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THE CIRCLE

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JOINING FORCES FOR POLAR BEAR CONSERVATION

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COVER: A polar bear watches a whaling crew offshore near Barrow, Alaska.

Photo credit: Mary Sage, Flickr.com, CC BY-NC-ND 2.0 DEED

THIS PAGE: A very thin female bear leaps across pack ice while hunting near Velkomstpynten, Svalbard, Norway.

Photo credit: Ilan Hopkins, Flickr.com, CC BY-NC-ND 2.0 DEED

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Editorial

Stepping up cooperation and climate action to protect polar bears

"This polar bear swims in the ocean where her grandmother once walked on top of it."

DR. JON AARS, a contributor to this issue, made this observation in the region he studies. He was referring to the effects of Svalbard's melting sea ice, but this sobering comparison captures the impact of the climate crisis on polar bears across the Arctic.

In just over 20 years—about two polar bear generations—parts of the Arctic have heated up so much that sea ice, the bears' essential habitat, no longer exists, forcing the bears to adapt swiftly.

Fortunately, polar bears are not only top predators, but master adapters, and in many parts of the Arctic they are still in good shape. But in others, climate change is simply happening too fast for them to keep up. Bold, urgent climate action is needed if we are to avoid losing all but a few subpopulations by the end of this century. We are at a critical juncture. We must act quickly and decisively.

In this special issue of *The Circle*, we mark 50 years of international cooperation on polar bear conservation. We explore how knowledge, tools and approaches have evolved over time and identify what is collectively needed to secure a future with polar bears in it.

In 1973, when the governments of Canada, Greenland (Kingdom of Denmark), Norway, Russia and the US signed a legally binding, multilateral treaty on polar bear conservation, we had little scientific knowledge about polar bear populations across the Arctic. Their solitary, roaming nature and the sheer vastness and remoteness of their icy home precluded systematic, large-scale surveys, and still makes research today costly and even dangerous. But new tools in the polar bear conservation toolbox—like the ability to retrieve genetic profiles from paw prints in snow and novel tracking devices that can be fitted to the bears' ears or even attached to their fur—are helping scientists to carry out polar bear research in culturally considerate ways and understand how the bears are coping with climate change.

In contrast to scientific knowledge, which is relatively new, Indigenous knowledge about polar bears' behaviours, habitats and interactions in the Arctic marine ecosystem has been accumulated and passed down among coastal Indigenous communities over thousands of years. It is an overdue development, yet a critical and welcome one, that Canada, Greenland and the US are now taking steps to co-produce western science and Indigenous knowledge, co-manage populations, and support Indigenous-led habitat protection for polar bear management and conservation. Solutions will only be sustainable if they are owned and driven by people who live and work there.

The legally binding, multilateral commitment by the five governments in 1973 was a landmark step and a success story for species conservation. It still stands today, but now that climate change is the biggest threat to polar bears, do these governments still have the power to secure a future for the species?

Continued international cooperation on polar bear habitat protection, sustainable population management and use, and coexistence between people and polar bears is essential. We cannot afford to waste time or money acting in isolation. Governments must learn from one another and collaborate continuously and effectively.

We cannot afford to waste time or money acting in isolation. Governments must learn from one another and collaborate continuously and effectively.

They must also lead in implementing key global treaties. Three of the five countries that signed the polar bear agreement are now among the world's top 10 highest emitters of greenhouse gases. They, together with all world leaders, must act to limit global warming to 1.5°C through the Paris Agreement. In addition, through the new Global Biodiversity Framework, the Arctic countries must protect and conserve 30 per cent of the Arctic Ocean by 2030.

If done right, these actions will help to secure the entire Arctic Ocean food web, maintain functional ecosystems in the face of change, and protect essential polar bear habitats for their survival now and in the future. ●

KIRSTEN SCHUIJT is director general of WWF International. She has worked in international conservation for 25 years, most in leadership positions with WWF.

Polar bear swimming, Spitsbergen (Svalbard), Arctic archipelago, Norway.

Photo credit: © WWF / Sindre Kinnerød

Photo credit: NASA/Thomas W. Johansen

A Southeast Greenland polar bear on glacier, or freshwater, ice at 61 degrees north in September 2016, taken during NASA's Oceans Melting Greenland field mission.

SOUTHEAST GREENLAND POLAR BEARS

Newly documented subpopulation could offer a glimpse of the species' future

IT IS WIDELY agreed that by melting the sea ice platform that polar bears rely on to hunt seals, the climate crisis is threatening their survival. But according to a recent study published in *Science*, researchers have identified a small, previously unknown subpopulation of about 300 polar bears in Southeast Greenland that seems to be thriving despite limited access to sea ice. Unlike most other groups, these bears hunt from fresh-water ice that flows into the ocean from glaciers.

One scientist has described this unique group of bears as "the most genetically isolated population" anywhere on Earth. The subpopulation has been living separately from others for at least a few hundred years, likely because of geography: they are boxed in by mountain peaks and the Greenland Ice Sheet to the west, the Denmark Strait to the east, and the East Greenland coastal current offshore.

Studying the subpopulation could help scientists shed light on the species' ability to survive as the Arctic continues to warm. Although the discovery could be good news for polar bears elsewhere in the Arctic, the scientists involved in the study say it's too early for optimism because the glacier ice that seems to be enabling the Southeast Greenland subpopulation to survive is not available in many parts of the Arctic.

HUMAN-BEAR CONFLICT IN CANADA

Figuring out where polar bears go after detention

A GROUP OF SCIENTISTS tracking where polar bears go after being released from a holding facility in Churchill, Manitoba, Canada has concluded that temporary detention is effective at preventing future conflicts between bears and humans. The scientists also determined that bears with a high likelihood of returning to communities should be held longer.

A key goal of the study was to reduce conflicts between bears and humans—which can be dangerous for both—by better understanding how management decisions affect the bears' behaviour.

Manitoba's Polar Bear Alert Program uses various strategies to reduce conflicts. One is to capture bears that have come into conflict with people, hold them, and eventually relocate them away from Churchill. To find out what bears choose to do after being released, the researchers used ear-tag satellite transmitters and compared the released bears' movements to those of adult females with no history of conflict. They found that the released bears travelled 89 kilometres further north than bears that had not been held. They also found that bears released later in the normal migratory period were less likely to re-enter a community.

COMMUNITY-BASED MONITORING

Collecting SMART data about polar bears

THE NUNAVUT Wildlife Management Board started the Community-Based Monitoring Network in 2012 so it could work with Inuit hunters to record their travel routes, wildlife observations and harvests. The idea was to gather the data needed to address concerns related to wildlife management, conservation and Inuit harvesting rights.

Now, the network is tapping into the power of the SMART partnership to enable participating Inuit harvesters to collect data about Arctic species, such as polar bears. SMART is a conservation area management platform that allows conservationists to collect, visualize, store, analyze, report and act on a wide range of data. It was developed in 2011 by nine conservation organizations, including WWF.

SMART is cost-effective, easy to use and compatible with almost any mobile device. Icons that use Inuktitut, the language of Inuit, have been added to the app to make it more accessible for participating Inuit hunters.

Because the data are so easy to access and analyze once in the SMART platform, they can be readily applied in a variety of wildlife management initiatives by the Nunavut Wildlife Management Board, its co-management partners, and communities.

ALASKA DRILLING PROJECT

Climate crisis impacts on polar bears overlooked

A CONTROVERSIAL oil-drilling project on the Alaskan North Slope—known as the Willow project—is facing legal challenges in part because of its potential impact on polar bears.

Earlier in 2023, the US government approved the ConocoPhillips venture despite legal challenges launched by environmental and Indigenous groups.

Before the approval, the US Fish and Wildlife Service had assessed the possible impacts to polar bears—including noise pollution, oil spills and encounters with humans—and concluded that over the massive project's three-decade span, four bears might be hazed (hit with projectiles) to scare them away from people, and zero would be killed.

But the environmental groups argued that the assessment ignored the fact that the project will intensify the climate crisis, which is the bears' most existential threat. For example, one lawsuit argued that a "drilling-as-usual" approach could cause the bears to become locally extinct within 30 years and entirely extinct by the end of the century. Another argued that the estimate of zero bears dying is likely inaccurate. Public objections to the project have shown up on social media with the hashtag #StopWillow.

In mid-September, the US government announced that it would prohibit drilling in 13 million acres of the National Petroleum Reserve and cancel all leases in the Arctic National Wildlife Refuge.

