INSIDE: Maternal Den Study | Ringed Seals and Sea Ice | The Paris Climate Talks

Tundra Times

The Annual Newsmagazine of Polar Bears International

Fall 2016

The Future for Polar Bears

HUMAN–POLAR BEAR CONFLICTS | POLAR BEAR RESEARCH | INDIGENOUS LENS

A Changing Arctic

Polar bears, seals, and northern peoples. They're all connected with each other—and they're all experiencing a changing world.

Sea ice is a vital part of the Arctic ecosystem, but as global temperatures rise and the sea ice retreats, age-old patterns are being disrupted for wildlife and indigenous cultures, with impacts that reach far beyond the circumpolar North.

This issue of Tundra Times explores the changes taking place across the Arctic, along with the work we're doing to sustain this threatened ecosystem.

Scientist Ian Stirling takes you onto the sea ice to discover the ringed seal's world and the impact of warmer springs on the seal pupping season (and what this means for polar bears).

Indigenous people from Greenland to Nunavut and Alaska share perspectives on a warming Arctic and the impacts on their lifestyles.

And our senior director of conservation, Geoff York, delves into efforts to reduce conflicts as more polar bears are driven ashore in more places as the sea ice retreats.

We also focus on polar bear research in Svalbard and share insights from fifteen years of polar bear den studies. And we shine a spotlight on our work with youth, the conservationists of the future, and the hope they bring.

And, finally, last year's tear-out sheets proved so popular that we've created a new set for this year: beautiful postcards and an educational sheet for kids on polar bear adaptations.

From polar bears to seals to northern peoples: We hope you enjoy this issue and will continue to be inspired to join us in conserving this remarkable part of the world that the polar bear calls home.

Krista Wright

Krista Wright
Executive Director

PBI's mission is to conserve polar bears and the sea ice they depend on. Through media, science, and advocacy, we work to inspire people to care about the Arctic, the threats to its future, and the connection between this remote region and our global climate.

Inside

3

4

6

8

10

12

14

16

Cover photo:
Daniel J. Cox | NaturalExposures.com

Dan generously allows PBI use of his award-winning images free of charge.

✂ cut between cards >

✂ cut between cards >

JOIN OUR EMAIL LIST

BECOME PART OF A COMMUNITY COMMITTED TO CONSERVING POLAR BEARS

First Name: _____

Last Name: _____

Email: _____

Country: _____

photo © Daniel J. Cox/NaturalExposures.com

place stamp here

POLAR BEARS INTERNATIONAL
PO BOX 3008
BOZEMAN, MT 59772
USA

< ✂ cut between cards

JOIN OUR EMAIL LIST

BECOME PART OF A COMMUNITY COMMITTED TO CONSERVING POLAR BEARS

First Name: _____

Last Name: _____

Email: _____

Country: _____

photo © Daniel J. Cox/NaturalExposures.com

place stamp here

POLAR BEARS INTERNATIONAL
PO BOX 3008
BOZEMAN, MT 59772
USA

< ✂ cut between cards

JOIN OUR EMAIL LIST

BECOME PART OF A COMMUNITY COMMITTED TO CONSERVING POLAR BEARS

First Name: _____

Last Name: _____

Email: _____

Country: _____

photo © Daniel J. Cox/NaturalExposures.com

place stamp here

POLAR BEARS INTERNATIONAL
PO BOX 3008
BOZEMAN, MT 59772
USA

The Future for Polar Bears

What does it mean for polar bears and the Arctic if we meet or exceed the Paris Agreement goals?

By Dr. Steven C. Amstrup

Last December at the Paris climate talks, world leaders agreed to a goal of holding the average global temperature increase below 2° Celsius (3.6° Fahrenheit) and to pursue efforts to limit the increase to 1.5° Celsius above preindustrial levels. Achieving this ambitious goal would prevent Arctic sea ice from disappearing and assure the survival of polar bears across much of their current range. It would also provide a better future for the rest of life on Earth, including humans.

But can we achieve such a target? The answer is definitely YES! Scientists have concluded it is physically possible to achieve the goal set in Paris. Because we have waited so long, however, we must act boldly and move fast.

Unfortunately, the goal set in Paris cannot be achieved by the greenhouse gas reduction pledges made at the climate summit. These commitments—Intended Nationally Determined Contributions or INDCs—do not come close to putting us where we need to be. In fact, if we rely on these pledges alone, we are likely to exceed the 1.5° C threshold between 2030 and 2045, with much more warming in store by century's end.

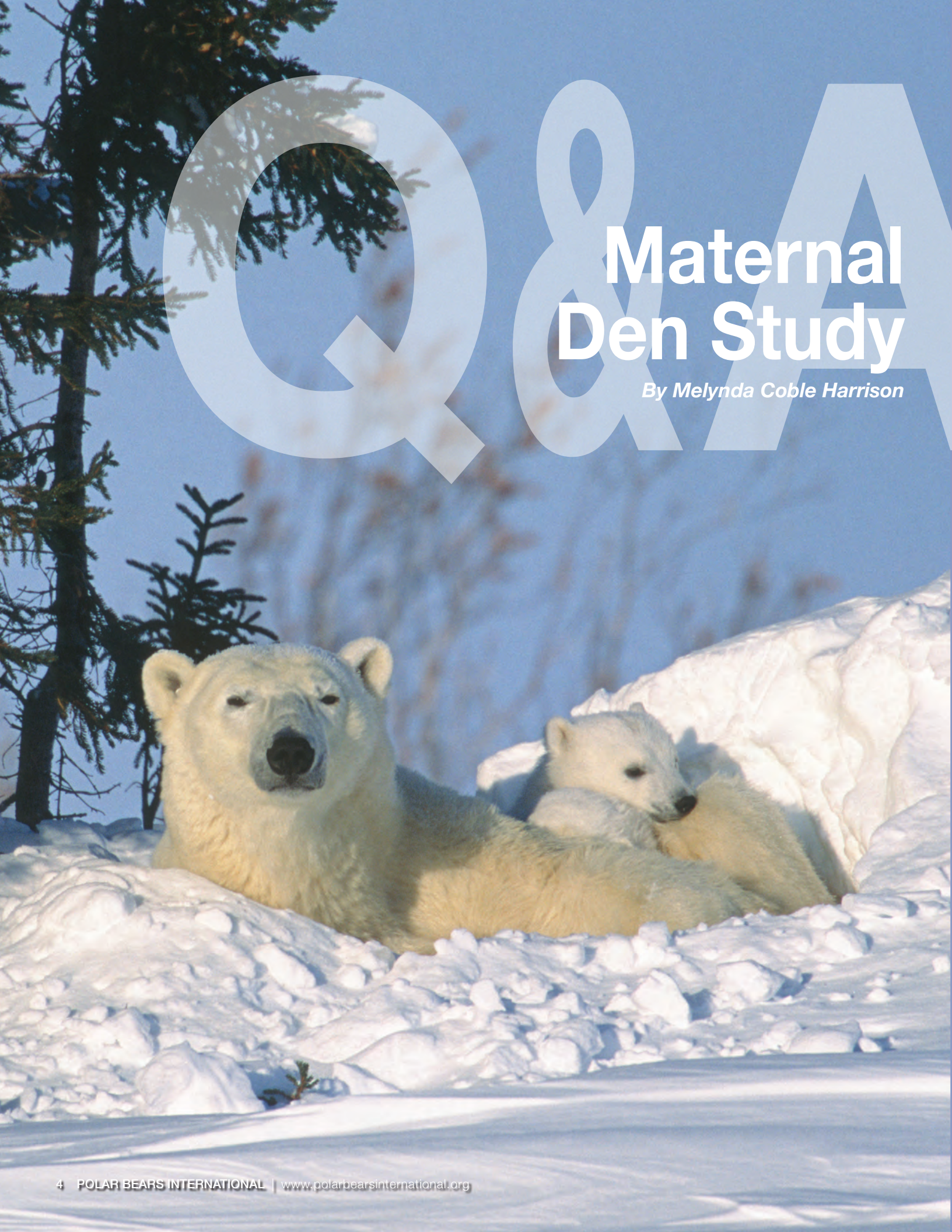
Although historic, the INDCs are voluntary and suffer the same flaw as past voluntary actions—they cannot get us onto the right emissions path fast enough to avoid dangerous climate change. Yet our policy leaders and most citizens are loathe to have the government tell us how much we can drive, where we must set our thermostats, or otherwise intervene in our lives.

