Traditional Knowledge Study | Polar Bear Status Map | Ear Tag Technology

POLAR BEARS INTERNATIONAL

Tundra Times

The Annual Newsmagazine of Polar Bears International Fall 2018

Research on Russia's Polar Bears

MILESTONES FOR POLAR BEARS

The town of Churchill, Manitoba, widely known as the polar bear capital of the world, is where it all began for Polar Bears International. We trace our beginnings to a pioneering group of polar bear enthusiasts with a passion for the bears and the Arctic.

Since those early days, Churchill has served as a base for our outreach efforts—efforts that now include our Tundra Connections© webcasts, Climate Alliance training, and Arctic cams (polar bear, beluga, and northern lights). That's why I'm thrilled to announce that this fall, we will proudly unveil our new Polar Bears International House in the town where it all began.

While Churchill is the natural choice for our new base camp and interpretive center, PBI's efforts on behalf of polar bears and their sea ice home will continue across the circumpolar Arctic.

In Svalbard, we're now on the third year of our Polar Bear Maternal Den Study, which builds on earlier research on Alaska's North Slope. In Russia, we recently began funding two projects—one in the Barents Sea, the other in the Chukchi Sea—that will help fill critical data gaps on two polar bear subpopulations. We're also helping to support a Traditional Ecological Knowledge Study in Alaska and several key projects in Canada, including work focused on reducing human-polar bear conflicts.

In this issue of Tundra Times, we take you to each of the five nations where polar bears roam. We introduce you to a ranger in Greenland; highlight research projects in the U.S., Canada, and Russia; and examine sea ice loss in the Barents Sea, which is shared by Norway and Russia. We also explore historical milestones, including the 50th anniversary of the formation of the Polar Bear Specialist Group and the 10th anniversary of the polar bear's listing as a threatened species under the U.S. Endangered Species Act.

Our tear-outs this year include a map of the 19 polar bear subpopulations and their current status, and, for kids, a poster on polar bear moms and cubs with facts on the back.

We hope you enjoy learning more about polar bears and our conservation efforts on their behalf.

Sincerely,

Krista Wright

Krista Wright
Executive Director

Polar Bears International's mission is to conserve polar bears and the sea ice they depend on. We also work to inspire people to care about the Arctic and its connection to our global climate.

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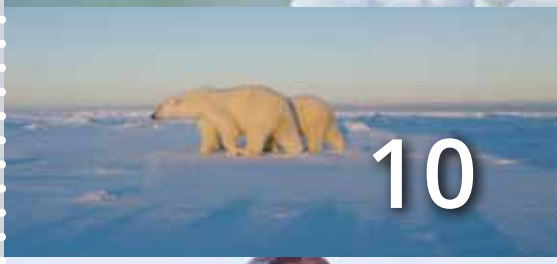

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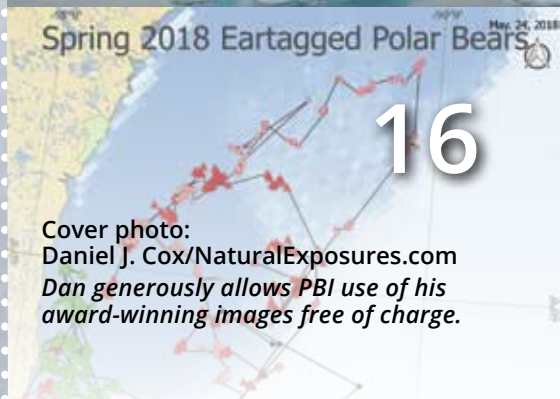

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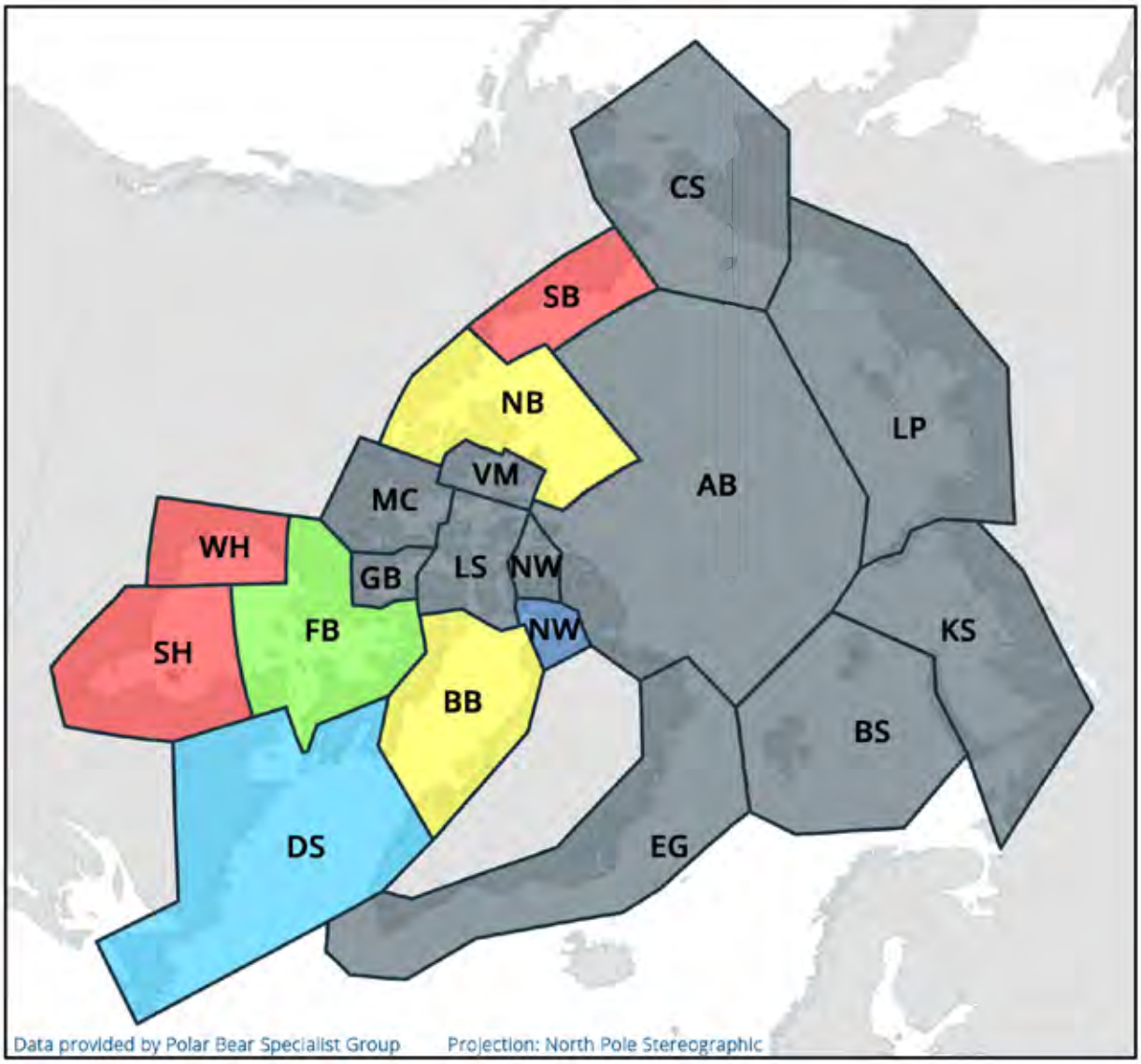

