POLAR BEARS
INTERNATIONAL
Protect their future and our own.

ANNUAL NEWSMAGAZINE 2024-2025 CONTENTS

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Editor: Barbara Nielsen

Art Director: Jenna Beckley

Designer: Amy Kelley Hoitsma

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Our Shared Future

From my home in Bozeman, Montana, it's easy to connect with the natural world. Mountains, forests, and rushing creeks serve as daily reminders of the beauty of nature and why I've devoted my life to conservation.

Whether I'm hiking on a mountain trail or working in my garden, I feel rejuvenated and inspired by my time outdoors.

No matter where on the planet you live, nature has the power to heal and inspire—and protecting the climate that allows nature to thrive is important to us all.

Through my work with polar bear conservation, I feel fortunate to have witnessed lone polar bears on the sea ice near Svalbard, Norway, and polar bear moms and cubs snuggling on the tundra near Churchill, Manitoba, Canada. Those moments come with a poignancy due to the warming taking place in the Arctic. But they also reinforce my commitment to do all that I can to protect polar bears and the sea ice they depend on.

I know it's a value that you share.

Across the world, we are more deeply connected with others than most of us realize—and those connections can make a real difference when it comes to action on climate change. By focusing on what brings us together, we can open the door to productive conversations and focus on building a better future for us all.

Our new video series, Talking About Climate Change, provides guidance on how you can navigate these important conversations. Look for natural entry points and try grounding them in things you both value. Your neighbor may not care about polar bears, but extreme weather events, rising home insurance costs, climate impacts on winter sports, or a future for their children and grandchildren may resonate instead.

Talking about climate change is especially important in a year with so many critical elections around the globe. By making climate part of our everyday conversations, we can elevate the issue and help elect leaders who support action.

Visit our website and social media channels to discover our new video series and action tools—and keep talking!

Sincerely,

Krista Wright

Krista Wright
Executive Director

Krista Wright

pbears.org/takeaction

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Indigenous Insights

Georgina Berg

By Kt Miller

Two years ago, as part of my master's thesis and my role with Polar Bears International, I embarked on a research journey with Georgina Berg, a Cree Elder and lifelong resident of Churchill, Manitoba, to document Indigenous knowledge of human-polar bear coexistence in the community. Using a storytelling approach, we explored how Indigenous people in the region coexisted with polar bears in the past, how they live with them in the present, and how they envision coexistence in the future.

We are sharing our findings through scientific publications. In addition, I created podcasts of the stories to share with the community in an approachable, non-academic way.

On a recent visit to Churchill, I met with Georgina to reflect on the study and its impact.

"I think this storytelling is what our people used to use before, and I think there's a lot of healing in it."

— Cree Elder

© Kt Miller / Polar Bears International

on Coexistence

Kt: This whole project started with a cup of tea. I was looking for a Churchill resident to serve as my co-researcher. I wanted someone who was a really good listener, who was respected in the community and would want to sit in on all of the storytelling sessions with me. I asked around Churchill, and it took almost two weeks, but finally I met you over a cup of tea. What did you think when we first met?

Georgina: The storytelling part of the project really excited me. I loved that idea. I had just retired, so I had lots of time.

Kt: We put together a trip to York Factory to get to know each other and plan the project. This is a research method called engaged acclimatization, essentially helping a researcher build cultural capacity and awareness. I knew York Factory was important to you and the community, since many Cree families were relocated to Churchill from there when the fur trade came to an end. What was it like to go to York Factory together?

Georginia: It was kind of surreal because my dad entered my mind and didn't leave until I was leaving there. I hadn't ever taken the time to think about my father's passing, and I don't even think I took the time to grieve until that very trip, which was a really remarkable thing. It took going back there to awaken that. All I could think about as we were leaving York Factory was that "this is going to be a good project in so many ways." Going back to our ancestral roots, it was like I could feel the energy of our ancestors blessing the project or, you know, saying that it was okay. It's almost like we went to the land to ask for its blessing.

And then we came home and we got busy on the project right away. We started chasing people down and sharing stories.

Kt: What was that like to work with me as a researcher, to go ask people to sit down and share stories?

Georgina: You know, it could have been a hard thing to do, but I think your personality and me being a local made it easier. We'd say, "Do you want to have a coffee and share stories?" And they'd say, "Okay, what time?" And we always had some tasty food to share too.

I remember when I left the first storytelling session I thought, "Wow, that really awakened a part of our culture." I imagined our mothers all sitting around telling stories, like they used to do all the time. It was an important thing, you know?

Kt: After we did all the storytelling sessions I went home, spent a bunch of time analyzing the data, and came back with a whole bunch of sticky notes (codes) and colorful pieces of paper (themes). We sat down with Churchill's Indigenous Knowledge Keepers first and then the other participants to share the initial findings.What was that like for you?

Our Coexistence Impact

With more polar bears coming ashore in more places as the sea ice melts, our coexistence efforts are more important than ever. Polar Bears International works with frontline communities in a number of ways, from waste management to "bear safe" practices and training in the use of deterrents. Our goal is to help polar bears and people live safely with each other. This includes supporting the town of Churchill in Manitoba, Canada, in its efforts to become a "Bear Smart" community, developing a model for other northern communities to follow.

Georgina: You had everything so organized with visuals that it wasn't overwhelming to process. It was broken up into chunks and that was a great approach. I'll never forget all those sticky notes, there must have been over a hundred of them! The way you organized the information was important.

Kt: Then I disappeared again and came back with a bunch of podcasts. What did you think when you first heard them?

Georgina: There's something about hearing your own voice or the voices of people you know that captures your attention. When I was a kid there was no TV, but there was always a radio. Everybody had a radio, and we listened all the time. I think the podcast reminded everyone of sitting around as kids listening to the radio. That was really cool.

Kt: So now, reflecting back, as the project has come to a close, what do you feel like we learned from everything we did together?

Georgina: Well, I know we learned that storytelling has to be a part of our culture. It always has been, but it was kind of forgotten and maybe not considered important, but it's really important. I think sitting down together, sharing a meal and telling stories is what our ancestors used to do. This project woke up a very important cultural practice that we had forgotten about, which is really valuable.

Kt: So there are all kinds of polar bear research of, you know, biology and population studies and that type of work. What does this type of research bring to our understanding of polar bears?

Georgina: [This community] has lived with polar bears for so long, and we almost don't realize how important they are to us. As the world is changing, like with global warming, they could be in trouble. I think one thing we learned was that the polar bears are like our family. We respect the land that they need to live on, and I think most of the time they respect our space that we need as well. So, we share the space and that's important.

What I loved about our research was the future visions, you know, what we should be thinking about as we go forward, especially with how fast the world is changing. I love that it provided practical solutions for us to continue to live with the polar bears and not hurt them and them not hurt us.

Kt: I think it also got everybody thinking about how they live with polar bears and, in doing so, maybe it increases people's mindfulness or awareness. By thinking about it from a coexistence perspective, it provided a lot of opportunity to find consensus and ways forward that were community-driven.