The solution to this quandary and the key to turning the physically possible into reality is a price on carbon emissions. If government did *just one thing*—establish a fair price for carbon emissions—the free markets of the world could sort out the rest. A price on carbon would eliminate current subsidies on fossil fuels and level the playing field for all energy sources. It would make renewable energy more competitive, cover the costs of new technologies, and create a multitude of jobs.

The actions we take in the next few years are critical for getting us on the right path. Now is the time to push our policy leaders to establish a fair price on carbon. At PBI, we are working diligently to get the word out. We and the polar bears thank you in advance for your help in doing so. We also thank you, as you go to the polls, for voting with polar bears and the earth's climate in mind.

Dr. Steven C. Amstrup is the chief scientist at Polar Bears International and was the Polar Bear Project Leader at the U.S. Geological Survey in Alaska for 30 years. In 2012, he was awarded the Indianapolis Prize, considered the Nobel Prize of animal conservation.

photo © Daniel J. Cox/NaturalExposures.com



Q&A Maternal Den Study

By Melynda Coble Harrison

How sensitive are polar bears to disturbances outside their dens on Alaska's North Slope? This is the question the U.S. Geological Survey was tasked with in 2000. Oil and gas companies were ramping up oil extraction, building ice roads in new areas, and bringing in workers—yet no one knew how that affected polar bears and their newborn cubs.

Dr. Steven Amstrup and Geoff York, both working for the USGS at the time and PBI now, helped design a maternal den study to better understand:

- When polar bears typically emerge from their dens with cubs
- How long families stay at the den site before heading to the sea ice to hunt seals
- How sensitive to disturbances denning polar bears may be

Over the past 16 years, this research has evolved to include several partners and has given us a broader picture of denning behavior, which is increasingly important as oil activity spikes and the sea ice shrinks.

We checked in with some of the Maternal Den Study crew from PBI and Brigham Young University to see what's changed since the start of the study, what lessons we've learned, and what's next.

Q: Where and when did the idea for the study originate?

A: Dr. Steven Amstrup, PBI Chief Scientist: While leading a study to test whether polar bear dens could be reliably detected by airborne infrared viewers, I realized we could collect on-the-ground observations of bears as they emerged from their dens—dens we had located via infrared or otherwise. Some observed dens were very close to oilfield infrastructure while others were in untrammeled areas. We thought this was a great opportunity to understand the behaviors of bears as they emerged from their dens in the spring as well as to document responses to various human disturbances.

As it turned out, the measurement of responses to disturbances has not been as feasible as we hoped (for logistical and regulatory reasons), but the opportunity to monitor behaviors still presented the possibility of new information.

We brought Dr. Tom Smith into the study (who also worked for USGS at the time) because of his prior experiences and knowledge in behavioral studies of other bears.

Q: What do you remember about the early days of watching polar bears from tents?

A: Dr. Tom Smith, Brigham Young University: It was painfully cold and difficult just to maintain a warm environment in which to spend a lot of hours and make observations. The Arctic is not a place one just "stands around" lest you freeze in place, but that's exactly what a study like this required at the time. Quite a challenge; the bears were the least of my concerns.

Q: How has the technology used in the study changed?

A: BJ Kirschhoffer, PBI Director of Field Operations: We've gone from watching the bears with spotting scopes and binoculars to using incredibly sophisticated remote camera systems. We started with video cameras, then switched to early digital, and are now using 4K digital media. People don't have to camp out on the sea ice watching for polar bears that rarely come out of their dens. As a bonus, the 4K digital can be used for research and outreach—it's really good footage.

Q: How has the field season changed over the course of the study?

A: BJ: Initially we had to replace the batteries in the cameras every seven days, so we had to be there for seven or eight weeks. With wireless technology, we can talk to and see the cameras from anywhere in the world a network exists. Now we deploy the cameras in less than a week and come back at the end of the season to recover units in three to four days.

Q: Does the study bother the bears; is it invasive?

A: Tom: This is a very non-invasive study with next to no interaction with bears. We snowmobile to their den location, set up a camera system, then leave, only to return well after the bears have left their den. We don't see them or interact with them.

continued on page 18

Melynda Coble Harrison is a freelance writer and PBI's social media manager.

Ringed Seals and Sea Ice

By Dr. Ian Stirling

It is not surprising that most people first think of polar bears when contemplating the rapidly disappearing sea ice in the Arctic due to man-made climate warming. The reasoning is both straightforward and logical. Even children in elementary school know that polar bears find it difficult to catch seals in the open water, so they depend on the presence of sea ice as a platform from which to more easily hunt them.

Consequently, as the sea ice breakup comes earlier and earlier, while freeze-up gets progressively later, the open water period through which the bears have to survive on their stored fat reserves, without being able to catch more seals, gets longer and longer. In the Barents Sea around Svalbard for example, the number of ice-free days per year is now increasing at the staggering rate of 65 days per decade. The negative effects of sea ice loss because of climate warming on some populations of polar bears, such as those in Western Hudson Bay and the Southern Beaufort Sea, are clear and have been well documented. But, what about the ringed seal—the polar bear's most important food source—in a steadily warming Arctic?