Oil production for the Willow project is slated to begin in 2029. The area where the project is planned is estimated to hold up to 600 million barrels of oil. The US government's own environmental analysis concluded that the project would generate 9.2 million metric tons of carbon pollution per year.

Photo: U.S. Geological Survey/public domain

The Trans-Alaska Pipeline is transporting oil produced on the North Slope.

Portrait of a polar bear. Svalbard, Norway

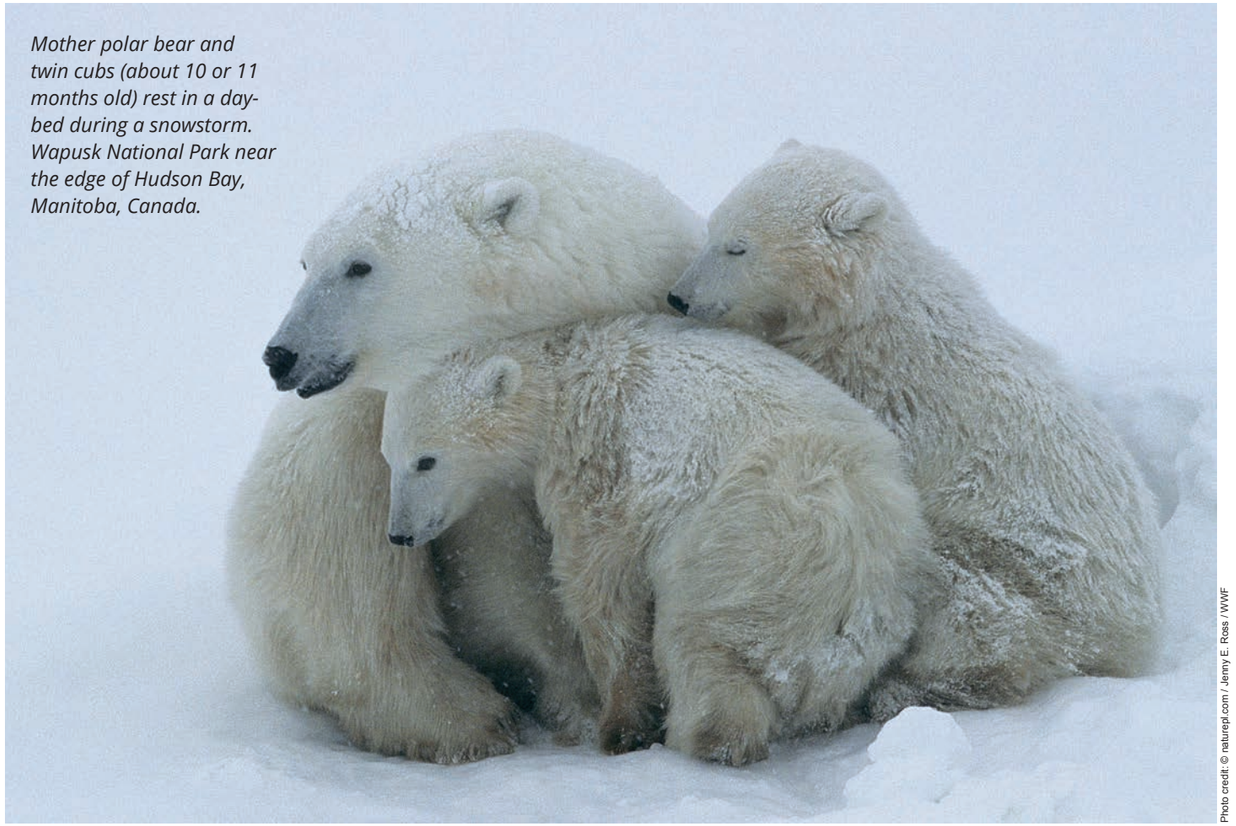
Photo credit: © Richard Barrett / WWF-UK

As climate change continues to have negative impacts on polar bears, international collaboration is essential even beyond Arctic regions. The Range States must also continue to apply responsible management practices and monitor polar bears while respecting relationships with Indigenous Peoples.

A 50th anniversary

RECOGNIZING FIVE DECADES OF COLLABORATION

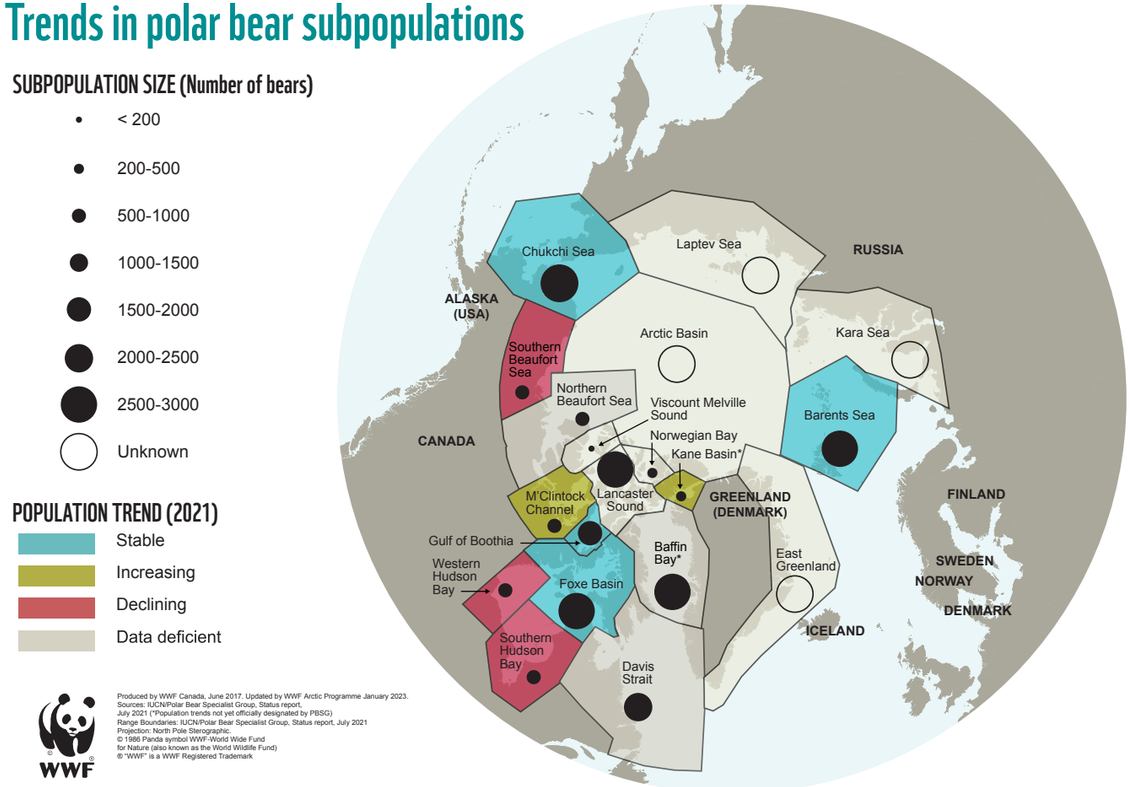
Polar bears have been intricately linked to Indigenous ways of life for millennia. Fifty years ago, countries that were home to polar bears agreed to work together to address the unregulated hunting of the bears by non-Indigenous people, which was considered to be having a negative impact on the species. But today, climate change is the major threat to polar bears' future. The need for collaboration to address the challenges associated with the climate crisis is more pressing than ever. **CAROLINE LADANOWSKI** and **DROPLAUG ÓLAFSDÓTTIR** recount the major polar bear conservation steps that five governments have taken since 1973. ➤



Mother polar bear and twin cubs (about 10 or 11 months old) rest in a day-bed during a snowstorm. Wapusk National Park near the edge of Hudson Bay, Manitoba, Canada.

Photo credit: © naturepl.com / Jenny E. Ross / WWF

Trends in polar bear subpopulations



IN THE 1960S, there was international concern about polar bears because of unregulated hunting by non-Indigenous people. The International Union for Conservation of Nature (IUCN) convened meetings with polar bear specialists to discuss the bears' status and establish what is now known as the IUCN/Species Survival Commission for Polar Bears (or the Polar Bear Specialist Group). These meetings ultimately led to an agreement in 1973 to coordinate polar bear research activities and monitoring.

