



## Warming Threatens Caribou During Critical Calving Season

By Emily Stone



*Penn State University biologist Eric Post observes caribou, like this mother and 3- to 4-day old calf, three times during the spring and summer near Kangerlussuaq, Greenland. Post's research has shown that global warming and the resulting change in the timing of plant growth in the breeding grounds has caused the calf mortality rate to increase fourfold in the past 15 years. Photos: Eric Post*

It takes a lot of energy for female caribou to birth and feed their calves. Which is why they've adapted to have their babies during the short period when the arctic plants they eat are at their nutritional peak. But what happens when global warming pushes the plants' schedule ahead a couple weeks and they hit their peak before the caribou start calving?

This is the question biologist Eric Post of Penn State University has set out to study in West Greenland. His results so far indicate that the answer is not good for the caribou. Their calf mortality rate has risen fourfold and the number of calves born has decreased by the same amount since Post started

monitoring the animals in 1993.

Post and his team of three to six researchers travel to a caribou breeding ground near Kangerlussuaq, Greenland, three times during the late spring and summer. They make daily observations of all the plants within 12 permanently marked areas and record the plants' phenology, meaning what stage of growth they're in. The group also uses spotting scopes and binoculars to count the number of adult female caribou and calves in the area.

They have data from seven summers, 1993 and then 2002-2007. During this time, the mean spring temperature at Post's study site has risen 4 degrees Celsius. Post is currently the principal investigator on a [new NSF grant](#) to make the same observations for three more years.

His research showed that plants began growing 14.8 days earlier in 2006 than in 2002. However, the calv-

ing season only started 1.28 days earlier in that same period of time.

"It looks like the caribou are pretty inflexible on when they calve," Post said.

He explained that this discrepancy is due to the fact that plants base their growing season on temperature while the caribous' calving cycle is triggered by length of daylight. And, of course, global warming does not affect the amount of daylight during a Greenland spring.

"There's a very good potential for a gap to develop," Post said. This gap is known as a trophic mismatch.

The effects of the mismatch are already evident in the calf mortality rate and overall decrease in births. The prime window during which female caribou nurse their calves is only 8-10 days long. That is an extremely expensive nutritional period for them, so they



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need all the plant nutrients they can get. But, because so many of the plants have already peaked, the caribou aren't getting enough nutrients for their young.

The caribou near Kangerlussuaq are part of a population of about 40,000, Post said. He usually sees about 500-600 a summer in the area that his team focuses on for study. One of his goals with the new grant is to bring on a new researcher to perform sophisticated statistical analysis on the data and create population models with it. This would help predict what may happen to different caribou populations and other groups of arctic animals that may experience growing trophic mismatch as temperatures rise.

His data is already being used in conjunction with other studies. Toke Thomas Høye, a research scientist at the University of Aarhus in Denmark, has been studying similar timing events for plants, insects and birds in northeast Greenland.

"One of the interesting ways to compare datasets of this kind is to relate the magnitude of the advancements over

time to the latitude of the observations," Høye wrote in an email.

Climate models predict that global warming will cause greater change in higher latitudes, which is borne out in both Høye and Post's research, Høye said. The two co-wrote a 2007 paper for *Current Biology*, in which they analyzed their own and other scientists' data to show that organisms in the high Arctic respond much more strongly to climate change than organisms at lower latitudes do.

Post is hoping to forge more collaborations between himself and his Danish colleagues who have worked in Greenland. This is one of the reasons he is currently doing a one-year residency program at the Danish Ministry of Environment. One of his ideas is to expand his research to include muskox, which use the same calving grounds as Post's caribou. Danish researchers have collected data on muskox in other parts of Greenland, which would provide a good comparison for new muskox studies.

Overall, Post said the trophic mismatch problem for the caribou is one of many caused by human impact, includ-

ing disrupted freeze-thaw cycles, hunting pressure and mineral exploration.

"It's just one more thing that makes it a little harder," he said. ●

*Emily Stone is a freelance writer in Chicago. She is particularly interested in polar science stories.*

## in the media

National Geographic's new television special, [Six Degrees Can Change the World](#) debuted earlier this month. A National Geographic film crew on the special, which is based on a riveting book by Mark Lynas, visited [Koni Steffen](#) up at the Jakobshavn Glacier last summer.