Polar Bear Subpopulation Trends (2018)

Status

- Increased
- Likely Increased
- Stable
- Likely Stable
- Likely Declined
- Data Deficient/Unknown

Subpopulations

AB	Arctic Basin
BB	Baffin Bay
BS	Barents Sea
CS	Chukchi Sea
DS	Davis Strait
EG	East Greenland
FB	Foxe Basin
GB	Gulf of Boothia
KB	Kane Basin
KS	Kara Sea
LS	Lancaster Sound
LV	Laptev Sea
MC	M'Clintock Channel
NB	Northern Beaufort Sea
NW	Norwegian Bay
SB	Southern Beaufort Sea
SH	Southern Hudson Bay
VM	Viscount Melville Sound
WH	Western Hudson Bay

POLAR BEARS INTERNATIONAL
polarbearsinternational.org

WHERE DO POLAR BEARS LIVE?

About 60% of the world's polar bears live within or are shared by Canada. Polar bears are also found in the U.S. (Alaska), Russia, Greenland, and Norway (Svalbard).

HOW MANY POLAR BEARS ARE THERE?

The most recent report from the International Union for Conservation of Nature (IUCN) estimates there are roughly 26,000 polar bears throughout the 19 subpopulations.

Scientists base this estimate on the best available information, combined with expert opinions on those subpopulations that lack current data.

WHY DO WE LACK DATA ON SOME POLAR BEAR SUBPOPULATIONS?

Polar bears live in remote areas that are difficult and expensive to study. This makes monitoring them a challenge, both for single surveys and long-term studies.

For this reason, scientists don't have solid figures on the total number of polar bears worldwide. They lack data on some subpopulations, specifically those in Russia and East Greenland.

Arctic Russia is especially data deficient. Not only is it one of the most remote areas on the planet, it lacks basic infrastructure (roads and airfields) and logistical support (small aircraft). Polar Bears International is currently helping to fund studies that will erase some of Russia's big blank spots.

CURRENT TRENDS OF THE WORLD'S 19 POLAR BEAR SUBPOPULATIONS

Increased

- Kane Basin

Likely Increased

- Davis Strait

Stable

- Foxe Basin

Likely Stable

- Baffin Bay
- Northern Beaufort Sea

Likely Declined

- Southern Beaufort Sea
- Southern Hudson Bay
- Western Hudson Bay

Data Deficient

- Arctic Basin
- Barents Sea
- Chukchi Sea
- East Greenland
- Gulf of Boothia
- Kara Sea
- Lancaster Sound
- Laptev Sea
- M'Clintock Channel
- Norwegian Bay
- Viscount Melville Sound

POLAR BEARS INTERNATIONAL

www.polarbearsinternational.org

World Ranger Day Award

By Geoff York

Every year, Polar Bears International recognizes an individual or team working on the front lines of polar bear conservation to reduce conflict between polar bears and people, a growing problem as more polar bears spend more time ashore in a warming Arctic.

This year we're proud to recognize the hard work and dedication of Erling Madsen of Ittoqqortoormiit, Greenland.

Madsen is the sole wildlife officer working in Ittoqqortoormiit, a coastal town of about 450 people bordering Greenland National Park—the largest national park in the world, where wildlife including muskoxen, walrus, and polar bears far outnumber people.

"Erling is our one-man army who spends a lot of his time, day and night, chasing polar bears away from town," said Heidi Hansen, biologist and head of section for the Ministry of Fisheries, Hunting, and Agriculture in Nuuk, Greenland. "He is truly doing a great job, protecting the town's inhabitants and the bears."

Madsen has served as a wildlife officer since 2004. As sea ice conditions have deteriorated in the region, the community has experienced an increase in the number of polar bears approaching the town dump, making Madsen's work more important than ever.

PBI's World Ranger Day Award recognizes the courage and commitment of rangers like Madsen working in remote places and challenging conditions to keep polar bears and people safe. We presented our first award, in 2016, posthumously to Vladelin Kavry, who co-founded the Umky Patrol in Chukotka, Russia. Last year, the award went to the Polar Bear Alert team in Churchill, Canada.

The recognition includes an award certificate, online recognition, Canada Goose gear, and a cash prize.

Geoff York is Polar Bears International's senior director of conservation. He has worked with polar bears for more than 20 years and has a special interest in conflict reduction efforts. He is the prior chair of the Range States Conflict Working Group and remains an active member.