The 1973 Agreement on the Conservation of Polar Bears was signed by the bears' five home states, also called the Range States: Canada, Denmark (Greenland), Norway, the Union of Soviet Socialist Republics (now Russia), and the US. The agreement was ratified and went into force in May 1976 for an initial five-year period. In 1981, the Range States unanimously reaffirmed an indefinite continuation of the agreement.

RANGE STATES COMMIT

The overall purpose of the 1973 agreement was to coordinate circumpolar efforts for polar bear management and the long-term preservation of the species and their habitat. The legally binding agreement prohibited the harvesting of polar bears except by Indigenous Peoples.

The Range States committed to coordinating actions relevant to the conservation and management of polar bears throughout the circumpolar range. They agreed to conduct national polar bear research programmes and to consult and exchange data from the studies. They also agreed to take appropriate steps to protect the ecosystem of which polar bears are a part.

Since the ratification of the agreement, the threat pertaining to the over-harvest of polar bears has largely been eliminated. Norway and Russia have imposed a general ban on hunting, and the other countries manage it according to conservation acts and/or regulations. In Canada, home to more than two-thirds of the world's total estimated polar bears, populations are co-managed in collaboration with provincial, territorial and federal governments, wildlife management boards, land claim organizations and Indigenous rightsholders. Canada has legislation that recognizes Indigenous rights and land claim agreements to ensure decisions include multiple knowledge systems and meaningful engagement with Indigenous Peoples for effective management.

Bilateral agreements are now established between Range States sharing responsibility for polar bear subpopulations to help ensure their good health and status and maintain sustainable harvests for Indigenous People. Protected areas have been established throughout the Arctic to safeguard essential polar bear habitat. All Range States have adopted national research plans for polar bears within their territories. At least one status assessment has been conducted for 15 out of 19 subpopulations in the last 31 years.

CLIMATE CRISIS BECOMES KEY THREAT

In 1975, the polar bear was listed under the *Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)* Appendix II. This means that stringent certification measures are required before polar bear products may be traded internationally. In 2015, the IUCN assessed the polar bear as *Vulnerable*.

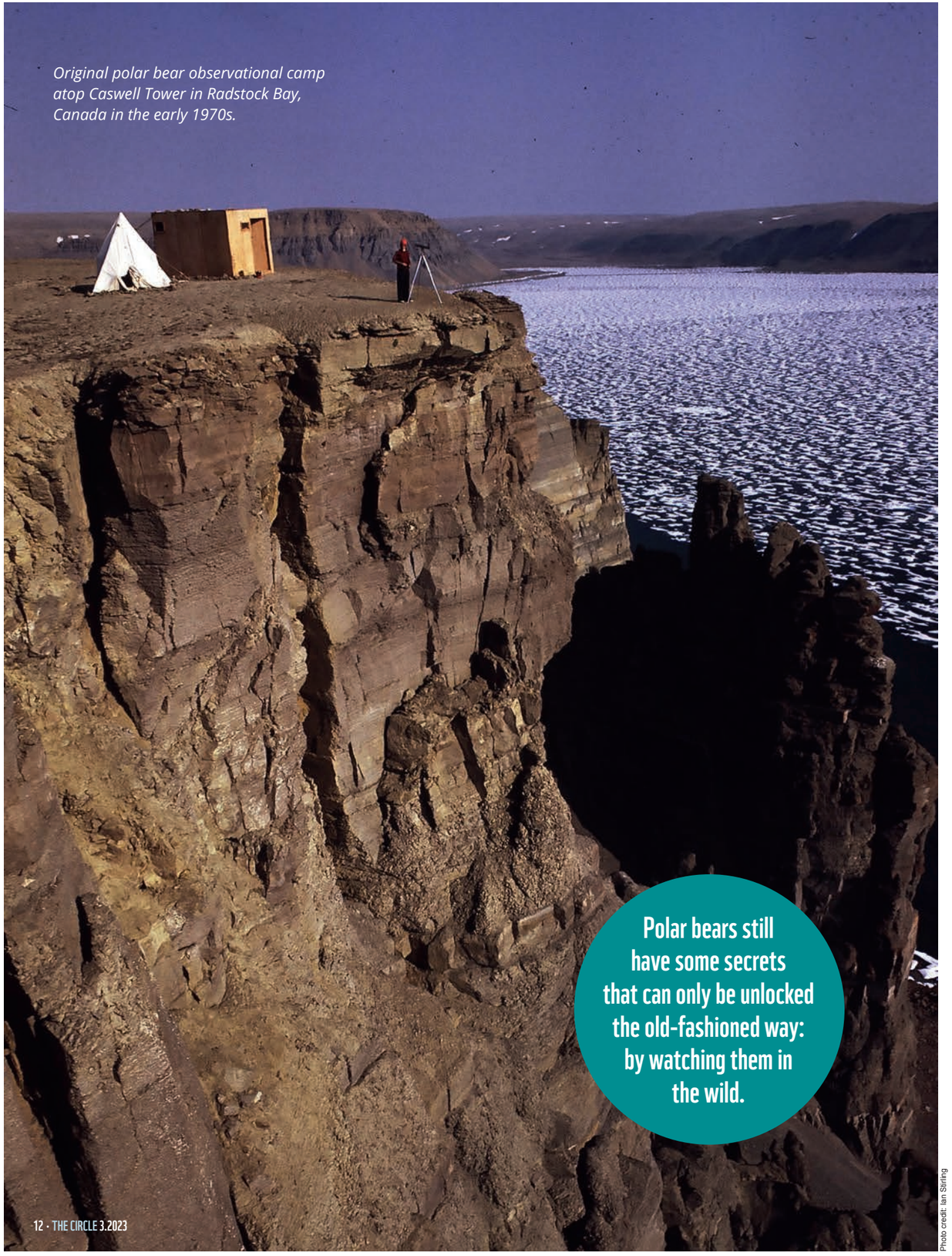
Recognizing that continued international coordination is essential for the protection of polar bears, the responsible ministers of the Range States signed the 2013 Ministerial Declaration recommitting the states to develop a circumpolar conservation strategy. The declaration further recognizes climate change as the key threat to polar bears. It also acknowledges the importance of polar bears to Arctic Indigenous Peoples as well as the key role that Traditional Ecological Knowledge and the participation of Arctic Indigenous Peoples play in polar bear conservation.

In 2015, the Range States adopted a 10-year Circumpolar Action Plan to strengthen international efforts to conserve polar bears. The plan's vision is to secure the long-term persistence of polar bears in the wild. It is supported by seven objectives and steps to meet them by 2025. The plan's working groups and operating teams have successfully addressed actions that reflect its vision, such as publishing a climate change communications strategy to reach audiences beyond government, developing strategies to reduce human-polar bear conflict, and supporting sustainable trade action.

As climate change continues to have negative impacts on polar bears, international collaboration is essential even beyond Arctic regions. The Range States must also continue to apply responsible management practices and monitor polar bears while respecting relationships with Indigenous Peoples. In fact, although the continued cooperation of the five governments is critical, complete success depends on the participation of Arctic Indigenous Peoples. Their collaboration is as important as ever. ●

CAROLINE LADANOWSKI is the Canadian head of delegation and current chair of the Polar Bear Range States Agreement.

DROPLAUG ÓLAFSDÓTTIR is a project officer supporting the Polar Bear Agreement with the Conservation of Arctic Flora and Fauna (CAFF) Secretariat.



Original polar bear observational camp atop Caswell Tower in Radstock Bay, Canada in the early 1970s.

Polar bears still have some secrets that can only be unlocked the old-fashioned way: by watching them in the wild.

Photo credit: Ian Stirling

Unlocking polar bear secrets

THE POWER OF OBSERVATION

Polar bear science is pretty high-tech these days. But as **ERIC V. REGEHR** writes, new doesn't always mean better—and researchers have gleaned some astounding insights into polar bear behaviour just by analyzing data collected during decades of close observation.

WHEN IT COMES to studying polar bears, science has come a long way. Satellites can now provide daily pictures of the sea ice that bears depend on. Researchers can identify individual animals from the DNA left in their footprints and figure out what they eat by analyzing single strands of hair. GPS tracking devices that once came as big radio collars are now smaller and lighter, providing near real-time movement information.

But while these and other technological advances have taught us a lot, a recent project reminded me that polar bears still have some secrets that can only be unlocked the old-fashioned way: by watching them in the wild.