Georgina: Yeah. I like that the youth were included too, because they'll eventually be the ones taking care of that, eh?

Kt Miller conducted this research in collaboration with Polar Bears International and Environment and Climate Change Canada as part of her master's thesis at Royal Roads University. She is now a PhD candidate at Carleton University continuing to study Indigenous knowledge and work with communities in the Arctic. Georgina Berg is a Cree Elder and Indigenous Knowledge Keeper in Churchill, Manitoba. She also is a board advisor to Polar Bears International.

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"He Was a Groundbreaker" Remembering Dr. Ian Stirling

By Kieran Mulvaney

Dr. Ian Stirling, one of the earliest and most influential polar bear scientists, and a long-time adviser to Polar Bears International, died in May 2024 at the age of 82. In this Q&A, Dr. Andrew Derocher of the University of Alberta—who was one of Ian's graduate students, spent 40 years working with him, and is a member of Polar Bears International's Scientific Advisory Council—remembers his mentor and friend.

Ian's passing is certainly going to leave a large hole in the polar bear community. He was truly a pioneer, wasn't he?

He definitely was. He was a pioneer in marine mammal ecology, specifically seals and of course, polar bears. Plus, he was like an energizer bunny, and he just never lost that passion. Even when he was sick, he was still working on papers right up to the end. In fact, he co-authored a paper that was published just a couple of weeks after his death. He was passionate about science and research and saw a lot of reasons to keep at it. It was as much a hobby or a passion as it was employment. And I think that really kept him going, long after most people would say, "I've had it, I don't want to deal with this anymore."

He clearly had a deep and abiding passion for the Arctic.

Not just the Arctic, but the Antarctic. He got his start working on Weddell seals in the Antarctic, and he never lost that passion for the Antarctic. A lot of Ian's interests were in how ecosystems worked and how species lived in their environment. We always think about him having a focus on polar bears, but in reality, he was really keen on understanding their interactions with seals. At his core, he was fascinated by seals; he worked on Hawaiian monk seals and on South American fur seals and sea lions. He was the president of the Society for Marine Mammalogy, the first Canadian to hold that position. So, you know, his respect was global and his reach and impact were profound. And of course, given his fascination with seals, he was inevitably drawn to polar bears as an obligate predator of them. It was a perfect fit for him.

He was also, as you mentioned, prolific in his publications, wasn't he?

Incredibly prolific. His position was: If you're not going to do the science, then don't bother the animals. If you're not going to publish the information, it's a waste of time, it's a waste of money, and you're just interfering with them unnecessarily. And if you're going to do this stuff, and you're going to use taxpayer money or donor money to do it, then publish it and get it out there, so people can see the results and use them.

Is it fair to say that, when he began his research, nobody really knew how to study polar bears, so he had to figure that out first?

His early observation studies were foundational. He conducted them from cliff tops and high towers, looking at polar bears doing what polar bears do. Nobody had really tried to study polar bears up to that point, and he found the right place to do it. It was also the right time to do it. Remember, the International Agreement on the Conservation of Polar Bears was signed in 1973, and Canada had committed to doing research on polar bears and managing populations based on the best available science. So, here is this young guy with a fresh PhD, stepping into a mandate that the five Arctic nations with

© Dr. Ian Stirling

polar bears had agreed was important. The polar bear was a species that was under threat, mainly from overharvest. And nobody knew what to do. So, Ian was starting with a blank canvas, and he approached it with the tools of the time, which were basically binoculars and a notebook. And later he was one of the early pioneers in figuring out how to catch bears and put satellite tracking devices on them—which, of course, just opened up the Arctic to ask new questions about polar bears. It was a case of the right place, the right time, but more critically, the right person.

Tell us a little about how you started working with Ian.

I was a graduate student. I did my master's and my PhD with Ian. Ian was willing to teach you, but it was the old style of teaching that, you know, we don't really do anymore: You were sort of thrown in the deep end and you sank or swam. The first year, Ian would take you out and show you how to catch bears. The year after that, it was a case of, "Here's a helicopter, I'm going back home to Edmonton, you catch 100 bears and then come home." He had an implicit trust in the ability of people if he thought you were competent.

You and Ian wrote the first paper connecting climate change and sea ice loss to polar bears. How did that come about?

That was 1993. Climate change was just emerging as an issue. I had finished my PhD a couple of years before that, and I was working for Ian as a research associate. It was just two years before that I had deployed the first satellite collars on the bears of Western Hudson Bay, and so we had a little bit of data. And then, of course, that was also the year when Mount Pinatubo blew off its cap and cooled the Arctic, which led to a bumper crop of cubs and fat and healthy bears. So, we had a little bit of an insight as to some of the potential effects of warming versus cooling.

"Very few people have had such a profound impact on polar bears and Arctic ecology as Ian has."

Dr. Ian Stirling with Krista Wright of Polar Bears International.

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Support for Science and Research

Arctic research is difficult and expensive. That's why we provided funding for Dr. Ian Stirling's behavioral research and will continue to support the work carried on by his team. It's also why we build strong partnerships, teaming up with government agencies, universities, and others on science that adds to our understanding of the polar bears' needs and vulnerabilities and informs their conservation. In addition, we nurture the next generation of researchers by funding postdoctoral positions, laying a foundation to ensure sound science continues.

Aside from the Mount Pinatubo year, things were already changing in the Western Hudson Bay population as a result of longer ice-free periods, but we didn't really know why we were seeing a drop in body weight in polar bears and fewer cubs. We thought there might be a climate change link, and we looked at that in the 1993 paper, which took a look at what might be happening in Western Hudson Bay. And then, in 2004, we had a follow-up paper, which I led, where we dove back into the topic of polar bears and climate change, this time showing a clear correlation, and then one more in 2012, led by Ian, which reviewed all the evidence. Just a few months ago, we were discussing that it had been 12 years since our last paper, so we must be ready for our next one. But of course, sadly, we're not going to be able to do that.

Can you give us an insight into the kind of person he was?

He was generous and a big thinker. He was also—well, I hesitate to call him a workaholic, because that has a negative connotation. If you were watching somebody who went fly fishing all the time because they loved it, you wouldn't call them a workaholic, because it's their passion. A long time back, one of his daughters wrote a little calligraphy sign on a card. And all it said on it was "No." And I can tell you, that card sat right in front at eye level all the time. I remember that because he would often sigh, "I just gotta say no to something." But he rarely did. And if it was an individual, he never did. He just was magnanimous beyond belief.

Ian was a pioneer in bringing greater inclusivity into science, wasn't he?

He was a groundbreaker. He worked closely with the Inuit in their communities, worked with them in the field, stayed in their towns a lot, and got to know them. And that was really critical in terms of what he did in the north. He was highly respected. That was noted in his Order of Canada Citation, which was not just for his work on polar bears, but also for his incorporation of traditional Inuit knowledge in his research. He was also a big advocate of women in science very early on. He was taking female students into the Arctic from the get-go, at a time when this was a hugely male-dominant group.

One more question. If you were to very briefly sum up Ian Stirling's legacy, what would you say?