Many people assume that as long as sea ice is present during part of the year, there will be lots of seals; and, if the polar bears have a platform to hunt from, everything will be fine. But could it really be that simple? Our knowledge of the status of most seal populations in the Arctic, but especially the all-important ringed seal, is rudimentary at best. However, we do know enough about the breeding ecology of ringed seals, the primary prey species of polar bears, to clearly identify some huge concerns. In fact, it is abundantly clear that the negative effects of climate warming on ringed seals in much of the Arctic are already dramatic. Ultimately, what happens to ringed seals is the most important single factor in how climate and the loss of sea ice impact the polar bear.

Throughout the winter and spring, ringed seals live beneath the solidly frozen ice along the coastlines and in the bays throughout the Arctic. They self-maintain their breathing holes by scratching the re-freezing sea ice with the claws on their fore flippers. In fact, each seal maintains several holes so that, if a polar bear discovers one, the occupant may be able to escape and breathe safely at a different one.

> Ringed seals and the polar bears that depend on them now face a severe and increasing new threat, directly resulting from climate warming.

In about early April in most areas, pregnant female ringed seals give birth to their pups in small birth lairs; they dig these in snowdrifts that form over their breathing holes during winter (Figure 1). In prime ringed seal breeding habitat, under normal conditions, the hard wind-blown snow over the birth lair provides a thick protective lair over the pup inside (Figure 2). (To understand how incredibly important that protective snow cover is to a birth lair, compare Figure 2 with Figures 4 and 5!) Such a lair hides the seals from hunting bears and provides protection from the cold to the tiny pup while it begins to accumulate a protective layer of fat from its mother's rich milk. At birth,

Dr. Ian Stirling is a research scientist emeritus with Environment Canada and an adjunct professor with the Department of Biological Sciences, University of Alberta.

FIGURE 1. Example of a perfect snowdrift for concealing a ringed seal birth lair and protecting the occupant.

FIGURE 2. Digging out an abandoned ringed seal birth lair illustrates the protection provided by a layer of hard wind-blown snow.

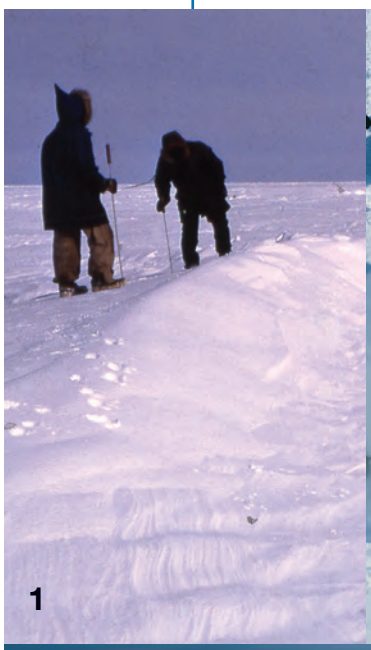
FIGURE 3. A fat female ringed seal and her newborn pup lie exposed on the sea ice in Svalbard after the roof of her birth lair collapsed.

FIGURE 4. Newborn whitecoat ringed seal pup killed by a polar bear but not eaten because it has not yet accumulated any fat.

FIGURE 5. A dead newborn ringed seal pup lies on the sea ice beside where its birth lair was washed away by unseasonably early rain.

FIGURE 6 *(inset previous page)*. A newborn ringed seal is vulnerable to predators on the sea ice after its birth lair was washed away by rain.

(Figure 3 © Mats Forsberg; all others © Ian Stirling)



the pups weigh only 4-5 kg (10+ lb) and have little body fat. However, by the time they are weaned at the age of about six weeks, they may weigh more than 20 kg (40-45 lb), of which 50% or more is fat.

Because of that fat, the most important time of the whole year for polar bears to feed is spring—from the time the pups first start to fatten up inside their birth lairs, through the period of melting and disappearance of the lairs, to the eventual breakup of the ice in early summer. During that period, the abundance of newly weaned ringed seal pups represents the biggest accessible source of fat for most hunting bears at any time during the entire year. Also, because the young seals are less experienced at avoiding predators than older ones, they are more vulnerable to predation. Thus, during that critical feeding period from late spring through early summer, most bears may accumulate up to two-thirds or so of the energy they will require throughout the entire year.

The critical importance of ringed seal pups to the reproductive success of polar bears was dramatically confirmed in the southern Beaufort Sea in the mid-1970s and again in the 1980s. In both decades, following an almost complete reproductive failure of ringed seals from natural causes, there was an immediate large-scale reduction in both the production and survival of polar bear cubs. The

continued on page 19

RESOLVING HUMAN-POLAR BEAR CONFLICT

by Geoff York

Compared to many bear species, polar bears are relatively well studied, still occur across much of their historic range, and are relatively abundant for a large predator—at least for now. Historically, they also had another important advantage: they spent most of their time on the sea ice, far from most human activity, reducing chances for conflict.

Unlike the brown bear in North America and Europe, or the sloth bear in India, contact and conflict with people occurred at a low and consistent rate for generations of polar bears and indigenous peoples. But the times, as the great Bob Dylan sang, they are a changing—and for the Arctic, more rapidly than either polar bears or people have ever experienced.

People who live, work, and recreate across the Arctic appear to be encountering polar bears with more frequency and in places where polar bears were either rare or completely absent.

People who live, work, and recreate across the Arctic appear to be encountering polar bears with more frequency and in places where polar bears were either rare or completely absent. Recent research from Dr. Karyn Rode at the USGS and others confirms that the bears are indeed spending more time ashore and in larger numbers than during recent history—at least in some regions.

As summer sea ice continues its rapid trend downwards in both area and thickness, more polar bears will be forced to decide: Do I stay on the sea ice as it melts ever farther from shore and productive waters, or do I come ashore? Loss of sea ice is also opening the Arctic to increased human use. This creates a perfect environment for increased conflict, which often has negative outcomes for both people and polar bears.

While we are not yet to the point, from a population ecology perspective at least, where every bear matters, evidence suggests we are quickly moving in that direction, in some regions sooner than others. In areas where polar bears are still harvested for food, every polar bear does matter. Bears killed in conflict generally count towards established quotas, diminishing opportunities for people to hunt. Front line managers also worry about a time in the not so

distant future when a series of bad sea ice years places a large number of food-deprived bears all too close to communities. What then?

We know from wildlife efforts around the world that successful conservation relies heavily on the people who live and work in those shared habitats, especially for predators and large mammals. We talk a lot about the ecological carrying capacity of a given species or habitat, but all too rarely do we talk about the *social carrying capacity*—that is, the tolerance of the people who share that space with a given species. It's very easy to "save the polar bear," but quite another thing to live with polar bears in your backyard—where your children play.