Dr. Ian Stirling, an adjunct professor at the University of Alberta and research scientist emeritus with Environment and Climate Change Canada, had this fact firmly in mind when he pitched a tent on a bluff and started observing wild polar bears in Radstock Bay, Nunavut, Canada in 1970. More than 50 years later, he hasn't forgotten it. His foresight led to one of the most interesting collaborations of my career: working with him and others to analyze thousands of hours of behavioural data collected from 1973 to 1999 while watching bears, well, just be bears.

A TREASURE TROVE OF BEAR INFORMATION

Each year in the camp, Dr. Stirling and other members of the team recorded everything the bears did—minute by minute, glasses fogged up, fingers freezing. This initiative produced such rich and unique information that, when the database was recently digitized for the first time, the hardest part was figuring out which analyses to start with.

We decided to focus on animal welfare. We compared the behaviour of a few bears that had been temporarily put to sleep for research with that of others that had not been disturbed. Our findings, published in the journal *Arctic*, show that bears sleep more and hunt less for the first 48 hours after immobilization, after which their behaviour returns to normal. But that wasn't all. We also discovered that several bears killed seals within 24 hours of immobilization, that adult males and adult females without cubs go days without hunting in the spring because they're too busy mating, and that polar bears hunt more under a full moon, even during the 24-hour daylight of the Arctic summer.

Today, Dr. Stirling's decades of observational data aren't just a neat slice of natural history—they're a treasure trove of ecological information that is relevant to the challenges now facing the species, including the number one threat of climate warming. So now, we're digging more deeply into the data to better understand what the future might hold. How many hours does a mother bear need to nurse her cubs each day? How many seals does a massive 600 kg male need to eat each week? And how are these and other things changing as the sea ice melts more each year and bears are forced to spend increasing stretches of time on land?

I hope this collaboration lasts a long time. Observational studies may not be flashy, but they're much more than a throwback to earlier times. Polar bears are intelligent and individualistic animals. They have adapted to one of the harshest environments on Earth in amazing ways. Some of the things we're learning—like how many days a polar bear will hunt patiently before killing a seal—are hard to grasp using only your imagination. You need to see them with your own eyes.

For me, the project has been a welcome reminder that in order to do the best science we can, sometimes we need to slow down and take the time to observe polar bears on their own terms. ●

ERIC V. REGEHR is a principal research scientist at the University of Washington with 25 years' experience studying wildlife.

Community-led conservation

PROTECTING AVIQTUUQ FOR FUTURE GENERATIONS

The hamlet of Taloyoak, located on the edge of Aviqtuuq (the Boothia peninsula) in Nunavut, is the northernmost community in mainland Canada. About 1,100 residents call the area home—as do some 2,000 polar bears. Industrial development, mining and shipping have threatened the area for years. But since 2016, the community has been working with WWF–Canada to protect the region and the species that call it home.

JIMMY ULLIKATALIK manages the Taloyoak Umaruliriqut Association, which is spearheading the creation of the Aviqtuuq Inuit Protected and Conserved Area (IPCA). The proposed IPCA would cover almost 90,000 square kilometres of marine, terrestrial and fresh-water ecosystems in Nunavut. Ullikatalik spoke to *The Circle* about the IPCA and what it will mean for the future of his community and species like the polar bear.

Set of colourful houses in Taloyoak with a raven flying above.

Photo credit: Emina Ida, WWF-Canada

Photo credit: Emina Ida, WWF-Canada

What makes Aviqtuuq special?
Our people have lived here for many generations. All kinds of wildlife prosper on this peninsula: it's a calving ground for caribou and muskox, and it's where many migratory birds come to have their offspring. And the polar bears den here during the winter. We are one with the environment and wildlife. It is also our livelihood. We want to protect it so the wildlife can prosper.

Why is this area important for polar bears in particular?
We have six major rivers that have Arctic char runs. Because there's a lot of fish, there's a lot of seal in the area—which means there's a lot of polar bears too. A few years back, we read a report that Canada had the cleanest polar bears in the world, and we want to keep it that way. We want to protect the area and the fish because one species feeds off other species, and it goes up the food chain. We need to keep the environment clean so our food is clean.

The polar bear is very important to us because it is one of the main foods we depend on. We want the ecosystem to be clean so we can continue to have access to the foodthatisnaturaltous—and that is better for us.

How is an Inuit Protected and Conserved Area—or IPCA—different from other protected areas?
An IPCA differs from a regular protected area by putting Indigenous People in charge. It's about doing what we want—and in this case, we want to have access to cultural foods to create jobs in our community. We want to protect the area from mining and gas exploration, but we also want to create jobs. Our plan is to build a cut-and-wrap facility to prepare and distribute our harvest. We're trying to create an economy for our community so we can take care of ourselves.

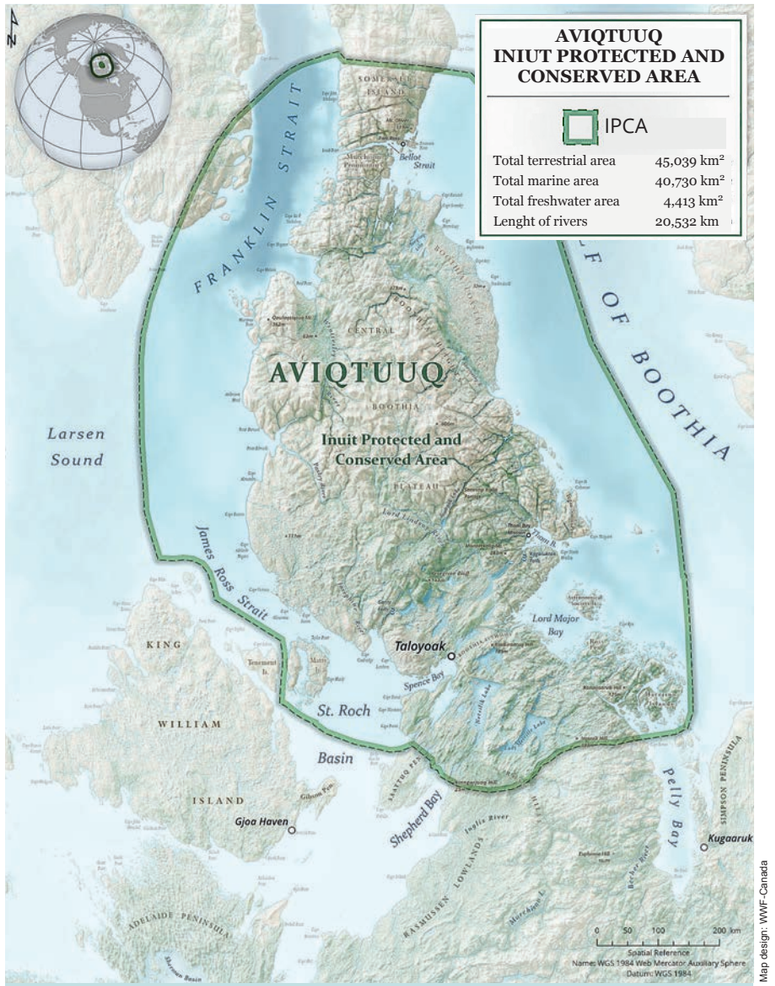
Why does the area need protection?
There's always been the threat of exploration for mining and oil and gas in this area. Back in 1972, they were trying to put a gas pipeline from up north down to Baker Lake in southern Alberta. But the elders back then didn't want that pipeline going down through Aviqtuuq. They knew it would disturb the ecosystem. So they had meetings in their houses in the evenings to try to stop the project, and they were successful. Ever since then, we've wanted to be protected from mining and gas exploration. So this need for protection didn't just start in 2016. It's been happening since 1972.

How will protecting the area help polar bears?
It will protect the land. It will protect the environment. It will protect the waters. If we protect the waters, the Arctic char will have clean plankton to eat, and the seals will have good, clean fish to eat. And then the polar bears will have good, clean seals to eat. The polar bear is very important to us because it is one of the main foods we depend on. We want the ecosystem to be clean so we can continue to have access to the food that is natural to us—and that is better for us.

What do you think this protected area is going to mean for the future of this region?
It means that there will be a place where wildlife will be able to prosper and roam freely without any disturbance to their migration routes or corridors. Once their environment is disturbed, they move off the land. Aviqtuuq is their home, and it is also our home. It has provided us with what we have needed to survive and thrive here for generations. We want to see the lands and resources here protected from industrial development because the area is sacred to us and has everything we need to prosper. ●

Credit: Darlene Alyout

Video: Polar bears gather and feed on a bowhead whale harvested by the community in Nallunuaq (Lord Mayor Bay), Nunavut, Canada.