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The Polar Bear Specialist Group:

By Barbara Nielsen

Half a century ago, at a time when the biggest threat to polar bears was severe overhunting, the five polar bear nations—Canada, Denmark, Norway, the USSR, and the U.S.—gathered to work together on polar bear research and conservation. Their first meeting took place in Fairbanks, Alaska, in 1965, at the height of the Cold War, an extraordinary feat during those tense times.

In 1968, the group met again, in politically neutral Switzerland. By then, the International Union for the Conservation of Nature had established a "Polar Bear Specialist Group" under the auspices of their Species Survival Commission. That meeting was the PBSG's first.

In this **Q & A with Dr. Ian Stirling**, a polar bear scientist emeritus with Environment Canada, a long-time scientific advisor to Polar Bears International, and a member of the PBSG from 1974 to the present, we talk about the group's history as it celebrates its 50th anniversary.

Barbara Nielsen is Polar Bears International's director of communications.

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50 YEARS!

Q: Who attended the first meeting?

The initial group was small, consisting of only two scientific delegates from each country, with the exception of Denmark, which was unable to attend. When sending invitations, the IUCN took the unusual step of naming the experts they wanted to participate in this new scientific group. They did this to prevent countries from sending bureaucrats, rather than scientists with knowledge of polar bears.

The fact that the meeting occurred at all was a major accomplishment due to the significant political tensions between the USSR and western countries at the time, particularly the U.S. Thus, to try to maximize the opportunity to have frank and open discussions about research and management needs, free of political statements, the group closed the meeting to the public and did not produce formal proceedings. Delegates decided that future meetings should be held every two years.

Q: What were the outcomes?

At the third meeting in 1970, the Soviets proposed establishing international protocols for the protection of polar bears. Individual PBSG members were tasked with informing their governments in preparation for further discussions in 1972.

As is now well known, these collaborations concluded with the Agreement on the Conservation of Polar Bears and Their Habitat, signed in Oslo, Norway in 1973. The agreement came into effect in 1976 after the minimum number of three countries had ratified it. Five years later, the PBSG and representatives of the five polar bear nations evaluated progress on the agreement, again in Oslo, and agreed it should continue in perpetuity. This was an enormous accomplishment, especially since it was the first international agreement on any subject signed by all the circumpolar Arctic nations during the Cold War.

Q: How did the membership change over time?

At first, membership was limited to scientists representing each of the participating governments. However, as the research needed to conserve polar bears evolved, and became more technologically advanced, the PBSG realized it needed to expand its expertise. Thus, in 1976, the late Dr. Nils Øritsland was invited to the sixth meeting, in Switzerland, to discuss physiological research and the first approaches to population modeling. His significant contributions and insights made the benefits of expanding the membership clear, which led to more invited specialists.

Currently, scientifically qualified members are drawn from government agencies, universities, and non-governmental organizations, based on their scientific knowledge of some aspect of the polar bear's biology. Representatives of indigenous groups from Greenland, Canada, and the U.S. have participated as observers for about 35 years. Over the years, members have conducted and reported on ever more detailed scientific studies in a wide variety of subject areas. After the first meeting, the PBSG kept written records of the proceedings, all of which can be downloaded from their website.

Q: What is the group's current focus?

Of particular importance to polar bear conservation was the realization, starting in the early to mid-1990s, that climate warming in the Arctic was causing significant sea ice loss, with potential impacts on polar bears.

At the 13th PBSG meeting, held in Nuuk, Greenland in June 2001, the group passed a resolution reflecting their conclusion that climate warming had now replaced hunting as the greatest single threat to the polar bear's future.

Since then, the amount of research undertaken to assess the possible effects of climate has increased greatly and, sadly, confirmed that threat.

A NATIVE LENS ON POLAR BEARS

By Dr. Hannah Voorhees

At a meeting last year with biologists and social science researchers, Joe Kaleak, an Iñupiaq from Alaska's North Slope, explained that hungry polar bears often try to break into his house, attracted by his seal oil supply—a fairly recent problem. With changes in the sea ice, Kaleak and community patrols in his village now must deal with polar bears on a regular basis.

Other Native experts from across the region told similar stories. They explained that, in addition to wider ecological changes, the impacts of more polar bears in their communities—and the different behaviors of those bears—are of great local concern.

Polar bears have long been a cultural keystone species for Iñupiaq subsistence communities. Collectively, Alaska Native experts have hundreds of years of cumulative knowledge about polar bears, as well as more recent insights into unusual polar bear occurrences. This wisdom is helping to shape the future of a local knowledge study on polar bears in the northernmost part of the state.

As the Arctic rapidly loses its summer sea ice, polar bears are losing critical habitat in Alaska, but gaps in scientific knowledge about how this change is affecting polar bears remain. Alaska has two subpopulations of polar bears: the Chukchi Sea and Southern Beaufort Sea bears. Of these, the latter is the best-studied scientifically, but local perspectives on polar bear ecology in the region have not been documented since the early 1990s, long before climate change was recognized as a threat.

Alaska Natives in subsistence communities that overlap with southern Beaufort Sea polar bear habitat have observed the bears over time. They can attest collectively to changes in polar bear feeding habits, physical condition, seasonal movements, and local abundance, as well as to the nature of human-bear interactions.