Very few people have had such a profound impact on polar bears and Arctic ecology as Ian has had. It's not just the duration of time, but it's the diversity of areas and the diversity of individuals that he influenced that really set the path for what we know about polar bears as a whole.

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Monitoring Polar Bear Moms & Cubs

By Dr. Louise Archer and Ian Ingram

With adult male polar bears reaching up to (and even above) 600 kilograms (1,300 pounds), it can be hard to imagine that polar bears begin their lives weighing around half a kilogram (1.1 pounds). Deep in winter, mother bears give birth to one to three tiny cubs inside maternity dens in the snow. These dens provide crucial insulation and protection; by feeding on their mother's rich milk, cubs can grow to about 20 times their birth weight by the time they emerge from the den in February–April.

Although the secluded dens provide excellent shelter for developing polar bear cubs, they can be challenging to study. In some areas, dens can be directly observed by humans, allowing for around-the-clock-monitoring in the spring by dedicated (and hardy) observers. Most often, however, researchers study denning behavior remotely using satellite telemetry collars, which are fitted to adult female bears earlier in the year and transmit location data, allowing us to piece together a bear's movements throughout the year.

© Geoff York / Polar Bears International

In the winter, an extended period of stationary GPS locations indicates a female has likely settled into a den. Some collars are also fitted with devices that record activity and temperature, with low activity levels and relatively warm temperatures further indicating a bear has tucked herself away in a den.

Insights from remote cameras

Satellite collars have proved invaluable for monitoring where and when maternity denning takes place, but their accuracy in capturing more fine-scale denning behaviors is unclear, particularly during the first few days after families emerge for the first time in the spring, when cubs get their first taste of life outside the den.

To better understand and protect this vulnerable period, Polar Bears International, the San Diego Zoo Wildlife Alliance, and the Norwegian Polar Institute have collaborated on a long-term study that uses remote cameras to monitor the behavior of polar bear families emerging from maternity dens in the Svalbard archipelago in the Barents Sea. Each spring since 2016 (excluding 2021 due to pandemic restrictions), our team has installed trail cameras at sites where satellite-collared females are suspected to be denning. These cameras record time-lapse images of polar bear families as they first emerge from the den, giving us a unique window into their behavior and how they interact with the environment during the den-emergence period. In addition, the camera observations are helping us model corresponding data from the mothers' satellite collars. This will improve our ability to remotely identify key denning behavior, including the first breakout from the den, subsequent forays, and the family's final departure for the sea ice.

The many thousands of photos collected between 2016 and 2023 have already been processed and classified by the San Diego Zoo Wildlife Alliance, and it has been a rewarding task to analyze the resulting hard-earned data and the impressive variation in behaviors that were captured! On average, we found bears first emerged from their den in early March, but this varied by as much as three weeks between individuals. Families also varied in how long they remained at the den site after emerging, with one family remaining resident for almost a month, whereas another appeared to depart almost immediately. Moms and cubs were more likely to spend time outside the den when temperatures were warmer; in addition, the time they spent outside gradually increased after their first emergence. This tells us that the post-emergence period may allow cubs to further mature and acclimatize until they are strong

Moms and cubs were more likely to spend time outside the den when temperatures were warmer; in addition, the time they spent outside gradually increased after their first emergence.

© Daniel J. Cox / NaturalExposures.com

enough to abandon the den with their mothers and traverse the sea ice to find seals.

In general, camera observations and inferences from satellite collar data matched up reasonably well, but the cameras gave us a further glimpse into some interesting (and some unexpected) behavior, including several mothers that decided to move their family to a new den after emerging, and one wobbly cub that took a tumble down a slope before being rescued by its anxious mother.

More detailed imagery

In addition to the off-the-shelf trail cameras that we install at the denning sites, we also install and test bespoke devices that we call DenCams, designed and built in collaboration with the San Diego Zoo Wildlife Alliance's Conservation Technology Lab. The trail cameras record a timelapse over the period of the deployment. The DenCams, however, record video continuously and use field-swappable lenses to provide a much narrower angle of view than the trail cameras. This means not a moment is missed, the bears are much larger in the imagery, and we have more than still snapshots from which to discern the bears' activities. Thus, there is the potential for much more to be revealed about den-emergence behavior to researchers poring over each season's data. A paper describing insights from the trail camera timelapses is already in the pipeline, and the more detailed DenCam footage may further add to our understanding of this secretive stage of a polar bear's life.

Engineering on the DenCams in preparation for the 2025 denning season began last spring, with Polar Bears International and Conservation Technology Lab staff, volunteers, and student engineering fellows working to streamline their deployment by making them lighter, more power-efficient, and easier to aim and assemble in the field. This is important because all the equipment is flown to within a few kilometers of the sites by helicopter and then hauled on sleds for the remaining distance by ski or on foot. And, while deployment days are chosen when conditions are favorable, the Arctic is a harsh, mercurial place, meaning researchers installing the equipment can easily find themselves working in incredibly severe conditions. So, every kilo and every minute matters!

As a warmer, less ice-covered Arctic becomes increasingly accessible to humans, continued remote monitoring is crucial to protecting denning habitats. We are hopeful that an enhanced ability to monitor denning bears, understand their vulnerabilities, and document any behavioral changes will help to ensure mothers and cubs remain undisturbed during this critical stage.

Dr. Louise Archer is a postdoctoral fellow at the University of Toronto Scarborough, supported by Polar Bears International. Ian Ingram is a scientist in conservation technology at the San Diego Zoo Wildlife Alliance.

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KEY FACTS
about moms & cubs

- During the denning period, polar bear moms don't eat or drink for up to eight months, one of the longest fasts in the animal kingdom.
- Polar bear moms give birth to one to three cubs in snow dens in late fall or early winter, nursing them until they are strong enough to leave the den three to four months later.
- At birth, newborn cubs are about the size of a block of butter. By the time they are 2 years old, male cubs can be as big as their moms and weigh hundreds of kilograms.
- Polar bear milk is about 31 percent fat when cubs are born, the richest milk of any land mammal.
- Cubs stay with their moms for just over two years, learning as much as possible about hunting and survival before they head out on their own.
- When cubs are weaned, they are considered subadults (from 2.3 years to 5 years old) and have to put their newly acquired skills to the test.
- On average only about 50 percent of cubs live past their first year. In parts of the Arctic with more sea ice loss, cub survival rates are even lower.
- From about the age of 5, female polar bears mate and produce cubs approximately every three years depending on multiple factors.

Polar Bear Health, Aging, and Survival in a Warming World

Identifying the health and stress of polar bear populations is important because this information can be used to guide conservation policies.

By Dr. Ruth Rivkin and Dr. Levi Newediuk

This past summer, many of us felt the heat of global warming. That heat can be deadly for polar bears living around Churchill, Manitoba, Canada. Polar bears rely on the sea ice that covers Hudson Bay each winter to hunt their favorite prey, ringed and bearded seals. Longer and warmer summers mean the ice covering Hudson Bay now melts earlier in the spring and freezes later in the fall. Once the sea ice melts, polar bears spend their time hanging around the shore, waiting for the sea ice to freeze again.