Map design: WWF-Canada

■ Aviqtuuq includes 90,000 square kilometres of land and water—an area almost of the size of Portugal. The region provides important denning and winter habitat for polar bears, calving grounds for the Ahiak caribou, a migration corridor for Peary caribou, and habitat for muskox. It also is a summer refuge for marine mammals, including narwhal, beluga and bowhead whales. Its freshwater lakes and rivers are fed by the surrounding marine waters, which are full of Arctic char.

Close encounters

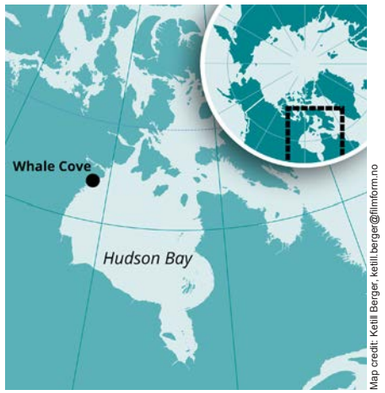
LEARNING TO LIVE ALONGSIDE POLAR BEARS

Whale Cove is a small Inuit community located on the western coast of Hudson Bay in the Canadian Territory of Nunavut. It is named for the large numbers of beluga whales that congregate in nearby waters every fall. But the whales aren't the only Arctic species that can be seen in the area—there are also plenty of polar bears, and their numbers are increasing. **JASON HARASIMO** explains why Arctic towns like Whale Cove are seeing more bears—and how these communities are responding.

STANLEY ADJUK WAS spending a quiet day at his family cabin near the mouth of a river, nestled amid the vast tundra, with his wife, daughter and two young grandchildren. The adults were gathered inside while the children played outside. It was an ordinary enough get-together until a massive polar bear appeared just three or four metres away from the children.

Adjuk's six-year-old grandson was the first to notice the towering presence. He had never seen a polar bear before, and mistook it for a caribou.

"Tuktu!" he exclaimed in Inuktitut, catching his grandfather's attention. On Adjuk's orders, the children scrambled inside, escaping the bear who was slowly stalking them. But in the chaos, Adjuk's grandson stumbled to the ground. Adjuk snatched him up and pulled him inside just as the bear closed the gap, coming within a metre of the two before Adjuk slammed the door shut. He reached for his rifle and opened the door again, but noticed with relief that the bear was escaping into the distance.



Map credit: Ketill Berge, ketill.berge@ilmorm.no

A GROWING CHALLENGE

This harrowing incident underscores a troubling trend: polar bears are increasingly being sighted in proximity to cabins and communities throughout the Arctic.

Situated in the Kivalliq region of Nunavut—and lying within the northern extent of the most extensively studied polar bear subpopulation in the world—is the tight-knit community of Whale Cove. Living alongside one of Earth's most formidable predators is a reality that the Inuit here have known since childhood. Equipped with considerable traditional knowledge of polar bear behaviour, they've learned to coexist with these majestic creatures. But as conditions shift rapidly due to the effects of climate change, both bears and humans are being forced to adapt.

The polar bears in the western Hudson Bay subpopulation depend heavily on the formation of sea ice to hunt their primary prey, the ringed seal. Until freeze-up occurs, the bears roam the coastal areas, a tradition that has always brought them into closer proximity to human settlements. But as the waiting period for freeze-up lengthens, so does the likelihood of human-polar bear conflicts. Communities in the western Hudson Bay region are seeing bears more frequently, often close to towns and cabins—a development that poses increased risks for both humans and bears.

"It's their migration route," explains Adjuk, a seasoned hunter. "We're on their land. Whale Cove is on a route they have been taking for a long time."

And their arrival is predictable—any time from mid-September to December. "They pass through and don't usually stay for long," he says.

Adjuk also says polar bear sightings were once far more rare.

"Now, we see them a lot," he says. "They're everywhere. In the last 15 to 20 years, we have seen more and more. Those we see near the community are generally in good health, not starving—but they seem less wary of humans."

The demographics of the bears that frequent Whale Cove vary, says Adjuk. "We see young, old, mothers with cubs, without cubs, male, female. It's not always the same bears, either."

STAYING SAFE

Living alongside polar bears requires vigilance and a clear understanding of what actions are safe. For the past three years, WWF–Canada has supported a polar bear patrol programme in Whale Cove, organized and administered by the Issatik Hunters and Trappers Organization, which handles all wildlife matters in the community. The programme employs a pair of patrollers during peak bear season, when the polar nights set in and the shores of Hudson Bay begin to freeze. These patrols not only help safeguard the community, but also bolster the feeling of security among residents.

Andy McMullen of Bearwise speaks with polar bear patrollers during a training session in Whale Cove.

Photo credit: Jason Harasimo/WWF-Canada

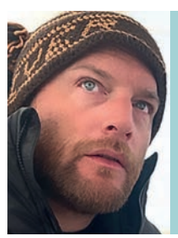
Investments in the programme by WWF and Nunavut Tunngavik Inc. have allowed for the purchase of skidoos, communication devices, all-terrain vehicles and bear patrol training, all of which significantly increase the programme's effectiveness and value.

While community members in Whale Cove have first-hand knowledge of the issues at hand, the lack of quantitative data has been a pressing concern. Investigative approaches and platforms like the SMART system are instrumental in capturing the critical data needed to build a comprehensive narrative. Patrollers are outfitted with mobile devices so they can log occurrences while on patrol. These data not only validate the community's concerns, but also serve as a powerful advocacy tool when engaging with territorial, federal and international government agencies. The data bridge the gap between anecdotal evidence and concrete, actionable information, enabling communities to make a compelling case for protecting both their way of life and the wildlife that share their environment.

The ongoing changes in polar bear behaviour and the bears' increasing proximity to communities like Whale Cove demand a multifaceted approach that combines traditional knowledge, modern technology and community engagement.

Collecting this information from across the Arctic can also help with understanding whole-Arctic trends in conflict between people and polar bears, and could lead to new tools and measures that are effective in deterring bears from communities.

The ongoing changes in polar bear behaviour and the bears' increasing proximity to communities like Whale Cove demand a multifaceted approach that combines traditional knowledge, modern technology and community engagement. As these beautiful animals continue to adapt to a changing Arctic landscape, the residents of Whale Cove and other remote communities stand as the frontline stewards of both their unique way of life and the fragile balance of nature that surrounds them. ●



JASON HARASIMO is an Arctic ecosystems specialist with WWF–Canada based in Iqaluit, Nunavut.

A polar bear skin hangs to dry in the yard of a local hunter, Utqiagvik, Alaska.

Photo credit: © Chris Linder / WWF-US

A team effort

COLLABORATING TO CO-MANAGE POLAR BEARS IN ALASKA

In the US, the *Marine Mammal Protection Act* of 1972 recognizes the importance of including Alaska Natives in the management of the species with whom they live. **MICHAEL MILLER** focuses on how the act allows Alaska Natives and their communities to weigh in on decisions—and continue their traditional harvesting.

This positive working relationship didn't develop overnight. It took leadership and commitment from both the council and the service to stay "at the table" to break through barriers arising from misunderstandings.

THE EFFECTIVE MANAGEMENT of marine mammals in Alaska has long required the US Fish and Wildlife Service to collaborate with Alaska Native organizations. When the two work together, Alaska wildlife can benefit from their blended knowledge.

In fact, the need to work together is built into law. Given the importance of marine mammals to the health and well-being of Alaska Natives—who rely on them for both cultural reasons and food security—the *Marine Mammal Protection Act* allows for the continued use of marine mammals by Native Peoples, protecting a way of life. For example, section 101 provides for traditional harvesting through an exemption so that Alaska Natives can rely on marine mammals for food and handicraft purposes.

But the act goes even further in section 119 to allow for co-management of the subsistence harvest of marine mammals between federal species managers and Alaska Native organizations (ANOs) like the Alaska Nannut Co-Management Council (ANCC). (The word "nannut" means polar bears in the Iñupiaq, Yu'pik and Yupik languages.)

A BRIDGE TO THE COMMUNITY

ANCC is a conduit for federal managers who need to interact with the people who are most affected by its management and policy decisions. The council was created by representatives of the communities that live within range of polar bears. Its purpose is to provide a framework for these communities' involvement in the management and policy decisions that affect their lives and their relationships with polar bears. The council has a governance board with representation from 15 Arctic communities as well as advisory members from regional entities to provide a wide spectrum of expertise on issues related to polar bear management.