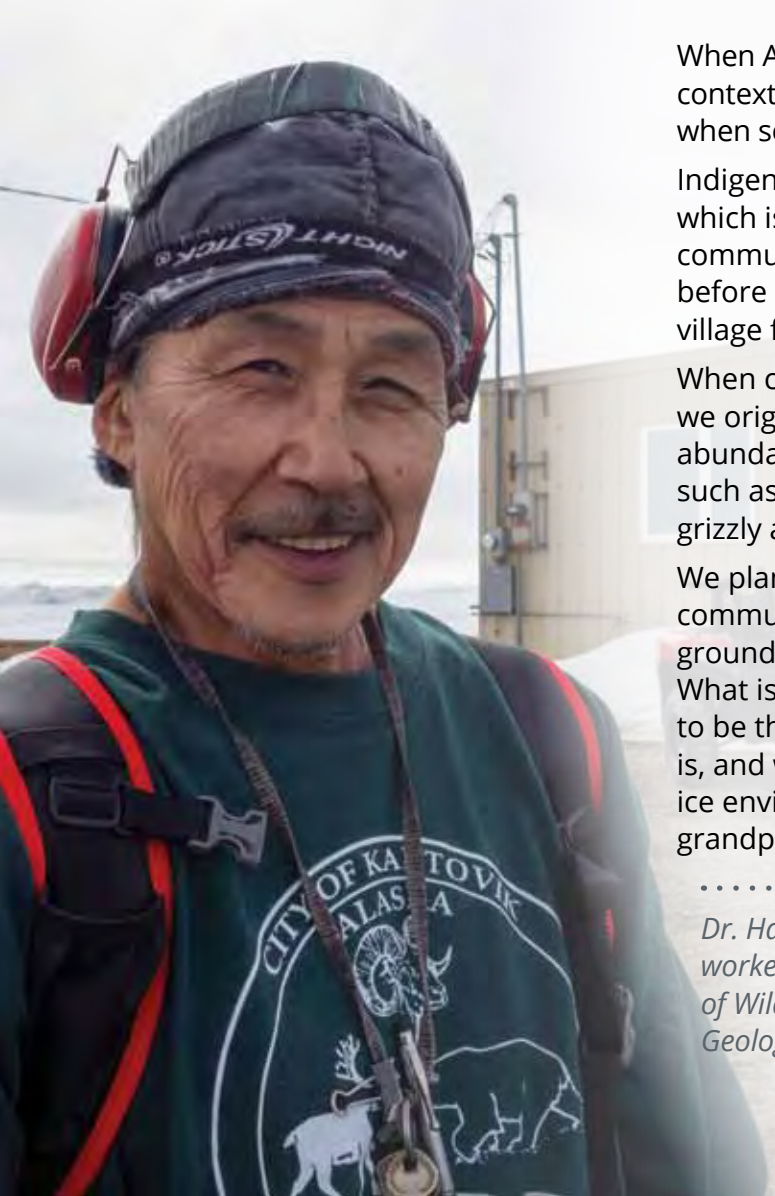
Over the past year, I've been conducting Traditional Knowledge interviews as life histories centering on polar bear encounters, stories, and memories, working in four communities on Alaska's North Slope. Polar Bears International is partnering in the project, with funding from the North Pacific Research Board and the National Fish and Wildlife Foundation.

The interviews paint a picture of diverse, localized polar bear ecology and human bear-interactions. Almost universally, community members who lived through the late 1980s and early 1990s remember seeing the first changes in their sea ice environment at that time. While sea ice loss is an overarching fact, effects on polar bears differ in each region, depending on geography and human factors.

As with climate change writ large, it no longer makes sense to consider polar bear ecology separately from human activity—an approach consistent with indigenous views on the interdependence between humans and animals. Alaska Native people have long depended on polar bears as a traditional food source, but polar bears in some regions now rely on humans for supplemental feeding at certain times of the year—such as whale remains from subsistence hunts.

photos © Hannah Voorhees

Dr. Hannah Voorhees relied on an open-ended, map-based approach during her interviews. This allowed her to cover topics including sea ice, seasonal movements of polar bears, human-bear interactions, seals, and polar bear condition.



When Alaska Natives observe polar bears now, it's often in the context of mass gatherings of bears that scavenge onshore when sea ice is absent.

Indigenous communities honor us by sharing their knowledge, which is why it is essential to ensure that we accurately communicate their words to a wider audience. Therefore, before publishing our results, we'll take them back to each village for their review and approval.

When complete, our report will contain both information that we originally sought—including data on the condition and local abundance of bears—as well as novel, unexpected findings, such as details on the highly dynamic interactions between grizzly and polar bears along Alaska's northern barrier islands.

We plan to take our final results back to Alaska Native communities for presentation and discussion, thus laying the groundwork for continued Traditional Knowledge research. What is clear is that while Iñupiaq people hold the polar bear to be the ultimate survivor, they also believe that adaptation is, and will continue to be, vital to the species' survival in a sea ice environment that differs dramatically from the one their grandparents knew.

Dr. Hannah Voorhees is an anthropologist based in Alaska. She worked collaboratively with the North Slope Borough Department of Wildlife Management, Polar Bears International, and the U.S. Geological Survey in organizing and managing the study.

10 YEARS *as a* Threatened Species

By Dr. Steven Amstrup

During my 30 years as Polar Bear Project Leader for the U.S. Geological Survey, I solved basic mysteries about polar bears, including where they den and how far they travel. In the first decades, I also tracked the polar bear's recovery in Alaska from over-hunting, heartened to see their numbers rebound and subpopulations flourish.

Those were exhilarating years for me, but my last major project was a somber one: I led the USGS research team that helped the government decide whether to list the polar bear as a threatened species under the U.S. Endangered Species Act.

By then, the impacts of a warming climate were well-documented across the Arctic and it was all too clear that sea ice loss, caused by that warming, was reversing earlier polar bear population gains. My team and I worked long hours for months on end to analyze the data, prepare forecasts, and compile reports, camping out at the office at points to meet the deadline.

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The project was intense and challenging, but important—and it was bittersweet when we learned that our findings had convinced the U.S. Secretary of the Interior to declare the polar bear a threatened species.

It's hard for me to believe that 10 years have passed since the polar bear was listed, yet we still haven't taken the actions necessary to save them. At the same time, it's important to remember that the polar bear's story isn't over. Time remains to halt rising greenhouse gas concentrations and change the polar bear's trajectory back to a positive one.

The importance of spreading this message led me to retire from my government job and become chief scientist for Polar Bears International. In my current role, I can speak freely, without government-imposed restrictions, about the need for all of us to minimize our personal carbon footprints and vote for leaders concerned about the world we are leaving our children and grandchildren.

Where are we now?

Since polar bears were listed, the Arctic has lost another million square kilometers of summer sea ice. Winter sea ice decline has accelerated; and the last five years have had weaker sea ice development than any other years on record.