Successful conservation requires a strong tolerance for living with a given species. One way to build that tolerance is to ensure that people who live and work in polar bear country have the information and tools they need to keep themselves and their families safe. A key part of this effort is to reduce negative interactions between people and polar bears and minimize potential conflict.

To fulfill our mission at PBI, we understand the need to work both on the pressing conservation needs of today, like conflict, while also doing our part to address the enduring threat of habitat loss. Polar bears need us to be successful as we address both immediate and longer-term threats. That's why PBI supports my time and efforts to chair the Range States Conflict Working Group and why we are focusing some of our resources on community level efforts like the recent Hudson Bay Front Line Operators Workshop on conflict reduction.

Creating safe communities while supporting efforts to keep both visiting workers and tourists safe will directly benefit polar bears today while building critical tolerance for this amazing, but potentially dangerous species. What I love most about these efforts is that they truly require action and effort from everyone in the Arctic—communities, industry, scientists, managers, and visitors. Efforts to date have been both grassroots, like the well-known Umky Patrol in Russia, and top down, like the excellent work being done by Manitoba and Nunavut in Canada, the North Slope Borough in Alaska, and Sysselmannen in Norway.

Geoff York is PBI's senior director of conservation. He has worked with polar bears and Arctic issues for more than 20 years.

Indigenous Lens

photo © Robert Thorpe

"Climate change, global warming is real in the Arctic. It's displacing us, confusing, disturbing, and very sad. There are a lot of fires and there's a lot of erosion—we're losing lands."

~ Sarah James, Gwich'in Native, Arctic Village, Alaska

"Our distinct way of life as Inuit is threatened. The world as we have come to understand it is changing before our eyes. Entire communities are at risk and may have to be relocated, and traditional methods of acquiring food are getting more and more uncertain. Now more than ever, we need to be resilient just as our elders have been."

~ Robert Comeau, Iqaluit, Nunavut

photo © Robert Comeau

photo ©Robert Thorpe

Therkel Larsen, Ilimanaq, Greenland

background photo © Daniel J. Cox/NaturalExposures.com

Native people in the Far North have depended on sea ice and a life tied to the land and sea for thousands of years. But climate change threatens that way of life, disrupting age-old traditions and cultures across the Arctic.

"[Arctic warming] is changing a lot of the scheduled seasons we have … like when it's time to go goose hunting, whaling, and fishing, and when to prepare the food that we process outside."

~ Nora Jane Adams, Barrow, Alaska

photo © Daniel J. Cox/NaturalExposures.com

photo ©Robert Thorpe

"If you come to my country, you will see how beautiful it is and that the people still hunt and fish. But how long will this exist? The ecosystem is threatened by global warming. Things are changing, and not for the good."

~ Dorthea Berthelsen, Ilulissat, Greenland

The Paris Climate Talks and Beyond

By Gerrit Wesselink

The Arctic is changing and the whole world is changing—there's no longer any doubt. Sea ice during the warmest part of the year has gotten smaller, impacting polar bears, other Arctic wildlife, and indigenous people, too.

As director of the Youth Arctic Coalition, I'm keenly aware of the changes taking place in the Arctic. And I'm alarmed that those changes are happening at a faster rate than anywhere else in the world, with more predicted to come.

That's why it has been gratifying to join forces with Polar Bears International and the youth organization, TakingITGlobal, to work on climate change. Along with two colleagues from YAC, I represented all three organizations at last December's Paris climate talks.

Thanks to people around the globe speaking up and demanding action, world leaders have finally started to get serious about the need to address climate change. Strong public support helped pave the way to success at the Paris talks, giving leaders incentive to come together on a meaningful climate agreement.

My hope going into Paris was that we would forge an agreement to limit climate warming to less than two degrees Celsius (which represents a change of almost six degrees in the northern regions). I quickly realized that attaining that goal would be a tedious exercise, with negotiators working around the clock to bring 195 countries into agreement. On the last day, after working long into the morning, participating nations finally reached the Paris Agreement. A record number of nations later signed the document on April 22nd at U.N. Headquarters in New York City.

The Paris Agreement is a key step forward in limiting the impact we have on our planet. It set the

Strong public support helped pave the way to success at the Paris talks, giving leaders incentive to come together on a meaningful climate agreement.

French President François Hollande, right, joined hands in victory at the end of the Paris summit. "You've done it!" he told delegates.

ambitious goal of limiting global temperature rise to 1.5 degrees—which would greatly slow some of the changes in the Arctic region. The Agreement acknowledges indigenous rights and human rights in general. It also recognizes that a warming climate has profound impacts around the globe.

At the Paris talks, I was especially encouraged by the presence of indigenous peoples from around the world. They worked tirelessly to make sure their voices were heard during the entire process. One afternoon, I attended a traditional Saami friendship stone ceremony in front of Notre Dame Cathedral. I watched as the Saami—indigenous people from Arctic Europe—gifted a stone to indigenous Samoans from the South Pacific to show their two futures are intricately connected. I believe the success of the Paris Agreement depends on our ability to see our climate issues as global issues, and our solutions as global solutions.

A lot of work remains to be done, and the Agreement includes a number of processes to make these happen:

A clock made of ice chunks from Greenland melted in front of the Pantheon Paris during the climate summit.

- First, it includes a system for reviewing the goals set by each country every five years, giving us the chance to measure how far we've come.
- Second, nations are developing procedures to deal with loss and damage caused by climate change—an especially crucial component in coming decades.

The image of a polar bear looking for sea ice to hunt has long been one of the strongest symbols of climate change. We often forget that Inuit hunters also depend on the sea ice for food and clothing. Do we consider access to traditional foods, or changes in culture and traditions, or the loss of generations-old traditional knowledge, in our calculations of loss and damage? And what about communities like Shishmaref in Alaska, set on a bank slowly eroding into the ocean? How will we help climate refugees like these?

A failure to act on the changes we see in the Arctic, and around the world, infringes on those same human and indigenous rights acknowledged in the Agreement.

We still have a long way to go, but the Paris talks were an important first step. Next year, the Youth Arctic Coalition plans to work to encourage nations to recognize that loss and damage can mean more than just the loss of infrastructure—it can also mean the loss of culture and community.

I believe that climate change is the biggest issue that humanity will face in the coming century. This makes it all the more important that we keep the best interests of polar bears, other wildlife, and humans at heart as we define procedures and work together on solutions.

Demonstrators in Paris unfurled red banners to highlight the red lines negotiators should not cross.

Gerrit Wesselink is the executive director of the Youth Arctic Coalition. He is passionate about northern communities and working with people from around the Arctic.

all photos © CJ Carter

Cultivating a Stewardship Ethic in Youth

By Madison Stevens

Madison Stevens has worked with PBI on outreach and education projects since 2011. During this year's Wapusk Leadership Camp she acted as a facilitator and videographer, drawing on previous work and volunteer experience with youth on climate change and environmental awareness initiatives around the world.