Its board and advisors work from a traditional understanding that both they and polar bears are essential parts of an ecosystem. Proper conservation considers issues related to harvesting, safety, community viability and the need to protect a cultural identity and way of life.

As an organization that serves hunters and handicrafters, ANCC provides both historic and present-day observations of polar bears, their habitat and the rapidly changing climate conditions in which they live, along with the behavioural changes exhibited by the bears as they adapt to a shifting climate. Having a strong structure to collect this information enables the council to inform federal agencies and support the better management of polar bears. Although the US Fish and Wildlife Service is the agency for polar bears in Alaska, its "western" managers often lack the traditional (and real-time) knowledge needed to properly address concerns of management and policy.

Many ANOs are engaged in marine mammal co-management activities that affect a variety of species and regions, all with variable degrees of capacity. Many are closely watching the continued development of ANCC, knowing its success can inform other efforts to strengthen Alaska Native management of the harvest and conservation of marine mammals in Alaska, such as polar bears.

SHAPING PERSPECTIVES

Outside of Alaska Native communities, most people's perceptions of polar bears are shaped by photos. Images of extreme survival conditions—and characterizations of the bears as apex predators, climate change victims, playful charismatic survivors and more—speak to the world's fascination with them. But proper management of the bears requires a broader lens. Groups like ANCC work to influence perceptions of polar bears and other marine mammals from an ecosystem viewpoint—a perspective that can only be arrived at after living for countless generations as part of the bears' ecosystem.

While a strong Alaska Native organization is essential for the proper management of polar bears (and all marine mammals in Alaska), so are strong working relationships. At the time of writing, marine mammal ANOs have generally positive working relationships with federal partner agencies, although all are facing chronic funding shortages. For optimal results, these organizations need proper funding to build capacity and retain staff as well as to fill partnership roles.

Equally important is a commitment from the agencies and ANOs to

It is essential that we continue to sit at the same table and find ways to work through differences.

continue to work together respectfully, making the most of each other's strengths and expertise to inform management actions. It is essential that we continue to sit at the same table and find ways to work through differences. Support from other groups, including state government, industry or non-governmental organizations, can also be helpful, with one important caveat: the support must be for the views of the communities most affected, and should not impose an outside lens on what a community should do or look like.

ANCC has made tremendous progress through hard work and a strong partnership with the US Fish and Wildlife Service. But this positive working relationship didn't develop overnight. It took leadership and commitment from both the council and the service to stay "at the table" to break through barriers arising from misunderstandings.

Much has been achieved, but much more needs to be done. Hopefully, our strong working relationship will continue—with appropriate funding—so we can fully achieve the goals set out in the *Marine Mammal Protection Act*.

MICHAEL MILLER is a tribal member and chairman of the Indigenous Peoples Council for Marine Mammals, an Alaska-based umbrella organization for the co-management of marine mammals between federal agencies and Alaska Native organizations.

Polar Bear about to enter water, Svalbard, Norway, September 2009.

This means some local bears now have much less sea ice where they hunt compared to what their great-grandmothers had.

Photo credit: © naturepl.com / Andy Rouse / WWF

Resilience in adversity

SVALBARD'S POLAR BEARS ARE DOING JUST FINE—FOR NOW

A female polar bear with her year-old cub wander the sea ice in search of food on the frozen fjords of Svalbard. They are looking for adult ringed seals, which make up the bulk of their diet.

Daughters favour the same areas that their mothers and grandmothers did. They also prefer to have their maternity dens close to where they were born.

Photo credit: © Sophie Lanfear / Silverback/Netflix

These days in Svalbard, local polar bears are being forced onto land for much of the year as sea ice becomes more and more scarce. Those that are more inclined to roam must swim long distances between the ice edge and their island destinations. Surprisingly, both groups are still in good shape, able to produce cubs and survive. But the ongoing loss of sea ice is bound to make their lives more difficult. The question for **JON AARS** is: How much change can they cope with?

THE BARENTS SEA hosts some 3,000 of the estimated 26,000 polar bears in the Arctic. Since the 1960s, scientists from the Norwegian Polar Institute have been studying the population that calls the archipelago of Svalbard home. Almost all our scientific knowledge about polar bears comes from long-term research programmes like this one in Svalbard, which I have been part of for the past two decades.

Along with my colleague, Magnus Andersen, I have been doing polar bear fieldwork in this area since 2003. During this period, we have seen profound changes as the sea and the air temperatures have crept higher and higher. Over the last 30 years, the length of the season during which the areas around the islands are covered in sea ice has narrowed to about four months (with some variation between local areas).

This precipitous decline in the number of days with sea ice is more than twice the rate experienced by any of the other 18 recognized polar bear populations. This certainly makes studying the bears in this area interesting. But how well are they managing with this pace of change?

HOMEBODIES AND ROAMERS

Before I start to explain what we know about how the Svalbard polar bears have responded to the effects of climate change, it's important to understand that we do not find just one type of space use among these bears. Rather, we find two very different ones. Some bears (likely fewer than 300) are what we call "local": that is, they never leave Svalbard. When there is sea ice around the islands, they do use it for hunting, but they are rarely more than a couple of hundred kilometres offshore.

The rest of the bears are what we call "pelagic": they visit Svalbard from time to time, but are more often on the move. When the sea ice retreats from Svalbard, usually in summer, these bears follow the ice and continue to hunt at the ice edge. They have found a way to hunt seals from the ice year-round.

As sea ice disappears from Svalbard for longer and longer periods, you might think that local bears would respond by moving to the areas that have the most enduring sea ice. But actually, the local Svalbard bears are *very* local: they remain in the same areas not only year after year, but across generations. Daughters favour the same areas that their mothers and grandmothers did. They also prefer to have their maternity dens close to where they were born.

This means some local bears now have *much* less sea ice where they hunt compared to what their great-grandmothers had. So how does that affect them? Surprisingly, we have observed that although they spend a lot more time on land (because they have no sea ice for much of the year), they are not in worse condition. If they survive the first few difficult years of their lives, they still grow up, have cubs and grow old. They have a shorter season for hunting ringed seals on the ice, but they make up for this by consuming more eggs and birds. In some areas, harbour seals are now more common and serve as prey. We also see more bears taking reindeer than we once did.

THE SEARCH FOR SEA ICE

And what about the pelagic bears? From decades of research, we know that they spend most of their time on the ice edge. Because that is now typically located 200 to 300 kilometres further north than a few decades ago, the bears are now located further north as well—and often further away from Svalbard—for much of the year.

If this means they can hunt seals year-round, you might wonder what the problem is. One issue is that in the years in which they reproduce, adult females need to reach land in autumn to build their maternity dens. But the sea ice in Svalbard is no longer stable enough in that season. In most recent years, it has not formed on time in historically important denning areas in east Svalbard. As a result, the bears are now more likely to den in new areas of Svalbard, if they reach Svalbard at all. Or they go to the western Russian Arctic (Franz Josef Land) instead.

In addition, if they have to swim as many as several hundred kilometres from the ice edge to the islands, they expend considerable energy—yet they need their fat reserves to last the winter so they can raise their cubs. Although this is worrisome, so far, the pelagic bears—like their local counterparts—seem to be in good condition.

The question is how much more sea ice loss both local and pelagic bears can tolerate before the energy balance between what they can get from food and what they need for reproduction and survival dips to the negative side.

For now, the good news is that by adapting their diets and following the ice further north, polar bears in Svalbard are doing just fine. The bad news is that research on climate and sea ice is showing us they are almost certain to lose more and more of their habitat in the coming decades. What is yet to be seen is how that may affect their survival. ●

JON AARS is a senior scientist at the Norwegian Polar Institute. He has led the institute's polar bear monitoring programme in Norway since 2003.

One of the four "burr on fur" prototypes designed to stick to a polar bear's fur.

Photo credit: © Erinn Hermsen /polarbearsinternational.org

Innovation

TECH TOOLS

IN THE CONSERVATION TOOLBOX

Monitoring polar bears and their habitats is critical in our quest to understand how they are responding to climate change—especially diminishing sea ice. When the Agreement on the Conservation of Polar Bears was reached 50 years ago, researchers had few options at their disposal for monitoring polar bears. But thanks to technology, that's not the case anymore.