Recent research has confirmed that bears stuck on land over most of the Arctic are largely food-deprived because Arctic terrestrial habitats do not host foods rich enough to replace the seal diet that polar bears lose as sea ice declines. We also know that polar bears lose about a kilogram each day they stay on land. In Western Hudson Bay, bears are now on land for nearly a month longer than they were 30 years ago. Bears have an incredible ability to fast, but there is a limit!

New research reinforces our understanding of the importance of sea ice. We now know that the carbon composing polar bears' bodies comes mainly from the tiny creatures that live on the underside of sea ice. Sea ice, therefore, is not just a hunting platform for polar bears, but the primary nutrient source for the food chain on which polar bears depend.

It's also important to note that all sea ice is not the same. Our research in Alaska showed that polar bears prefer to feed on ice over productive shallow continental shelf waters. Radiotracking bears in the Beaufort Sea revealed that they used to feed throughout the summer on that near-shore ice. With summer ice retreating ever farther from the continental shelf, most bears follow the ice as it retreats over deep polar basin waters. It has long been known that these deep waters are relatively unproductive, and new findings have revealed polar bears that follow the pack ice over the deep polar basin waters, apparently are, like those on land in Hudson Bay, food-deprived. This helps explain why the Southern Beaufort Sea subpopulation, which I studied for 30 years, has declined by approximately 40%.

Important threshold

Although the relationships between CO_2, temperature, and average sea ice extent are largely linear, there are dangerous thresholds as we allow continued warming. The "average" sea ice extent is calculated from many individual years. That average doesn't address the great variability of those years, nor does it accurately reflect trends in the ice-free season during which polar bears must fast. An important threshold, from a polar bear perspective, is the frequency of ice-free summers as we go forward into a warmer world. In a world that is 2°C warmer, we can anticipate the Arctic will be largely ice free every third summer, whereas if we were able to hold temperature rise to 1.5°C— the goal set at the Paris Climate talks in 2015—ice-free summers will occur only about 3% of the time.

We know what we need to do to save polar bears, and we know it is still possible. Now we need to turn that possibility into plausibility—for polar bears and for all of us.

Dr. Steven Amstrup is chief scientist for Polar Bears International.

A COLLABORATIVE POLAR BEAR STUDY ON

WRANGEL ISLAND

By Dr. Eric Regehr

Located 140 kilometers north of mainland Chukotka (Russia), Wrangel Island is one of the most wild and remote places on Earth. It's also one of the most fascinating. Woolly mammoths roamed Wrangel for several thousand years after they disappeared elsewhere in the world, and today you can walk casually around the island and find fossilized teeth in the streambeds, or tusks sticking out of the tundra. As a *zapovednik* (strict nature reserve) the island has the highest level of environmental protection in Russia. Largely pristine and free of human disturbance, it supports a unique array of Arctic plants, terrestrial animals like the muskox, dozens of species of migratory birds, and—at least recently—some of the highest concentrations of polar bears ever observed.

Wrangel Island is located within the range of the Chukchi Sea polar bear subpopulation, which roams across the Bering, Chukchi, and Eastern Siberian seas. This subpopulation is shared between the U.S. and Russia, which means that animals commonly move back and forth between the two countries and that conservation and management decisions for polar bears are made jointly under a bilateral treaty. In the summer and autumn, bears in the Chukchi Sea subpopulation—including those that use the sea ice around Alaska—will follow the ice as it retreats northward into the polar basin. Some of these bears hop off on Wrangel Island and use it as a terrestrial refuge as they wait for the sea ice to reform. If the bears are pregnant females, they will stay on Wrangel even after the ice reforms, building their maternity dens on the island where they give birth during the winter and emerge in the spring to step out onto the frozen sea with new cubs.

In recent years, a larger proportion of Chukchi Sea bears tracked using satellite telemetry have traveled to Wrangel Island, and spent a longer time there, likely because of sea ice loss due to climate change. Given that sea ice loss is expected to continue, the importance of Wrangel Island to polar

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© Dr. Eric Regehr

bears will likely increase. This makes it an ideal place for scientific studies to monitor the Chukchi Sea subpopulation and learn more about how climate change can affect polar bears in general.

In autumn 2016, American and Russian scientists started jointly working on a study of polar bears on Wrangel Island, the first such collaboration in decades. We completed a 1,000-kilometer survey using all-terrain vehicles and observed 179 individual bears. This count was similar to the number of bears thought to be on the island in recent years, although the lack of systematic surveys prior to 2016 makes this difficult to determine.

In autumn 2017, the Arctic sea ice extent was the lowest on record during the preceding winter. When our research team arrived on Wrangel in September, open water stretched for over 100 kilometers in every direction. During the 2017 survey, we observed 589 bears. This included 181 bears, the largest aggregation of polar bears ever documented, in the immediate vicinity of a washed-up bowhead whale carcass on the southwestern coast of Wrangel.

In both years the team collected detailed data on sex and age class, number of cubs, nutritional condition (i.e., fatness, which for polar bears is related to survival), and behavior for most bears observed. These data will help us understand the status of the Chukchi Sea subpopulation and how it is responding to climate change, including how long bears can remain on shore, cut off from their primary prey of ice-dependent seals, before experiencing negative effects on survival.

We also used new, noninvasive methods to collect hair samples from bears, which will be added to a genetic database and used to help estimate the total number of bears that come to Wrangel each year. This is important because ground-based surveys miss some animals due to the ruggedness of the terrain, meaning that the actual number

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Technology *on the* Tundra

A chat with BJ Kirschhoffer, director of field operations

By Kt Miller

Q&A

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Rung by rung, BJ Kirschhoffer climbed up the ladder on the old research tower at Cape Churchill in Wapusk National Park. In normal clothing he would fit just fine, but his huge parka, Arctic mitts, and big white bunny boots made things a little more difficult—not to mention the -40° C temperatures.