Many polar bears either spend these ice-free days fasting or turn to alternative food sources. There are reports of polar bears foraging on land for kelp, bird eggs, or berries. Unfortunately, new data suggests that these food sources are much less nutritious and cannot sustain most polar bears in the absence of seal prey. Polar bear cubs in particular are affected, as their mother's milk becomes much less rich or dries up altogether. Fasting is stressful for the bears. Without enough food to support their cubs, the Western Hudson Bay polar bear population is shrinking.

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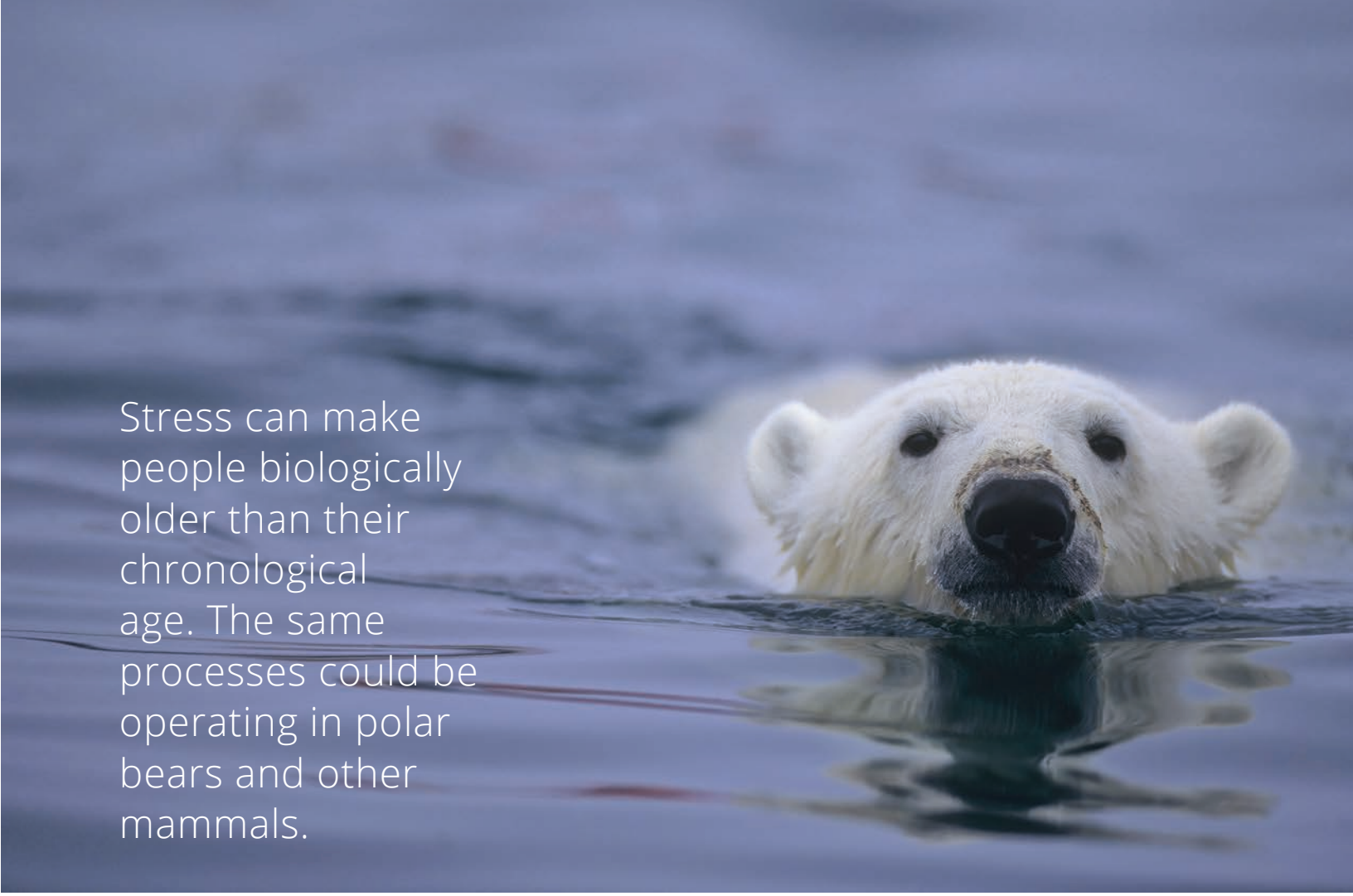

Stress can make people biologically older than their chronological age. The same processes could be operating in polar bears and other mammals.

Long-term exposure to stress is harmful for many animals, polar bears and humans alike. Through genetic analysis, we have been investigating the stress of sea ice loss on Western Hudson Bay's polar bears. As animals, including humans, age, microscopic "epigenetic" marks are lost from our DNA. These losses happen so predictably over our lifespans that scientists can look closely at the DNA inside our cells to predict our epigenetic ages using epigenetic clocks. In humans, we know that stressful environments and unhealthy habits (like smoking cigarettes) can cause us to age epigenetically faster than expected. As a result, stress can make people biologically older than their chronological age. The same processes could be operating in polar bears and other mammals, so we are building an epigenetic clock for polar bears to compare their epigenetic and chronological ages.

With a polar bear epigenetic clock, we could answer many questions about the impacts of disappearing sea ice on the health of polar bears in Western Hudson Bay. One possibility is that polar bears who age faster are less capable of finding enough food to support their cubs. In humans, faster epigenetic aging leads to a shorter lifespan. It is also possible life spans are shorter for polar bears who epigenetically age faster. Because the effects of climate change are predicted to continue escalating in the coming decades, it is crucial that we identify how the stress of warmer climates affects polar bear longevity and survival.

Genetics research could also help us answer questions about the effects of climate change on polar bears across the Arctic. For example, are polar bears aging faster only in Western Hudson Bay, where temperatures are the warmest in the Arctic, or is this effect more widespread? Comparing aging rates across the Arctic may help identify populations that might be under large amounts of stress from climate warming. Another unanswered question is whether spikes in temperature align with spikes in aging rates. The survival rate of polar bears is closely tied to sea ice levels — in years when sea ice melts early or freezes late, polar bear survival is at its lowest. These warmer years when polar bears have to fast for longer than normal are likely very stressful, and may accelerate the aging rates of polar bears more than normal years. Spikes in temperature could serve as a real-time indicator of stress for polar bears.

(continued on page 34)

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How much do you know about polar bears?

Take our quiz to find out.

1. Approximately how many wild polar bears are there?

A. 15,000 B. 17,500 C. 26,000 D. 37,000

2. How many countries have wild polar bear populations?

A. Three B. Four C. Five D. Six

3. What color is a polar bear's fur?

A. White B. Yellow C. Green D. None of the above

4. What is the longest distance a polar bear has been recorded swimming?

A. 270 miles B. 333 miles C. 426 miles D. 502 miles

5. When was the first international agreement to protect polar bears signed?

A. 1972 B. 1973 C. 1983 D. Trick question—there isn't one

6. On average, how many penguins does a polar bear eat in a month?

A. 5+ B. 35+ C. 100+ D. None of the above

Answers on page 33

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How Do Scientists Count Polar Bears?