Several new tools have emerged in recent years that could provide scientists with new ways to track and monitor polar bears so we can better understand how they are faring. We look at three innovations that are providing new ways to collect the information needed to manage and conserve these Arctic animals. These innovations also aim to address recent concerns on the part of Arctic Indigenous communities that some research methods can disturb polar bears.

1. TAKING INSPIRATION FROM NATURE

Anyone who owns a dog knows just how sticky—and persistent—burrs can be. But researchers at Polar Bears International, Toronto's York University and 3M have used burrs as inspiration for a new method to track polar bears.

The "burr on fur" device temporarily attaches to the bears' fur and carries basic GPS tags that transmit tracking information to researchers. The device is non-toxic and designed to fall off seven months to a year after being attached.

The researchers have developed several prototypes. One is shaped like a pentagon and pulls the bear's fur through copper tubes, which researchers crimp to hold the fur in place. Another is a metal triangle with strong brushes resembling pipe cleaners on each side that get caught in the bear's fur.

But for the burr on fur method to succeed, the device must be able to withstand harsh Arctic conditions, including extreme cold, saltwater and snow—and that's a challenge the researchers are still working on. They've tested the prototypes' performances in zoos and aquariums as well as on wild polar bears in western Hudson Bay in the Canadian Arctic. They plan to use the data they gather to make design adjustments.

Photo credit: © Micaela Hellstrom / WWF Arctic Programme

Photo credit: © Melanie Lancaster / WWF Arctic Programme

WWF's Melanie Lancaster collecting samples of snow from polar bear tracks in Alaska. Each paw print is like a genetic fingerprint.

2. DEVELOPING A BETTER EAR TAG

Two key challenges with using ear tags to monitor polar bears are that the antennae can ice up or break, and the tags need to reliably drop off after a set amount of time. In 2018, WWF–US teamed up with the US Fish and Wildlife Service and a Canadian engineering company named MistyWest to develop an ear tag that could overcome these issues. (A US-based design company named IDEO was also initially part of the project.)

Together, they have created an ear tag prototype with a completely internal antenna and an attachment mechanism that is guaranteed to drop off after the tag's use period. To develop a tag small and light enough to sit on a polar bear's ear, the group took moulds of bears' ears. Although the group had set out to develop a waterproof enclosure for the tag that could withstand the Arctic's harsh conditions, it has not succeeded yet.

The internal antenna design and associated open-source files are now offered on GitHub to allow other developers to advance and refine this innovative technology. WWF plans to collaborate with manufacturers and other innovators to incorporate this antenna technology into ear tags that can be used on polar bears and other species.

3. USING eDNA TO MONITOR BEARS

Every living organism sheds cells into the environment, leaving behind traces of its DNA. You can think of these traces as a "genetic fingerprint." For nearly a decade, WWF has been working on a project to retrieve environmental DNA (eDNA) from polar bear footprints in the snow to support conservation efforts. In 2018, WWF teamed up with MIX Research to try to retrieve DNA from the nuclei of cells. The DNA contains the unique "genetic fingerprint" of every polar bear.

The team scraped snow from polar bear tracks in Alaska and sent the samples back to MIX's lab in Sweden. There, for the first time, they successfully isolated and sequenced trace amounts of eDNA from the cells' nuclei. From 13 sets of polar bear tracks, they sequenced enough eDNA to identify 12 individual bears (the 13th sample turned out to be from a bear whose tracks were collected on two separate days).

Unlike conventional research methods, which require more contact with polar bears, collecting eDNA from snow samples allows researchers to obtain crucial data without disturbing or even needing to see the bears. With some training, non-scientists can also collect footprints, which means that Indigenous and local community members, volunteers, hunters and trackers can help monitor and manage polar bears. Collecting footprints can also complement existing monitoring efforts and enable researchers to study polar bear subpopulations that we currently know less about.

In addition, this new method can shed light on movement and genetic exchange between areas, mating systems, behaviours and bears' ability to adapt to climate change—information that is essential for polar bear management and conservation. The team has also used the method successfully on lynx and snow leopards, and hopes it can be used to monitor other species that leave footprints in the snow, expanding our knowledge of diverse ecosystems. ●

Peering into the unknown

WILL THE LAST ICE AREA SUPPORT POLAR BEARS?

Accelerated warming in the Arctic over the past few decades has resulted in rapid changes to the Arctic habitats that marine species rely on. Against this backdrop, the Last Ice Area may be an important refuge for species that depend on sea ice. **KRISTIN LAIDRE** explains what we know about the area's ability to support polar bears—and what we still need to figure out.

SOME ARCTIC SPECIES—SUCH as narwhal and beluga and bowhead whales—make use of ice habitats, but don't depend on them for survival. But others need sea ice for feeding and critical life events like reproduction, moulting and resting.[1] These include the seven pinnipeds (walrus as well as ice seals) and polar bears.

Indigenous and other northern people, in turn, depend on these Arctic marine mammals for a range of cultural, nutritional, economic and spiritual reasons. For these species and the people who rely on them, the Last Ice Area is a source of hope in a changing climate—but at this point, it's not clear what we can expect from the area.

LONG-LASTING SEA ICE HOLDS PROMISE

Largely covered by thick, multi-year ice, the Last Ice Area is located along the margin of the North American and Greenlandic Arctic Basins.[2] It is considered one of the most important refuges for many ice-dependent marine mammals because its sea ice cover is expected to endure through the 21st century.[3] Scientists expect it to be one of the last places in the Arctic that can support marine species that need sea ice to survive.

In general, warming in regions of the continental shelf that were once covered in multi-year ice may initially support the ocean's ability to sustain life because the sun can more easily penetrate the thinner annual ice, fuelling the plant and algae blooms that are at the base of the marine food web.[4] In addition, thinner, more mobile sea ice can change the frequency and size of open water areas like polynyas, which attract marine mammals. In Kane Basin, an area that once had a substantial amount of multi-year ice, these changes initially provided more productive and suitable habitat for polar bears and have so far offered them transient benefits.[5]

But there are some significant unknowns when it comes to determining whether the Last Ice Area will support viable populations of polar bears. Foremost among these are the persistence and resilience of summer sea ice in the region as well as the future productivity of the ecosystem. Both of these factors will influence the availability and density of ice seals—the bears' primary prey—because the accessibility of seal pups is critically important to the bears' springtime foraging success.[6]

Areas where seals breed generally have annual ice over the continental shelf, ice edge features, or polynyas[7]—so if these habitats occur more frequently and remain available in the Last Ice Area, then the region may be able to support polar bears. Currently, polar bears are distributed around the Last Ice Area in North and Northeast Greenland (where they are part of the East Greenland subpopulation), in Kane Basin between North Greenland and Canada, in Norwegian Bay, and in the Arctic Basin.

A FUTURE REFUGE FOR POLAR BEARS?

Despite some of these encouraging possibilities, uncertainty about the long-term stability of the sea ice in the Last Ice Area brings its role as a refuge into question. Recent research suggests the area is losing ice mass at twice the rate of the Arctic Ocean.[8] Other studies suggest the Last Ice Area is experiencing long-term sea ice thinning.[9] It is critical that future scientific work quantify the area's resilience.

For now, few to no primary data are available on the distribution, density or movements of marine mammals in the Last Ice Area. To assess how species might use the area in the future, scientific studies have had to make assumptions about habitat requirements based on knowledge gleaned from other northern areas. However, this is challenging because the seasonal cycle (the timing of ice break-up) in the Last Ice Area takes place quite a bit later than in more southerly areas.

In the future, dedicated Last Ice Area research could collect the data that we critically need to predict the future. These programmes could include repeated aerial surveys to assess changes in the abundance and distribution of marine mammals as well as marking or tagging programmes to assess the movements and life histories of individual animals. Ideally, these programmes would be combined with studies of sea ice and snow. This information could give scientists a useful benchmark for comparing the data that will be collected in future decades, and allow them to quantify and understand change.

Map credit: Kettil Berger, kettil.berger@imform.no

1. Laidre et al. 2008.
2. WWF 2018, Moore et al., 2019.
3. Derocher et al., 2004, Hamilton et al., 2014, Laidre et al., 2015.
4. Arrigo et al., 2012; 2014, Mundy 2009; 2014, Assmy et al., 2017.
5. Laidre et al., 2020.
6. Stirling 2002.
7. Stirling 1997.
8. Moore et al., 2019.
9. Schweiger et al. 2021


Photo credit: Tiina Ilkonen.