Summer in the subarctic has none of the balmy regularity of southern latitudes. Despite abundant daylight, conditions can change drastically in the span of a few hours, from bluebird skies to fog dense enough to shroud a polar bear as it ambles over a nearby ridge.

Wapusk National Park, a vast expanse of peat wetland and boreal forest along Hudson Bay in Manitoba, is best known as a polar bear denning site. Yet the park also hosts other flora and fauna. In June, the tundra is strewn with wildflowers and teems with wildlife including caribou, geese, and arctic foxes, while the nearby Churchill River attracts thousands of migrating beluga whales.

Due to its remoteness, Wapusk is one of Canada's least visited parks. Yet every summer, it serves as a classroom for a select group of Manitoba youth attending Wapusk Leadership Camp, a Parks Canada program that nurtures leadership skills and environmental awareness. During the camp the students are based at a research station accessible only by helicopter. From there, they spend their days exploring the unique ecosystem surrounding them. This year, PBI and explore.org teamed up with Parks Canada to help facilitate the camp.

"At Parks Canada we often talk about connecting the hearts and minds of Canadians to special places, and what could be more important than connecting with youth?"

Left: Two Wapusk Leadership Camp students catch sight of a herd of caribou. Center: The tundra wildflower bloom is in full swing in mid-June. The research station in the background serves as the students' home for a week. Right: At the mouth of the Churchill River, a pod of curious belugas approaches the Zodiac. Photos © Madison Stevens.

says program director Heather MacLeod. "It's easy to do when we take these kids into special places like Wapusk. By actually getting feet on the ground, they gain experience and find out for themselves why the park is special."

This year, students bundled up in their warmest gear and slept outside in temperatures that hovered around freezing at night and rarely surpassed 5°C (41°F) during daytime hikes. Undaunted, they often paused to lie down on the tundra to examine a patch of lichen or observe a herd of roaming caribou. "One of the things I like about this camp is that it gets people out of their comfort zone and into a new environment," says Parks Canada facilitator Jill Larkin. "Every time I see a student get excited about a new animal or plant it reminds me of when I first saw a polar bear, when I first saw a caribou."

Each encounter is a hands-on opportunity to learn about the tundra and the threats to its stability. "So few people have the pleasure to be in this area," says student Sean Perry, "but the impact that humans have here really demonstrates how fragile the ecosystem is."

Another goal is to connect students—some members of First Nations themselves—with Manitoba's diverse indigenous heritage. "It's interesting to see the land that [my ancestors] might have walked upon and get a taste of how they survived," remarks Antonina Kandurin, a participant from Churchill who belongs to the Swampy Cree nation.

PBI's Programs Manager Marissa Krouse stresses that a focus on Northern communities plays a critical role in our outreach efforts. "What affects polar bears also affects families, the health and economy of people who live in the North," she says. Wapusk National Park continues to be an important seasonal hunting ground for the region's aboriginal people, and these communities are integral to conservation efforts in and around the park.

At PBI, we focus much of our energy on science, pushing the frontiers of polar bear knowledge in order to better plan conservation efforts. But because we recognize that it is also crucial to ensure that people feel invested in developing solutions, we are equally committed to raising awareness through education. According to Marissa, "We often say that this is the first step in conservation action: getting people to care."

In conversations with people from all walks of life about climate change and the challenges it poses to our planet, some of the most astute questions and comments I've received have come from youth. They know they will have to grapple with the effects of climate change and work together to develop solutions. Most of all, they understand that their actions have global impacts. Spending a week in Wapusk with this group of inspiring upcoming leaders, I am confident that this generation is equipped with the conviction and tools to sustain a future for places like Wapusk National Park, for polar bears, and for ourselves.

For more information on Wapusk National Park, visit the Parks Canada website.

Polar Bear Research in

Svalbard

By Dr. Jon Aars

Svalbard is a Norwegian archipelago in the High Arctic, at about 77° to 81° north latitude. Dutch seamen discovered the islands in 1596, and the area's sea mammals were hunted excessively over the next centuries by a variety of European explorers.

Polar bears were not the main target of these early explorers, but as whales and walruses became rare, hunters began seeking the bears for their skins, with a particularly intense effort starting in about 1870. For an entire century, about 300 polar bears were taken per year until they were granted protection in 1973.

Svalbard's polar bears have been studied for a long time, mostly by researchers from the Norwegian Polar Institute, where research programs started in the 1960s. We began a long-term polar bear mark and recapture study in 1987.

This 29-year data series is one of only three long-term studies on polar bears. Furthermore, it is the only one from a population where no hunting occurred during the data collection period. It is thus a very valuable reference study.

Polar bears were granted protection in Svalbard at a time when excessive commercial hunting was thought to be the only significant threat, but things have changed. Pollutants from industrial areas carried in by winds or sea currents build up in the Arctic's food web. Apex predators in some areas of the Arctic now have levels of toxic pollutants high enough to affect their health.

Svalbard's polar bears have some of the highest levels of pollutants recorded. Accordingly, studies on polar bears and toxicology have become an important part of our research program. The most valuable information from these studies may be how different pollutants interact with hormonal systems, and the potential health effects.

The other concern to Svalbard's polar bears is even more serious: Their habitat is shrinking. In some areas where there used to be sea ice much of the year, there is now only occasional ice. The ice edge is moving farther north, which means that bears hunting on the pack ice must often range much farther away from the islands than in the past.

This is an issue because pregnant females depend on reaching the islands to den. The best traditional denning areas in Svalbard are in the eastern part of the archipelago. Polar bear females need to reach these islands in autumn, usually by early November. They dig their dens in drifts on the leeward sides of mountains where snow has accumulated.

What we have seen frequently in recent years is that sea ice does not form in time around these denning areas, and few females reach the islands. Possibly some of these bears now den in Franz Josef Land in the western Russian Arctic or they may skip denning some years—we do not yet know.

Thus, much of our research now focuses on the impact of bad ice years on reproduction. To collect the needed data, we attach small light-and-temperature loggers to the ears of polar bear females. We later recapture the females and recover the loggers to obtain insights into their denning activity. (Inside the den it is almost dark and the temperature remains above freezing even when it is far below zero outside.)

If we recapture a female after five years, we will have five years of her denning history. Females only den when they give birth, so we can use this data to see if bad ice years are followed by a failure to reproduce. The loggers also provide rough locations for the bears. Thus, we can see if they have denned in the Russian Arctic in certain years.