Despite the challenges, scientists over the years have developed several different ways of estimating polar bear numbers.

By Kieran Mulvaney

How many polar bears are there? And how do scientists estimate polar bear numbers?

The answer to the first question is that there are thought to be about 26,000 bears throughout their Arctic range, although there is much uncertainty or insufficient information about several of the 20 subpopulations.

The short, somewhat facetious answer to the second question is: not very easily. Polar bears wander over vast distances in remote, frequently inaccessible areas that regularly experience conditions that are not only inhospitable and challenging to work in but can also be hazardous.

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Complex task

"Polar bears have some of the largest home ranges of any four-legged animal on the planet, which definitely complicates things," says John Whiteman, chief research scientist for Polar Bears International and assistant professor of biology at Old Dominion University. "You have an enormous area that you're working in, which requires aircraft, and the Arctic is a very dangerous place to fly."

Added to that is that bears tend not to stay within the boundaries of a search area. Conditions change from one year to the next. During one survey, ice may be extensive and so more bears may be far offshore, while the next survey may encounter more bears on land. And some parts of the Arctic are easier to work in than others, with better logistical support.

"When you have a really large area to cover and when you have a lot of bears, that's when it gets really challenging," explains David McGeachy of the Wildlife Research Division at Environment and Climate Change Canada.

Diverse methods

Despite the challenges, scientists over the years have developed several different ways of estimating polar bear numbers.

Historically, the most common has been "mark-recapture." Scientists dart bears with sedatives, affix ear tags, and mark the bears with tattoos inside their lips. The idea is that over the course of a survey—which may last several years—a mathematical equation allows researchers to calculate how many bears there are, based on how many captured bears had been previously marked. While the bears are tranquilized, they can also be measured and weighed. Researchers also take biopsies that provide information about their health and possible contaminants in their system.

In recent years, physical mark-recapture has become somewhat controversial, because of concerns that the stress of being pursued and tranquilized may have on bears.

Whiteman, who has analyzed the impact of mark-recapture studies on polar bears, concludes that, by and large, "The research suggests that capture overall has minimal effect on bear health, including over the long term." Having said that, he adds, "There's an intangible set of values involved. Is this something that people want to happen?"

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Other approaches

To that end, researchers are increasingly deploying other methods. One is genetic biopsy, in which darts are fired at bears and immediately retrieved, procuring a small amount of hair and skin. Because each bear's DNA profile is unique, this technique, like mark-recapture, allows researchers to determine what proportion of bears are being re-observed, and to extrapolate from there to produce an abundance estimate.

Aerial surveys are also in the mix: literally, flying along predetermined transect lines and counting bears. This technique, too, involves an element of calculating numbers by estimating what percentage of bears are being observed.

"Often aerial surveys are designed so that you have multiple observers, for example, in the front of an aircraft and in the back," explains Whiteman. "The observers in the front will see a bear and note it, and whether or not the observers in the back see the same bear will help assess how successful they were at observing all the possible bears during the flight."

Apples to oranges

While all these methods are likely to produce somewhat similar estimates of polar bear numbers, they are sufficiently different that scientists caution strongly against inferring population trends by comparing an estimate derived from, say, aerial surveys with a later one in the same region based on genetic biopsy. Additionally, estimates may change, not necessarily because the number of bears has increased or fallen, but because a greater understanding of how bears behave or are distributed in a particular area can lead to more accurate counts.

Whiteman points to an updated estimate for the subpopulation of polar bears in Baffin Bay (between northeastern Canada and Greenland). In the 1990s, a series of aerial surveys there produced an estimate of about 2,000 bears. Approximately 15 years later the survey was repeated; but, Whiteman explains, "In the interim, other work in the area had made it clear that bears ventured further inland than anybody realized. Also, logistically, it became feasible to survey a larger area. And of course, there was a lot of ice loss, so presumably any bears that during the first survey had been out on the sea ice were now on shore."

The second survey therefore covered a larger area and ventured farther inland and as a result yielded an estimate of approximately 2,800 bears. "So, it appeared to be an increase of 800 bears," says Whiteman. "But the authors were very clear about stating: 'Don't compare these two numbers, because that comparison is not valid.'"

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That didn't prevent climate change deniers from asserting that researchers had been "hiding" figures that showed a population increase.

"That's the challenge," says Whiteman. "Do you want to do the exact same thing time after time for consistency? Or do you always want to do the best possible job that you can in estimating the total population size? If you're a scientist, and you're interested in creating the best objective data and then having a grounded conversation about it, you're always going to pick the latter. But unfortunately, that's not what always plays out in the public sphere."

McGeachy notes that, notwithstanding the fact that population surveys can be arduous to conduct and produce results that are immediately misrepresented, researchers persist with them because they are important.

"Everyone wants to know how many polar bears there are, but that is one of the hardest things to estimate. So, sometimes people ask questions that you don't have the answers to," he says. That said, McGeachy continues, not least because it can take years to determine changes in population numbers, "If you want to know the impacts of climate change on polar bears, abundance might not be the tool you want to use. You might want to use things like the changes in birth rates, impacts on survival, impacts on body size, so that might get you a better answer."

Fortunately, notes Whiteman, this is information that can also be gathered in the course of doing surveys.

"Even if you're only able to do one incomplete survey, there are indirect indicators of a population's trajectory that you can get," he explains. "You can look at things like how many cubs per female did you see? And if you don't see very many cubs, then that population is probably not doing well."

Although the issue of population numbers can be a vexed and controversial one, Whiteman recognizes the interest in them.

"It's a very, very understandable human impulse," he says. "People want a number, I want a number. They may ask, 'Well, why don't we know exactly how many polar bears there are?' But I find that when you respond with, 'Well, there are actually these discrete subpopulations, each with their own dynamics. And then here's what it takes to try and count them. And here's the logistical difficulty,' people almost always want to follow along with that narrative. And at the end, they respond, 'Oh, that's really interesting.'"

Kieran Mulvaney is a freelance writer who has written extensively about polar bears and the Arctic for publications including National Geographic, The Guardian, and The Washington Post.