Inside the tower, it was absolutely freezing, but somehow BJ managed to work—plugging in equipment and pulling off his mittens to type things into his computer. Occasionally he'd ask me to hold something, hand him a tool, or watch the other end of a piece of equipment to see if a light came on. I happily obliged, thankful for the wind break inside the building.

When people ask, I usually describe BJ as a self-taught Arctic engineer. He also takes on the role of computer guru, scientist, tech whiz, and educator—a priceless ability in remote places. Together, we've crimped wires in subzero weather while blasted by Arctic winds. After six years of working with him, I'm inspired by his drive, passion, and ability to teach himself almost anything—all with a goal of conserving polar bears and their Arctic home.

Q: You went from graduating college with a degree in photography to directing PBI's field projects. How did that happen?

It was a happy accident. I worked for photographer Daniel J. Cox of Natural Exposures for six years and, through him, volunteered to run the Polar Bear Cam in Churchill. Once there, I showed up early, stayed late, and was just excited about this type of work. Things broke a lot—that's how it is in the Arctic—and PBI gave me the time and space to fix things. I've always been interested in technology and trouble-shooting. My dad's an industrial engineer and my grandfather and uncle were electrical engineers. When I was a kid, instead of getting toys, I'd get motors and transformers and wires. So, in Churchill, I was up there, I was available, I was willing to figure things out, and I believed in the mission and the work PBI was doing.

Q: What do you find so fascinating about technology? Do you enjoy the challenges of working with it in the Arctic—or is it simply frustrating?

I enjoy the fact that technology can help answer questions in the natural world that will potentially help polar bears. The Arctic is a very demanding environment. Humans aren't designed for temperatures like that and neither is anything with a battery or circuit. What I enjoy is trying to find a purpose for things that weren't meant for the Arctic and making them work. It's pretty fun to make it all happen.

Kt Miller is Polar Bears International's media and outreach manager.

Q: You've worked with internet networking, remote camera systems, synthetic aperture radar, and more. What technology are you currently most excited about and why?

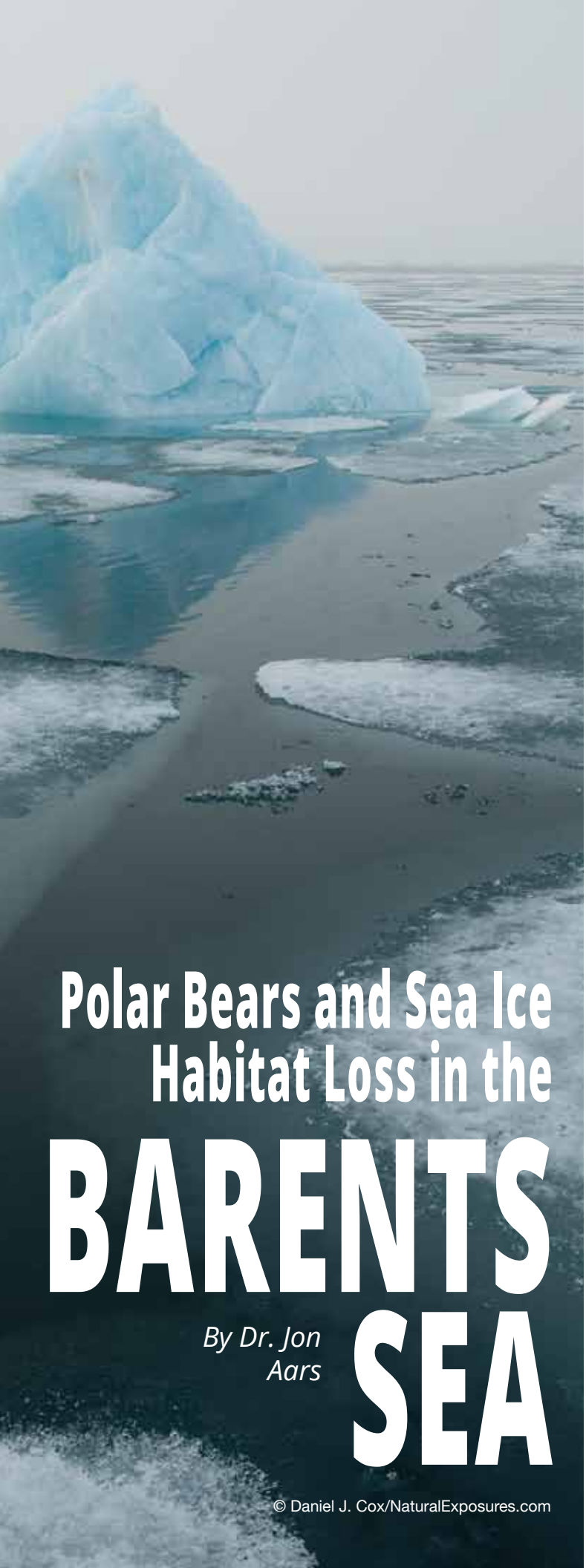
I think it's two-fold. I'm excited about the educational programming that we do, outreach that allows us to give people an Arctic experience without going to the Arctic—so things like the Polar Bear Cams and our Tundra Connections© webcasts. On the research side, I find all the remote sensing stuff really interesting—synthetic aperture radar to find dens under the snow, for example, or compact surveillance equipment to detect bears as they approach villages. As technology changes, so do research methods. I love exploring noninvasive ways to understand and help polar bears.

Q: What keeps you motivated to learn new ways to apply technology to polar bear conservation?

It's just inherent. I'm genuinely interested in polar bears, and I love working in this fascinating and beautiful place, the Arctic. That's my motivation. I'm pretty fortunate to have a really cool job that makes me want to come to work every day.

Q: How do you think technology will change what we know about polar bears in the next 10 or 20 years?

Hopefully what we're going to see is that technology will be able to help us ensure their survival by letting us live more greenly on the planet. I hope in 20 years we'll have this greenhouse gas thing figured out and we'll be back to regular research.