Last year, we surveyed the polar bears in the Norwegian Arctic to estimate the population size. We found it is close to 1,000, but with high uncertainty. The study indicated that despite habitat loss, there is no evidence of a decline, yet. We know that Svalbard's polar bear population grew steadily during the first decades after protection from excessive hunting. This was no surprise: Scientists expected their numbers would reach their former levels, depending on available habitat and prey, before leveling off. But it is encouraging to see that the population may be able to sustain itself in current sea ice conditions.

Polar bears, however, depend on sea ice, and in no other area of the Arctic has the sea ice decline been as fast as here. This trend is predicted to continue. One goal of our monitoring program is to detect the first signs of a population decline at the moment that habitat and prey availability reach a critical threshold. In the meantime, we continue to study different aspects of the polar bear's ecology with the goal of being able to manage the population in the most optimal way in the future.

Dr. Jon Aars is a senior research scientist at the Norwegian Polar Institute. Since 2003, his work has focused on polar bear ecology in Svalbard.

photo © Daniel J. Cox/NaturalExposures.com

Maternal Den Study Q&A

continued from page 5

Q: What are some of the things we have learned in the last 16 years?

Tom: This work has confirmed a few things I already knew about brown/grizzly and black bears:

1) These are very intelligent animals that don't take unnecessary risks nor react inordinately to human activities that are non-invasive and non-threatening. This is good news for Arctic explorers, workers, and others: They are probably not negatively impacting polar bears.

2) I used to think that there were good moms and perhaps not so good moms because, in the bear world, some mothers lose their cubs and others don't. But an alternative, and more likely explanation, rests on what is called residual reproductive value (RRV). A young mom has many more litters yet to bear in her lifetime so she has much more to lose by taking unnecessary risks than an older mother. Rather than risk losing the current cubs and all the unborn ones, a younger mother will bolt and abandon cubs much more quickly than an older one, one who has little to lose.

3) We really know nothing about these bears compared to what there is yet to discover and learn!

Q: Why does it take so long to learn anything from a study like this?

Tom: Long-term studies are important because we are looking at an animal with a long lifespan. If we look at one, two, or five years of a bear's life, we get a very incomplete picture. Polar bears could have low (or high) birth rates for several years in a row, then completely reverse for the following ten years. Polar bears require what we call a longitudinal study, lest we make premature conclusions about them.

Steve: Even with the accessibility provided by the North Slope infrastructure and with the aid of telemetry and infrared surveys, the distribution of dens in northern Alaska is sparse. Of dens located each year, only a few are in locations where we can set up to observe them. So, yearly sample sizes are small. Hence, it takes many years to collect sample sizes that allow meaningful interpretation.

Q: What technology challenges do you see going forward?

BJ: Transportation is on our minds for the first time. We have to snowmobile over sea ice to get to the den sites. Two years ago we saw moving water on the sea ice in January for the first time. As the climate changes we might have to change how we deploy our equipment.

PBI Calendar of Events

Climate Alliance Training
October 2-8, 2016

Project Polar Bear Registration
Early October–late November

Polar Bear Cam
Late October–late November

Polar Bear Week—
Energy Challenge
October 30–November 5, 2016

Northern Lights Cam
November 2016 – March 2017

International Polar Bear Day—
Thermostat Challenge
February 27, 2017

Earth Day—Transportation Challenge
Project Polar Bear Winners Announced
April 22, 2017

Arctic Sea Ice Day
July 15, 2017

Beluga Cam
Late July-August

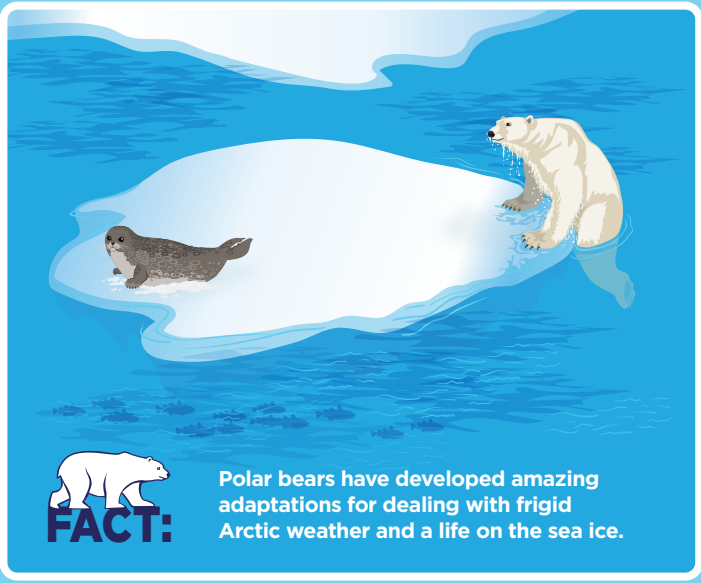
Visit **polarbearsinternational.org**, for details on these events and programs and how you can get involved.

photo © Daniel J. Cox/NaturalExposures.com

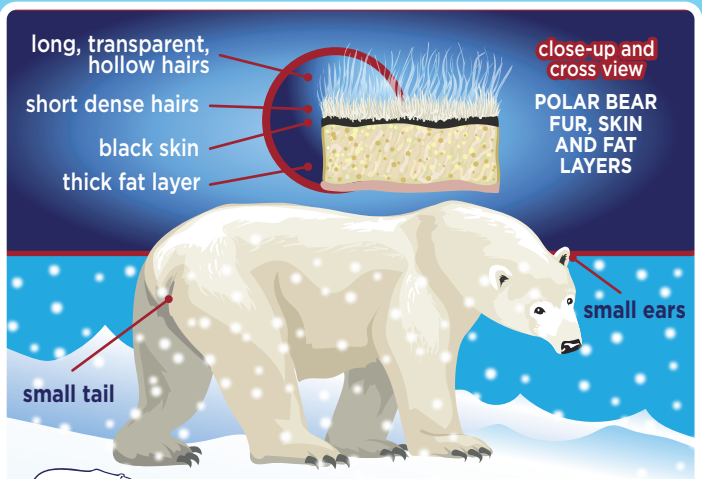
POLAR BEARS INTERNATIONAL

SAVE OUR SEA ICE

www.polarbearsinternational.org



FACT: Polar bears have developed amazing adaptations for dealing with frigid Arctic weather and a life on the sea ice.

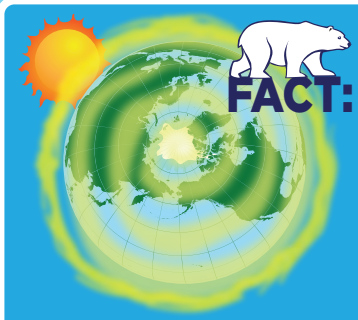


FACT: Two layers of fur and a thick padding of fat help keep polar bears warm, and the polar bear's compact ears and small tail prevent heat loss.