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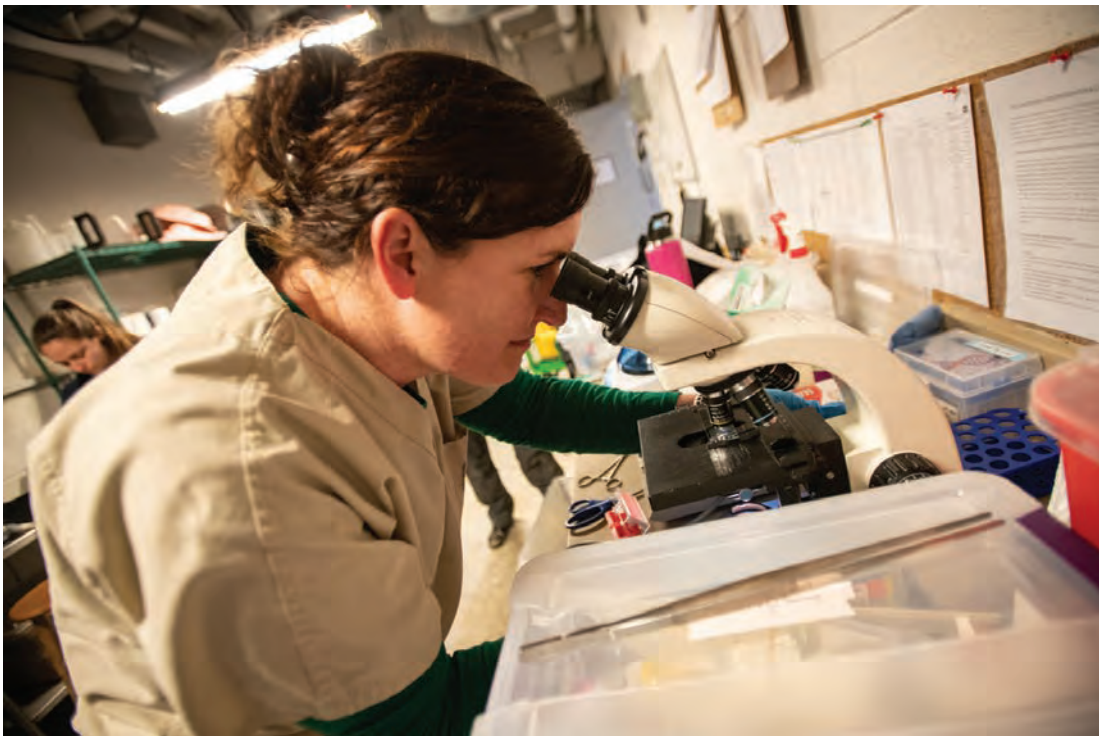
Arctic Ambassador Centers: 20 Years!

By Amy Cutting

© Brookfield Zoo Chicago

Polar Bears International is celebrating the 20th anniversary of the Arctic Ambassador Center network of zoos and aquariums this year—which says something about how long I have been in this field and working with polar bears.

I first met Robert and Carolyn Buchanan of Polar Bears International in 2001 when they were exploring what zoos and aquariums could bring to polar bear conservation. They quickly discovered that zoos are full of passionate, talented individuals who care deeply about animals and wildlife. But more important: They realized that zoos and aquariums could serve as a vital conduit for sharing conservation messaging with people from all walks of life.



Members of our Arctic Ambassador Center network help inspire the public to care about polar bears (left) and play a key role in research that informs their conservation (above).

Reaching the public

As most of us know, conservation is really a people problem. This is especially true for a species like the polar bear, whose habitat is literally melting out from under them due to human-caused climate change. Because of this, it is absolutely critical that we engage as many people as possible in taking action.

In North America alone, accredited zoos and aquariums see hundreds of millions of visitors every year. Critically, these guests are diverse in their political, economic, and social backgrounds. Conservation organizations often have trouble accessing diverse cross-sections of society and end up "preaching to the choir," but many different folks enjoy a day at the zoo with their children or grandchildren.This creates an unprecedented opportunity to engage with them about our shared value of a healthy future for polar bears and people.

What's more, studies show that zoos are trusted voices on conservation, viewed as reliable messengers across the political spectrum.

Climate change and more

Polar Bears International has always had a big tent approach to polar bear conservation, and the Arctic Ambassador Center network is one of the first and strongest examples of how we've managed to have an outsized impact for our relative size. The program is led by Marissa Krouse, our director of conservation programs. Under her leadership, the network has grown from a handful of zoos and aquariums in the U.S. to 49 facilities in the U.S., Canada, and Europe.

The zoos and aquariums that join our Arctic Ambassador Center network amplify the call for climate action both on the ground and through their widely viewed media platforms. They share their creativity, passion, and talent to help conserve wild polar bears not only through exhibit signage and educational programs, but also by taking part in special events and campaigns. What's more, they lead sustainability efforts in their communities, engage with civic leaders, and leverage their unprecedented access to polar bears to advance conservation science, helping with studies that would be impossible to conduct with polar bears in the wild.

Mutually beneficial

As part of our relationship, we provide our Arctic Ambassador Center members with access to our extensive film and photo library and support for interpretive messaging. We generate media toolkits for our awareness days and create and support professional development opportunities for zoo staff that translate into effective outreach on polar bears and climate change and improved animal care. We help increase the visibility

© Grahm S. Jones / Columbus Zoo and Aquarium

(Above) A keeper at the Columbus Zoo and Aquarium shows a replica of a polar bear skull to an interested student, explaining how polar bears are adapted to a life hunting seals on the sea ice.

Meet Marissa Krouse

Through her role as director of conservation programs at Polar Bears International, Marissa Krouse works closely with our Arctic Ambassador Centers. A former keeper at the North Carolina Zoo, Marissa participated in our pilot Leadership Camp (now called Climate Alliance) in 2009, where she developed a passion for polar bears, the Arctic ecosystem, and climate communications. She returned as a facilitator in 2010 and 2011 before joining our team in 2014.

"The network means so much to me," Marissa says. "Whether I'm collaborating with educators, communication teams, or animal care specialists, I know we're working together on behalf of polar bears and Arctic sea ice, helping to bring about change through our collective efforts. It's incredibly fulfilling and inspiring."

of their conservation efforts and ability to tell compelling stories. In addition, members of our Arctic Ambassador Center network tell us that their engagement with Polar Bears International provides inspiration to their staff, helping them retain talent, gain credibility, and help their employees grow.

It can be rare to have a truly mutually beneficial partnership, but the Arctic Ambassador Center network represents just that. We are aligned in our objectives and our messaging. We share trust, values, and a vision for the future. What's more, we each bring valuable skills and assets to the table that we freely share. Pooling our resources and sharing our passion has created a powerful force on behalf of polar bears. Twenty years in, I am proud to be a part of it.

Amy Cutting is vice president of conservation at Polar Bears International. She joined our team in 2022 after volunteering for more than 20 years. Prior to joining our staff she spent 20 years at the Oregon Zoo as an animal keeper, senior keeper, and curator overseeing animal care and species recovery programs.

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© Shervin Hess / Oregon Zoo

A New Population of Polar Bears

By Kieran Mulvaney

An isolated group of approximately 300 polar bears in southeast Greenland has gained official recognition as the 20th subpopulation of polar bears in the world.