KRISTIN LAIDRE is a scientist at the University of Washington in the US who studies the ecology and population dynamics of Arctic marine mammals, including the impacts of climate change.

The Last Ice Area is considered one of the most important refuges for many ice-dependent marine mammals because its sea ice cover is expected to endure through the 21st century.

Looking west along the northern coast of Greenland.

Photo credit: Kristin Laidre.

Polar bear research

MARKUS DYCK: REMEMBERING AN ICON

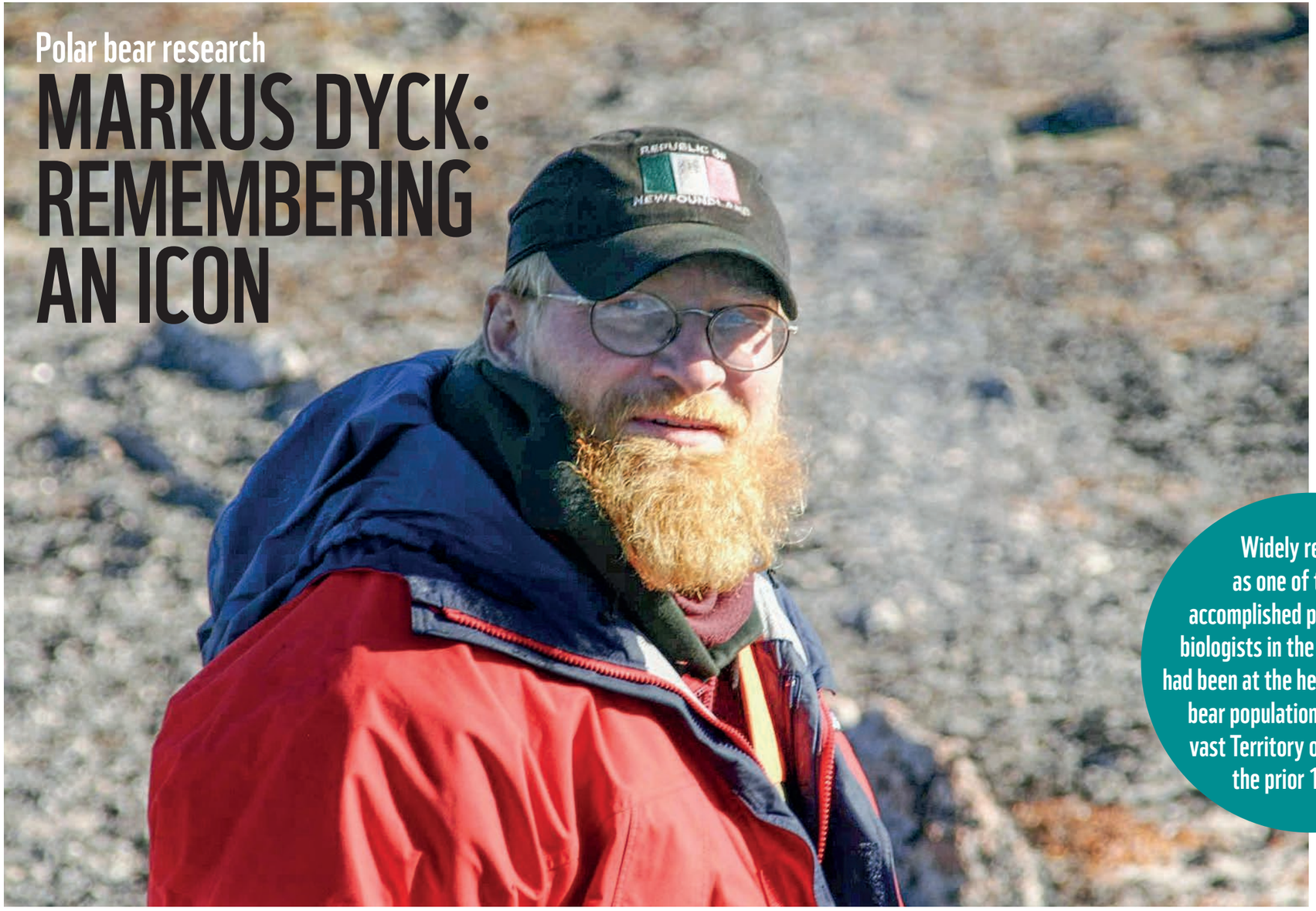


Photo credit Lily Peacock

Photo credit: Steve Peacock

Marcus Dyck and Lily Peacock work together to tag bears. The orange dots on the bears' backs ensure the researchers won't catch them again in the near future.

As a graduate student in Canada coming up in the polar bear world over a decade ago, Markus Dyck loomed large. He seemed to be an author on every polar bear paper coming out of the northern Territory of Nunavut—and eventually, he was appointed senior polar bear biologist for the Government of Nunavut. As **BRANDON LAFOREST** recalls, his name carried an almost folkloric reputation.

BY THE TIME I met Markus, it was like meeting a celebrity—or maybe Big Foot, or something in between.

Tragically, Markus lost his life in a helicopter crash on April 25, 2021, near the community of Resolute Bay while conducting a population survey of the Lancaster Sound polar bear subpopulation. Two flight crew members also lost their lives that day.

Widely regarded as one of the most accomplished polar bear field biologists in the world, Markus had been at the helm of every polar bear population survey in the vast Territory of Nunavut for the prior 10 years. He logged countless hours flying the surveys and consulting with affected communities before and after any work took place. A scientist by training, he was known across the country for his respect for the Inuit communities he worked in and for advocating for the incorporation of Inuit knowledge in polar bear management.

Widely regarded as one of the most accomplished polar bear field biologists in the world, Markus had been at the helm of every polar bear population survey in the vast Territory of Nunavut for the prior 10 years.

A celebration of his life was held on August 31, 2023, in Iqaluit, the capital city of Nunavut. Friends gathered in person and virtually to share stories and bid him a final farewell. Markus had explicitly asked that in the event of his death, no such gathering occur. But much like my decision to write this article and honour the man who contributed so much to polar bear management in Canada, Markus' best friend explained that when your death garners international media attention, your life must be publicly celebrated.

Markus was a long-time WWF collaborator, a friend to many on our staff, and we considered him an extended part of our WWF family. I'm proud to say that over the years, his polar bear research in Nunavut was supported in part by WWF, including WWF–Canada's Arctic Species Conservation Fund.

In 2016, WWF–UK's chief polar advisor, Rod Downie, joined Markus in the field for a memorable survey of the M'Clintock Channel subpopulation. I knew Rod would be in good hands in the field with Markus, but I also knew from others that Markus had high expectations of anyone assisting him. Rod returned with a reverence for Markus and his work ethic. He described him affectionately as a "rough diamond"—an apt description for a man who left an impression on everyone who met him.

Personally, I always admired his calm, cool and collected approach to the sometimes-charged issue of polar bear conservation. When Markus spoke, everyone listened, and I can recall many meetings where he was the voice of reason.

I spoke to Markus on the phone a few days before he left for the field in April 2021. There was nothing special about the conversation. We discussed logistics, reporting, timelines. We all understand the risks of polar bear fieldwork, but it doesn't prepare you for the worst.

Markus' contributions to polar bear management in Canada and internationally have been immense, and we all owe him a true debt of gratitude. We miss him dearly. ●

BRANDON LAFOREST is lead specialist, Arctic Conservation, with WWF–Canada.

THE BACK PAGE

Photo credit: Anders Beer Wilse, public domain

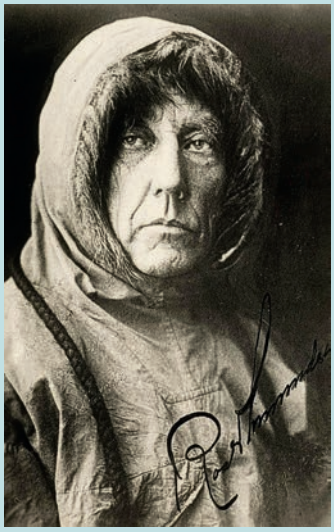


Photo credit: Public domain

Celebrating the life of Roald Amundsen

This year marks 150 years since the Norwegian polar explorer Roald Amundsen was born. From 1903 to 1906, he was the first explorer to sail through the Northwest Passage aboard his ship, *Gjøa*. He was also the first to reach the South Pole in 1911 and the first to take a trans-Arctic flight across the North Pole. His life came to a tragic end in 1928, when he died in a plane crash over the Arctic Ocean while searching for survivors of a lost airship.