FACT: Small pads on the bottom of the polar bear's paws, called papillae, grip the ice and prevent them from slipping.

The polar bear's curved claws are perfect for gripping seals—and the bears are strong enough to pull a seal from its breathing hole.

FACT: Polar bears rely on sea ice for reaching their seal prey. Hungry bears catch seals at their breathing holes or along ice edges when they come up for air. Without sea ice, polar bears will struggle to survive in many parts of the Arctic. And Arctic sea ice is at risk ...

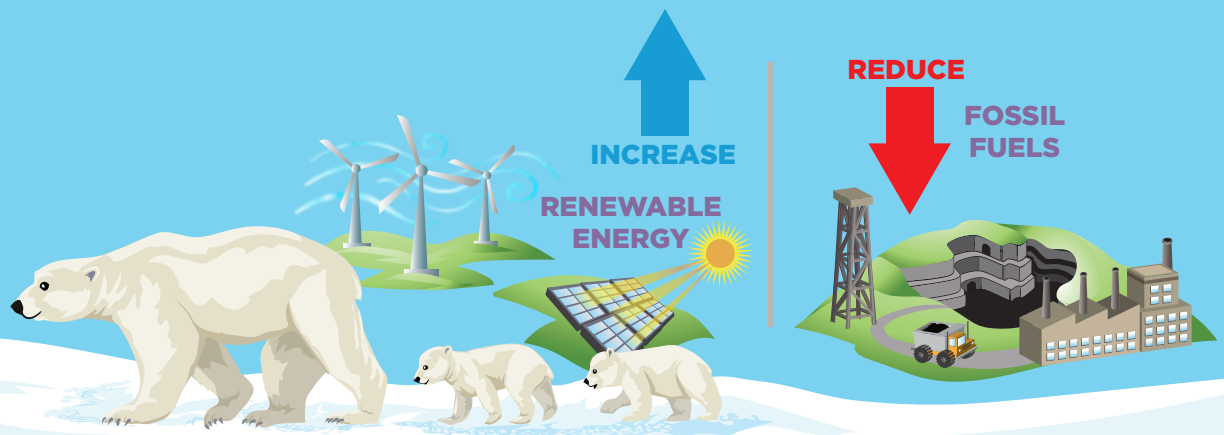


FACT: Gases in the atmosphere act like a blanket trapping heat around Earth. When we burn fossil fuels like coal, oil, and gas, we pump extra CO_2 into the atmosphere, thickening the blanket and disrupting our global climate. Just as a hot summer day melts ice in a glass of water, a warming planet melts Arctic sea ice.

TOGETHER WE CAN REDUCE CO_2

FACT: Sea ice loss from climate change is the single biggest threat to polar bears—and the reason the bears are listed as Vulnerable on the IUCN's Red List of Threatened Species. But we can change that by reducing our use of fossil fuels, helping polar bears and people, too!

POLAR BEARS INTERNATIONAL



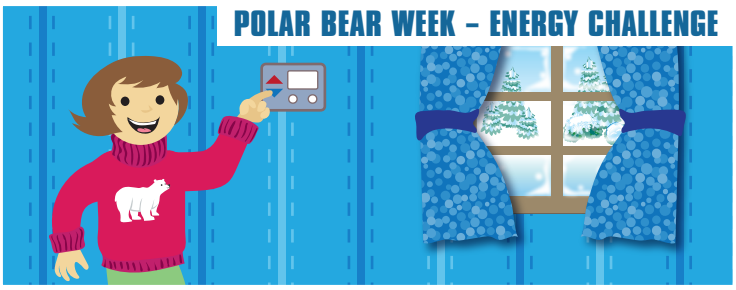
TEAM UP WITH US FOR POLAR BEARS AND THEN TAKE THE NEXT STEP WITH COMMUNITY SOLUTIONS!

The key to getting the climate system back to functioning the way it should and to preserving a future for polar bears across the Arctic is to move away from fossil fuels for energy altogether. In the meantime, we can also take steps to use much, much less of the kinds of energy that add heat-trapping gases to our atmosphere.

HERE'S HOW:

- ☐ **Register for Project Polar Bear in October. With the help of an adult mentor, teams work on community projects to reduce CO_2 and have a chance to win a grant to further their efforts!**
- ☐ **Meet scientists and ask questions during our Tundra Connections webcasts, LIVE from the subarctic tundra in October and November.**
- ☐ **Make your voice heard by VOTING, at the ballot box or in the classroom! Vote for candidates that support action on climate and let your representatives know you support a renewable energy future.**
- ☐ **Participate in PBI's Save our Sea Ice Campaign. It focuses attention on the challenges polar bears face in a warming Arctic and the community-level solutions we can plug into together to stop climate change.**

POLAR BEAR WEEK – ENERGY CHALLENGE



Take our Energy Challenge during Polar Bear Week, first week of November. Reduce energy consumption at your home, with your neighbors, and in your school or workplace:

- Replace light bulbs with LEDs & insulate and weather-strip buildings
- Adjust heating and cooling habits in homes and buildings
- Choose a renewable energy source. If you're in the U.S., visit arcadiapower.com/pbi for information on obtaining clean energy while benefiting PBI—no matter where in the country you live!

INTERNATIONAL POLAR BEAR DAY – THERMOSTAT CHALLENGE

Celebrate International Polar Bear Day with us on February 27th. Take our Thermostat Challenge—and then make it a habit:

- Turn down the heat a degree or two and enjoy hygge, or winter coziness, for polar bears—put on your fuzzy slippers and a comfy sweater, light candles, sip a hot drink, or bundle up for a walk in the snow.
- In summer, set air-conditioning thermostats higher.

EARTH DAY – TRANSPORTATION CHALLENGE

On Earth Day—or starting any day you choose, take our Transportation Challenge:

- Support community solutions that reduce carbon emissions related to transportation—from no-idling zones to bike lanes and public transit options.
- Launch a Bike Commute Challenge or No Idling Zone at your workplace or school.

ARCTIC SEA ICE DAY – CLIMATE ACTION

Join our Arctic Sea Ice Day celebration on July 15th.

- Help raise awareness about sea ice loss in the Arctic, why it matters, and how we can help!
- Let your representatives know you support swift and meaningful action on climate change.

CHECK OUT OUR SUPPORT MATERIALS!