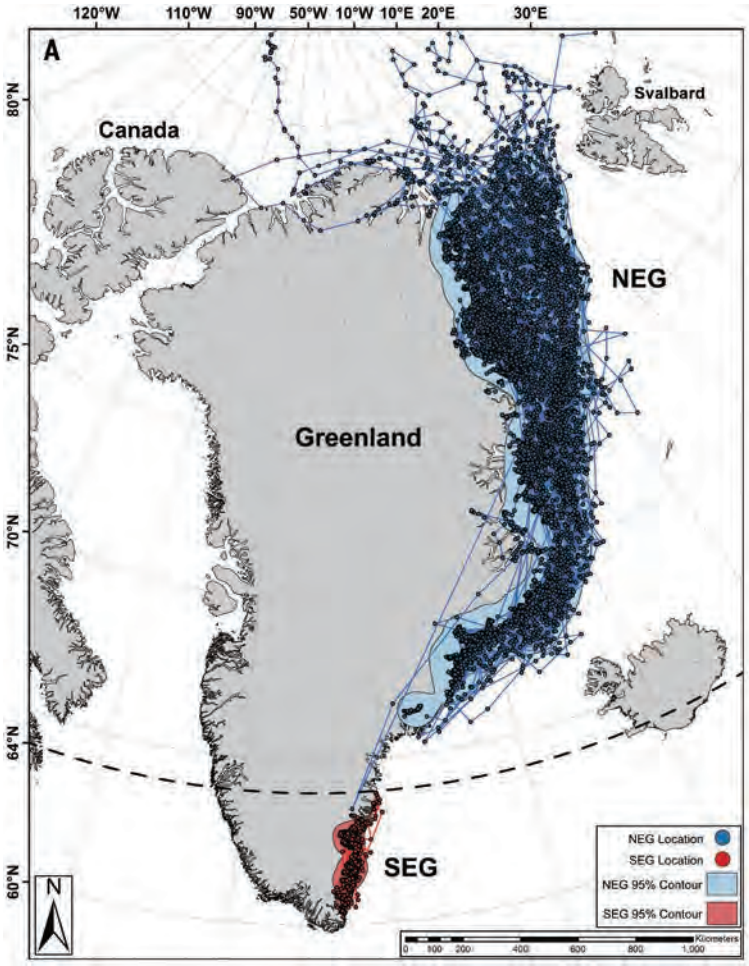
The polar bears of eastern Greenland were previously considered to be one subpopulation, but in 2022 a team led by Dr. Kristin Laidre of the University of Washington determined that those in the southeast were geographically and genetically distinct and very rarely interacted with bears from farther north.

In fact, notes Beth Shapiro, a geneticist at the University of California, Santa Cruz, and a co-author with Laidre of the 2022 study, these bears are "the most genetically isolated population of polar bears anywhere on the planet."

At their June meeting in Seattle, members of the IUCN Polar Bear Specialist Group (PBSG)—the principal independent body of scientific experts on polar bears—agreed with that assessment. They determined that these bears meet the criteria to be classified as their own population.

Polar bears in the Southeast Greenland population live deep in mountainous fjords along the coast—and, fascinatingly, only have access to sea ice for four months of the year, between February and late May. They survive the rest of the time by hunting seals from chunks of freshwater ice that calve off the Greenland ice sheet. It is not known how the bears first reached this isolated area, but genetic data suggests they did so hundreds of years ago.

The fact that the bears are able to use glacier ice to survive suggests that some glaciers that terminate in the ocean, and particularly those that regularly calve ice, could serve as a small-scale climate refuge for polar bears as the sea ice retreats. Unfortunately, notes Polar Bears International Chief Scientist Emeritus Steven Amstrup, there are not enough such glaciers to support many bears in the Arctic, and many of the glaciers themselves are retreating.



Satellite tracking shows that the Southeast and Northeast polar bear populations are distinct and have different behaviors. The blue lines show that Northeast Greenland polar bears travel across extensive sea ice to hunt. The red lines show that Southeast Greenland polar bears have more limited movements inside their home fjords or neighboring fjords.

"Nearly all glaciers worldwide are currently in negative mass balance, and the glacial ice on which these bears depend will, like the sea ice, disappear if we allow the world to continue to warm," he points out.

That view is echoed by Laidre.

"Glacial habitats are not found in all of the Arctic, or in most of the polar bears' range," she points out. "And besides, glacial ice is itself in retreat. What the findings possibly tell us, however, is where the polar bear might persist as a species—the pockets of habitats where the bears could survive for longer periods when we have very little ice in the Arctic. But, no, it's not going to save them. We're still going to see a lot of the same predicted declines around the Arctic, especially in all the places with no glacial ice."

© Laidre et al. / Science. Caption: University of Washington.

A Legacy for Polar Bears

By Valerie Beck

It was a dark and stormy night—really—when my husband, Dick, and I landed in Churchill on a turbulent, snowy flight from Winnipeg. November 1998. Our first trip to Churchill. We were both serious amateur photographers, loaded with equipment and not enough film. That's right: Film. Kodachrome. This was going to be a once-in-a-lifetime experience. That first trip expanded to 12 or more.

But let's get back to that first night. With gear in hand, we stepped out onto the airport tarmac and had our first sighting: three Arctic foxes tumbling in the deepening snow, their brilliant coats sparkling under the terminal's spotlights. A new species for us both. We were thrilled. We were certain their greeting forecast the rest of our stay.

Dick Beck, Krista Wright, and Valerie Beck on a Tundra Buggy.

We were right. Morning and night, dozens of bears surrounded the Tundra Buggy Lodge. And our daily buggy excursions offered continuous sightings among the willows. There were the harried females gently mothering and fiercely protecting their cubs. Most with twins, some with triplets. The newborn cubs of the year (COYs), simply adorable. The yearlings, mostly obedient and playful. And the almost-two-year-olds, painfully confused by the sudden news that they had to start fending for themselves.

And then there were the males. Massive, royal, pompous, scarred and unscarred. Testing the ferocity of mother bears, play-fighting with each other among the willows, and sprawling, exhausted, for naps on the tundra ice and snow. The superior specimen that year, and for several years thereafter, was fondly—and respectfully—referred to as Cool Hand Luke. He owned the beach.

We knew that every bear we saw would be unforgettable. Little did we know how that would apply to so many of the people we met as well. From renowned biologists and acclaimed photographers to a gaggle of equally passionate polar bear aficionados—these originals foresaw and acted upon the need to protect the bears and their habitat. An actual nonprofit organization soon developed, now called Polar Bears International, and Dick was quickly offered a seat on the nascent board.

Those were the days.

These days, polar bears face significant challenges—and need a tireless, well-funded champion.

Enter Polar Bears International. PBI is the only organization solely dedicated to the ongoing welfare of polar bears. PBI supports research, education, programs, outreach, and innovation with creative ideas, strategic management, financial acuity—and success.

From the outset, Dick and I committed ourselves to the vision and mission of PBI. For that reason, each year, PBI is the first recipient we discuss when planning our philanthropy budget. And because of our steadfast confidence in PBI's future diligence, we have ensured that at the end of our lives, PBI will receive our legacy gift.

We expect it will be our last, best investment.

For information about planned giving and legacy gifts, please contact Megan Spranger at fundraising@pbears.org.

Valerie Beck is a member of Polar Bears International's board of directors and a long-time supporter.

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Make a Lasting Legacy With Your Gift

At Polar Bears International, your generous support drives everything we do. A legacy gift will contribute to our long-term growth to ensure that our children and grandchildren will experience the beauty and majesty of wild polar bears.

Join us in making an impact on our shared future.