Polar Bears and Sea Ice Habitat Loss in the BARENTS SEA

By Dr. Jon Aars

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Although the Arctic is warming faster than any other place on Earth, causing sea ice to get thinner or disappear in many areas, the process varies considerably across the North. In some areas, conditions may actually improve for polar bears, at least temporarily—for example, in regions where the sea ice has historically been too thick, and the coverage too extensive, for seals and polar bears to thrive. Studies have shown that, depending on the season, polar bears typically prefer sea ice coverage of 60-80%, not too far from land and over shallow, more productive waters. The bears often hunt close to the ice edge.

The Barents Sea hosts one of 19 recognized polar bear subpopulations. Nowhere else in the Arctic has the loss of sea ice habitat been nearly as fast and dramatic over the last four decades as in this region.

The Barents Sea bears are shared by Norway and Russia. Although we lack data from Russia, the Norwegian Polar Institute has studied its bears since 1987, particularly through an annual capture program. This has given us insights into how these bears have changed their behavior, and coped with habitat loss, so far. Further, it has provided insights that may be helpful in understanding how bears both here and elsewhere may be able to cope with future challenges in a warming climate.

Svalbard is an archipelago of a few large and many small islands in the Norwegian Arctic. Polar bears in the Barents Sea utilize that area, the pack ice, and the Russian Franz Josef Land archipelago farther northeast. A few decades ago, sea ice connected all the islands much of the year; in addition, a sea ice corridor connected the two archipelagos and the ice edge, typically year-round. Now, in much of the area, the ice-free period has been extended by more than a month per decade.

Traditionally, some of the more remote and smaller islands in eastern Svalbard have served as important maternity denning habitat for polar bears. In many of the years since 2000, the sea ice has not formed early enough in autumn to allow pregnant females to reach these islands in time to den. After such years, fewer females are found with cubs in Svalbard, although it is likely that many are instead denning in Franz Josef Land. What we do know is that important denning

habitat has been lost and that polar bears have had to change their migration routes.

Polar bears in the Barents Sea area are now generally found much farther north than before and, for part of the year, the ice edge is located over deeper and less productive waters. Also, in recent years Svalbard has often been ice-free for months. This was not the case in earlier years, when the bears could always find corridors of ice to get to and from the ice edge where many of them hunt.

The good news is that data shows that polar bears are able to swim for days to get between the islands and the ice. The bad news is that they now have to, and research shows that it's energetically much more expensive to swim than to walk. This means that for a pregnant female in autumn, a few days' swim to reach a denning island may burn the same number of calories as a few weeks' worth of walking. The fat reserves are especially vital for females that spend half a year in dens without eating, while nursing cubs. This may be why we do not see females swimming to islands that aren't surrounded by ice, while we do see females swimming from islands to reach the ice edge in summer.

A few hundred bears stay in Svalbard year-round and do not follow the ice edge. This means they do not have to expend energy on long walks, or worse, on long swims. Their problem is they must endure longer ice-free periods, where they're unable to hunt seals. We've seen behavior changes in bears that spend more time on land. They plunder bird nests in summer, sometimes taking birds, and occasionally reindeer. Carcasses of walrus and whales also sometimes serve as alternative food sources. However, polar bear subpopulations do not occupy any area without temporal access to sea ice, and sea ice associated seals, and thus no subpopulation is likely to survive on terrestrial foods only.

Despite a dramatic loss of sea ice, there are not yet signs of a decline in the Barents Sea bears. The most plausible explanation is that a ban on hunting, which began in 1973, led to a population size far beyond carrying capacity. Although this carrying capacity has since declined, it may still be as high or higher than the current population size. We do know that bears are able to survive and reproduce under the current conditions. However, sea ice loss is predicted to continue, and this subpopulation is likely to be challenged in thefuture.

Dr. Jon Aars is a senior research scientist at the Norwegian Polar Institute. He has studied polar bear ecology in Norway since 2003.

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Tracking Change on the Sea Ice:

New Ear Tag Technology

By Dr. Andrew E. Derocher

The Arctic is changing in a myriad of ways, but few habitats are showing the effects of warming more than the sea ice ecosystem that polar bears and their prey depend on. In an eyeblink in evolutionary time, the polar bear's ancestors changed from a brown terrestrial omnivore to a white marine carnivore dependent on seal blubber for its existence. It's well understood in conservation biology that extreme specialization is a risk for any species.

For decades, we've remotely monitored the polar bear's habitat, tracking sea ice decline by satellite, but we must also study how the bears are responding to a changing Arctic. Will they be flexible enough to change their behaviors, at least to some extent? Such data provides important insights.

The only practical means of monitoring polar bears is by tracking individuals. For decades researchers have relied on satellite-linked collars on adult females, but this left all other segments of the population poorly understood. Adult

males, by virtue of their massive neck diameters, can't wear a collar. Further, they're so strong that they would destroy them if we tried. Subadult bears grow too fast. They can't be safely collared because the drop-off mechanisms are still too unreliable. However, ear tag satellite-linked radios have emerged as a possible means of gaining new insights into both adult males and subadults. We know from studies of fasting bears that subadults are a weak link in a polar bear population, with lower survival rates than adults: the transition to adulthood is tough. Insights into how subadults are handling change is critical for conservation.

In 2016, my research group embarked on a new study to use ear tag radios to explore a diversity of conservation issues, with a focus on subadults and adult males. (We are also continuing our long-term monitoring of adult females.) The downside is that we can get only one location per day with ear tag radios but six locations per day with collars. Also, ear tags only last about four months, compared with a year for collars.

Working in collaboration with the Polar Bear Alert team in Churchill, we have been deploying ear tag radios on bears before they're released from the town's holding facility. Our goal is to understand their post-release movement patterns. We monitor how many bears head back to Churchill (conservation officers keep a close eye on the movements for early warning of repeat offenders) and how many head northward into other communities. The data will help us assess whether the management actions in Churchill are effective at keeping polar bears out of trouble or if their release adds to headaches in other places. So far, it looks like most of the "problem" bears are reluctant to cause additional trouble; most head out onto the ice after their brush with the law. Tracking these bears also gives us more data on the date that they move onto the sea ice. The duration of the ice-free period is closely linked to their survival and reproductive success.