- View our iTunes U collections on polar bears, climate change, and the Arctic ecosystem. *https://itunes.apple.com/ca/institution/polar-bears-international/id458648180*
- Visit our website for pre-made social media memes, educational handouts, and toolkits to help you scale up your actions! *www.polarbearsinternational.org*

Ringed Seals and Sea Ice

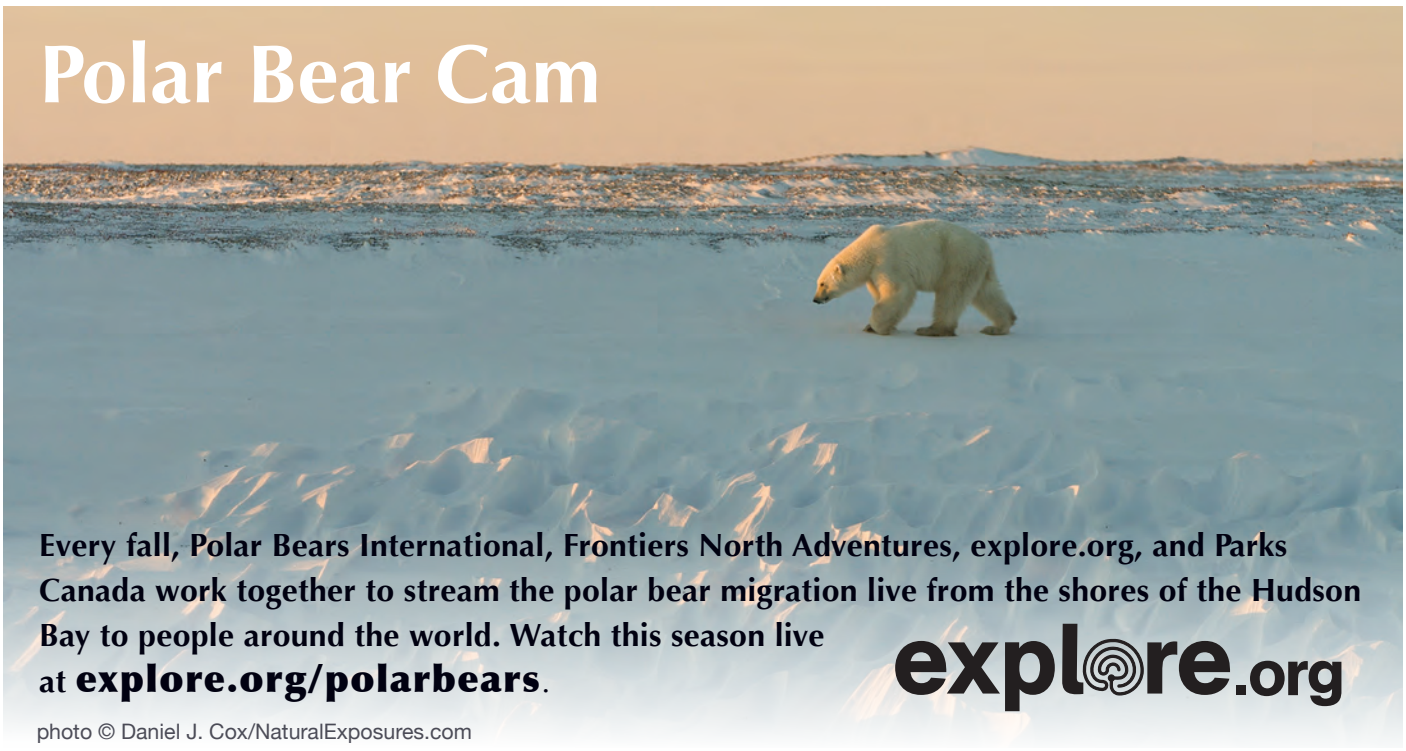
continued from page 7

most important conclusion was that the large supply of fat from ringed seal pups in spring and early summer is the most important single factor in maintaining a large viable population of polar bears.

But ringed seals and the polar bears that depend on them now face a severe and increasing new threat, directly resulting from climate warming. The rapidly warming weather in spring throughout much of the Arctic in recent years makes the protective snow roof of a birth lair more likely to collapse and melt prematurely. When this happens, the newborn pups are exposed to predators on the sea ice before they have had time to accumulate much fat or are mature enough to swim with their mothers to another breathing hole and escape (Figure 3). In such cases, a bear can easily see the large dark-colored adult female from a distance and, if it does, a lethal attack will quickly follow. The adult female ringed seal will desert her pup and flee if a predator approaches, but the oblivious pup will be killed, even though it is of little nutritive value at such a young age. Sometimes such young pups are not even eaten because they don't have enough fat to make it worthwhile to the bear. Similarly, unseasonably early rain, instead of snow, may prevail for long enough to simply wash away a birth lair completely, leaving the pups completely without protection (Figure 5), as a colleague and I witnessed on SE Baffin Island in Canada in 1979. All the birth lairs in the two bays where the rainfall was focused were washed away, leaving the pups exposed on the ice (Figure 6), where most were vulnerable to heavy predation by arctic foxes and polar bears. Sadly, although the bears killed many seal pups, they were of little energetic value because they had not yet lived long enough to accumulate a significant amount of fat from their mothers' rich milk.

At this point, we do not know how extensively or frequently the loss of protective birth lairs for ringed seals is occurring throughout the circumpolar Arctic but some worrisome events have been observed already. For example, in the last two springs, many of the fiords in Svalbard have not frozen early enough to accumulate sufficient snow cover to facilitate construction of safe birth lairs. When that happens, the pups may be born unprotected on the open ice and suffer high mortality rates. Such large-scale problems with ringed seal productivity, and the survival of their pups, are likely already far more widespread than we have been able to document to date. Even so, it is already clear that as the climate continues to warm throughout the Arctic, the potential for large scale, and progressively more widely spread, negative effects of warm weather on ringed seal pupping habitat are increasing.

Clearly, simply having some ice to walk on and hunt from is not enough on its own to ensure the health of polar bear populations.



POLAR BEARS INTERNATIONAL
PO BOX 3008
BOZEMAN, MT 59772
polarbearsinternational.org

NON PROFIT
ORGANIZATION
U.S. POSTAGE
PAID
STONE MOUNTAIN GA
PERMIT NO. 1176

Sustaining a future for polar bears across the Arctic

SFI Certified Fiber Sourcing www.sfiprogram.org

FSC Mixed Sources

Thank You to our Platinum and Gold Sponsors

THE BODY SHOP FOUNDATION

FRONTIERS NORTH ADVENTURES

Quark Expeditions®

Natural Exposures® Daniel J. Cox

CalmAir

CANADA GOOSE®

photo © Daniel J. Cox/NaturalExposures.com

TUNDRA TIMES™ is the annual newsmagazine of Polar Bears International®, a 501 (c)(3) organization. All marks and text appearing in this literature including, but not limited to, Polar Bears International name, logo, and programs are trademarks, registered trademarks, or service marks of Polar Bears International. © 2016 Polar Bears International. All Rights Reserved.

To receive timely email news and updates on polar bears and their Arctic habitat, please complete the *sign-up* form on our website.

We neither sell nor distribute our mailing lists. You can view our complete Privacy Policy on our website.