Consider these gift options today:

- A gift in your will or by beneficiary designation
- A gift of appreciated stock
- A gift from your IRA or donor-advised fund

For more information about making a gift to Polar Bears International, contact us at:

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Advocate for Polar Bears Wherever You Are

By Alex Shahbazi

No matter where you live, you can take action for polar bears.

Carbon emissions are quickening climate change, melting the Arctic sea ice that polar bears need to hunt and that all of us need for a stable planet. **But because those emissions come from every corner of the globe, the good news is that no matter where you live, you can have an impact on climate action.**

The best way to do this is by advocating and voting for policies that lower carbon emissions.

Policies are the plans, rules, and sets of guidelines that our elected officials create and follow. They can be as big as your country signing an international treaty and as little as your town putting in a bike lane to encourage fewer car trips.

So, how can you help bring about these changes?

One of the most important things you can do is vote. 2024 is a major election year around the world, and billions of us will get the chance to put people in public office who will push forward climate action.

Research candidates' climate platforms and make sure to vote for the ones that promise the most change.

But voting doesn't stop after casting a ballot at the top of the ticket. Congresspeople and members of parliament make the laws of our nations, and state and provincial legislators do the same on more regional scales. Mayors, city councils, county commissioners, and more bring the scope of action right to our doorsteps. Voting for candidates who will lower carbon emissions at ALL levels of government is crucial for making the biggest impact we can.

You can also make a difference in your daily life.

Do you have kids in school or are you in school yourself? You can help the climate by pushing for more plant-based cafeteria foods and no-idle zones for buses and cars.

Are you part of an HOA? Try promoting policies that permit native lawns and more infrastructure for walking and cycling.

What about work? Your company can improve its energy efficiency and offer incentives for taking public transportation or carpooling to the office if you advocate for these options with leadership.

And don't forget the importance of talking about climate change. Concern about climate change is normal, but most people avoid talking about it. By sharing your concern with others and connecting over shared values, you can help normalize these conversations and open the door to productive solutions.

Polar bears and people need rapid reductions in the carbon that humanity emits. But polar bears can't vote or advocate for climate action—only we can. After all, people and polar bears have a shared future, and our actions now decide where we're headed for generations to come.

Alex Shahbazi is an environmental policy, programs, and research consultant.

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POLAR BEARS INTERNATIONAL CALENDAR OF EVENTS

International Polar Bear Day
February 27

Arctic Sea Ice Day
July 15

Beluga Cam
Mid-July—late August

Polar Bear Cam
Late October—late November

Tundra Connections Webcasts
Late October—mid-November

Polar Bear Week
First week of November

Northern Lights Cam
November—March

Polar Bear Quiz Answers *(from p. 20)*

1. C - The most recent estimate, published in 2016, concluded that the number of polar bears worldwide was around 26,000, with a confidence interval of as few as 22,000 and as many as 31,000.
2. C - Polar bears are found in all the countries that border the Arctic Ocean: Canada, the United States, Norway, Russia, and Greenland.
3. D - Polar bear fur is actually unpigmented and translucent, but looks white in visible light. Older bears often look yellowish because over the years, seal oil discolors their fur. Captive bears have sometimes even ended up looking green because of algae that have become embedded in the hollow hairs.
4. C - Impressive as this figure is, it isn't much cause for celebration. The female polar bear in question swam from the north coast of Alaska in search of sea ice; during her journey, she lost 100 pounds of body weight and her yearling cub. As sea ice retreats because of global warming, polar bears are likely to have to swim greater and greater distances in search of the ice pack.
5. B - The Agreement on the Conservation of Polar Bears was signed in Oslo in November 1973 by the United States, the Soviet Union, Norway, Denmark (on behalf of Greenland), and Canada. Among other things, it prohibited the use of aircraft and large motorized vessels to hunt polar bears and the commercial sale of skins and other items obtained from hunting polar bears.
6. D - Christmas card illustrations notwithstanding, polar bears and penguins do not live in the same region. All penguins are in the Southern Hemisphere, while polar bears all live in the high latitudes of the Northern Hemisphere.

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Polar Bear Health *(cont. from page 17)*

Conservation implications

Identifying the health and stress of polar bear populations is important because this information can be used to guide conservation policies. For example, as more of the Arctic becomes ice-free during the summer, it is possible that shipping activity will increase through the Canadian Arctic Archipelago (CAA) and up into the high Arctic. We recently identified polar bears in the high Arctic and CAA as being the most genetically vulnerable to climate change. If conservation policies can be targeted towards reducing stress in these already jeopardized populations, then it may be possible to mitigate further negative outcomes.

Ultimately, the survival of polar bears will depend on many aspects of their biology, not just their ability to cope with stress. If polar bears can adapt to warming environments, then they may be better able to manage the stress of climate change. Our work suggests that while most bears are not suited to warm environments, polar bears in the southern Arctic may carry genetic variants that allow them to better survive ice-free periods (although they can only fast so long). We are following up on this research by identifying specific genes that may provide an adaptive edge for polar bears to better withstand this stressful environment.

Other mechanisms may also help polar bears survive sea ice loss, such as their ability to travel long distances to more suitable habitats farther north in the Arctic. In such a case, we might expect to see polar bears persisting in a smaller region of the Arctic than they currently occupy. Regardless of which mechanism is operating, it is essential that we continue monitoring the health of polar bears. Reducing emissions and minimizing the effects of climate change as much as possible will be the most effective strategy for ensuring the survival of these majestic animals.

Dr. Ruth Rivkin and Dr. Levi Newediuk are postdoctoral research fellows at the University of Manitoba, *funded in part by the National Sciences and Engineering Research Council of Canada. In addition, Dr. Rivkin's position is also funded by Polar Bears International and the San Diego Zoo Wildlife Alliance and Dr. Newediuk's by Environment and Climate Change Canada.*

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STATE OF THE POLAR BEAR

Climate change is a serious global issue - especially in the Arctic.
Here are some eye-opening statistics everyone needs to know.

OVER

60%

of the world's polar bears

LIVE IN CANADA [1]

The IUCN considers the polar bear a

VULNERABLE SPECIES

due to the current and projected loss of their sea ice habitat [1]

2050

Without action, the world's polar bear population could

DECLINE BY TWO-THIRDS BY MID-CENTURY DUE TO SEA ICE LOSS [5]

Western Hudson Bay polar bears now spend over

3-4 WEEKS LONGER

on land compared to the 1980s [4]

Polar bears use sea ice as a platform to

REACH THEIR SEAL PREY

An area of ice larger than Norway, Sweden, and Denmark combined has

VANISHED IN THE LAST 3 DECADES [3]

Sea ice is critical for polar bears, but on average

THE ARCTIC IS LOSING

13%

OF ITS SEA ICE EVERY DECADE [2]

The average winter temperatures in Alaska and western Canada have increased

3-4°C (5-7°F)

OVER THE PAST 50 YEARS [3]

Sources: (1) IUCN Polar Bear Specialist Group / (2) National Snow and Ice Data Center / (3) Arctic Monitoring and Assessment Programme / (4) Marine Ecology Progress Series / (5) Nature

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