Our other project with ear tag radios started in spring 2017 and continued in 2018. We deployed 10 radios each spring to track spring movements, habitat use, and migration patterns. We're focusing on adult males and subadults. Dates ashore add to our understanding of the length of

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EAR TAGS | *continued from page 17*

the ice-free period. We also gain insights on body condition and other health indices when we catch bears in spring. A fat bear is a happy bear and much less likely to cause trouble around people.

In my 34 years of field research and over 50 expeditions studying polar bears, I'd say the Hudson Bay spring project is about the most challenging. We find polar bears by tracking them from a helicopter. Trying to find the bears in such broken ice, with little snow to hold tracks, and at times, freezing rain that turns the area into a skating rink, is far from easy. However, if it were easy, somebody else probably would have done it by now.

My research group is still in the early days of analyzing the data from the ear-tagged bears. It takes several years to get enough data to make meaningful insights but with two years of data, our computers are already cranking away.

Dr. Andrew E. Derocher is a biology professor at the University of Alberta and a longtime scientific advisor to PBI. He has studied polar bears since 1984.

PBI Calendar of Events

Polar Bear Cam
Late October–late November

Winnipeg Celebration of Hope
October 27, 2018

Polar Bear Week
First full week of November

Northern Lights Cam
November–March

PBI House opening
November 2018

Toronto Polar Bear Affair
February 23, 2019

International Polar Bear Day
February 27

Arctic Sea Ice Day
July 15

Beluga Cam
Mid July-mid September

Visit polarbearsinternational.org for details on these events and how to get involved.

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Winnipeg Celebration of Hope Fundraising Gala

2017 Sponsors

Canada Goose

Feather Industries

Exchange Petroleum

Kelleher Ford

Frontiers North Adventures

Banrock Station Wines

Corby Wine & Spirits (Polar Ice Vodka)

Toronto Polar Bear Affair Fundraising Gala

2018 Sponsors

Canada Goose

CIBC

Sporting Life

TD

Conros

Feather Industries

Torkin Manes

Deloitte

The W. Garfield Weston Foundation

Dates for upcoming events

Winnipeg: October 27, 2018

Toronto: February 23, 2019

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Mom and Cubs Facts

Pregnant females dig a snow or peat den in the fall, give birth, and emerge about 3–5 months later. During this time, they live off their fat reserves. Adult males and nonpregnant females don't den at all!

During her time in the den, the mother does not eat, drink, or pass waste. In western Hudson Bay, pregnant females can go for up to 8 months without eating!

When polar bear cubs are born, they are only slightly larger than a stick of butter. Cubs grow rapidly, thanks to the calories in their mother's rich milk, which is about 31% fat—the fattiest milk found on land!

One of the most critical times in a polar bear's life cycle is the denning period, when vulnerable young cubs depend completely on their moms for food and protection. Cubs will stay with their mom for up to 2.5 years.

Moms and cubs emerge from their den in March or April, which is around the same time seals are pupping on the sea ice. This helps ensure that when hungry families get back to the ice, there is lots of food to eat.

POLAR BEAR WORD SEARCH

See if you can find the list of words below in the box of letters.

- ❒ ARCTIC
- ❒ CANADA
- ❒ CLAW
- ❒ COLD
- ❒ CONSERVATION
- ❒ FAT
- ❒ FUR
- ❒ HUNT
- ❒ MARINE
- ❒ NORTH
- ❒ PAWS
- ❒ POLAR BEAR
- ❒ RINGED SEAL
- ❒ SAFETY
- ❒ SEA ICE
- ❒ SWIM

N	A	L	I	A	M	H	T	R	O	N	A
A	O	Y	H	A	D	P	M	S	O	O	R
E	Y	I	R	N	R	A	N	O	L	I	C
C	A	I	T	D	T	W	N	A	O	F	T
I	N	N	E	A	H	S	E	A	F	A	I
E	D	W	I	C	V	S	Y	D	C	T	C
S	F	U	R	W	D	R	T	U	N	P	O
C	L	U	A	E	A	I	E	B	H	A	N
O	Z	L	G	W	O	T	F	S	U	D	S
L	C	N	S	W	I	M	A	W	N	A	T
D	I	E	C	I	A	E	S	N	T	O	R
R	P	O	L	A	R	B	E	A	R	V	C

of bears on Wrangel in 2017 could have been substantially higher than 589.

As a scientist who studies polar bears, working on Wrangel Island has already been a highlight of my career. It's a chance to observe bears being bears, to think differently about human-bear relationships (especially when a bear is pounding on the cabin walls at night), and to collect much-needed information in a collaborative manner, at low cost, and without stressing the animals. I also think that Wrangel Island—and the Chukchi Sea subpopulation more broadly—can provide a refreshing reminder that not all of the news for polar bears is currently bad. Ecological research suggests that, to date, bears in the Chukchi Sea have remained healthy and productive despite sea ice loss. The first-ever estimates of subpopulation abundance and vital rates (i.e., reproduction and survival) were recently obtained from a 10-year tagging and satellite tracking study in Alaska. Also, active work on conservation and management is taking place under the bilateral treaty between the U.S. and Russia. This includes progress toward a legal, managed, and scientifically-based subsistence harvest in Russia that would allow the Chukchi people to resume a culturally and nutritionally important practice that has been banned since the 1950s. Although none of these things diminishes the long-term and pervasive threat of sea ice loss due to climate change, they do demonstrate that current conditions for polar bears are variable across the Arctic and that there are opportunities for positive progress, even in the face of unprecedented environmental change.

Dr. Eric Regehr is a principal research scientist at the University of Washington and the American lead on Wrangel Island polar bear studies.

Polar Bear Cam

Every fall, Polar Bears International, Frontiers North Adventures, explore.org, and Parks Canada team up to stream the annual gathering of polar bears from the shores of Hudson Bay to people around the world. Watch the live cam at explore.org/polarbears or polarbearsinternational.org//#polar-bear-cam.

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