as Ferguson points out, the Arctic is changing fast, and we need to pay close attention to what is going on there. "The better predictions we have about how things are going to unfold in the near future, the better we can prepare for changes."



See a photo gallery of polar bears from Manitoba's Wapusk National Park at mag.cangeo.ca/dec15/polarbears.