"Not only did we get to do the science but the scenery and the whole thing unfolding was magnificent," says Mathew Sturm about last year's [Barrenlands Traverse](#). He talked with a reporter from the Fairbanks Daily News-Miner in [this story](#) to prepare for a presentation at the University of Alaska's Museum of the North last week. ●



Post examines a caribou carcass near Kangerlussuaq, Greenland, to determine the age, gender and general condition of the animal at its time of death, which helps him track winter mortalities. Photo: Pernille Boving

## field notes

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The 25th Running of the Yukon Quest got underway on February 8th. Photo: Carsten Thies

## alaska

We hear that Fairbanks buzzed (or barked) a little in January as people prepared for the [Yukon Quest](#), perhaps the most rigorous dog-sled race in the world owing to the rugged country through which the trail winds. The race started in Fairbanks early this month. It will end some two weeks and 1,000 miles later in Whitehorse, Yukon (Canada). We checked in with Yukon Quest and discovered that they're celebrating the IPY. Spokeswoman Amanda Leslie writes: "As it is International Polar Year and the 25th Running of the Yukon Quest, we've prepared 1,000 commemorative envelopes with both U.S. and Canadian IPY stamps that will be carried on the trail by the mushers.



Matt Irinaga's son Quinn bundles up in Mom's parka during the Yukon Quest. Photo: Eli Kramer

"With the envelopes, we are celebrating Roald Amundsen, who explored both poles, and in 1903 led the first expedition to successfully traverse the Northwest Passage. His ship was iced-

in south of Victoria Island and Amundsen trekked overland by dog team (and back) to Eagle, Alaska (now an official Yukon Quest checkpoint and the northernmost settlement with a telegraph station), to communicate his 'success' to the world.

"His granddaughter Suzan Amundsen has completed the Yukon Quest four times."

The dogs must've been straining at the gang line in January as their humans prepared the trail for the mushing to come.

We thought this an apt metaphor for our state in January as well (just don't scrutinize the imagery). With few scientists yet in the field, we were nonetheless very busy in our Fairbanks offices working over budgets and early season plans, securing subcontracts for planes and helicopters, searching for hotel rooms, investigating freight options, and more.

January temperatures dropped into the basement just in time for the near-monthly visit to Ivishak Springs planned by (University of Alabama) Alex Huryn for his perennial spring [food web study](#). Alex, research assistant Stephanie Parker, and PFS' Matt Irinaga arrived at Toolik Field Station on January 20<sup>th</sup>, and spent the next four days waiting for the winds ("gusting to 60 mph!" Matt exclaimed) to calm enough for safe helicopter operations. When the winds quieted, the temperatures plummeted. "When we flew to the Ivishak it was -42 with wind chill down to -65," Matt reported. "Yikes!"

## sweet dreams



### Annika Taavi Merkel

Polar Field Services is happy to announce a new addition! On 05 Feb, Marin Kuizenga, Alaska Project Manager, gave birth to Annika Taavi, weighing 7 lbs. 11 oz. Jeff (Dad) and Matteo (big brother) are thrilled and Marin looks forward to spending the next few months at home with Annika. Congratulations!

The group worked at Ivishak for the next four days. Instead of staying at the camp, however, they returned to Toolik Field Station each night with the helicopter. The weather was just too unpredictable and threatening, and the team did not want to be stranded in it. In the end, Matt says that Alex "seemed happy with his collections and experiments." ●



Stephanie Parker and Alex Huryn visit Ivishak Spring in January. Photo: Matt Irinaga

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*It's been a long, cold, lonely winter. Summit Station, January 29, 2008. Photo: Robert Kummelehne*

## greenland

### Kangerlussuaq

The lights went on in the CPS offices in Kangerlussuaq late last month, as Mark Begnaud and Ed Stockard both spent two weeks there preparing the way for spring research to come. Tent and equipment repairs kept them busy, but not much could keep them warm, as temperatures dropped below  $-55^{\circ}\text{F}$ . Ed noted that temperatures were almost 100 degrees warmer during the 2007 trip: "A 'Chinook' had blown through and it was  $+52^{\circ}\text{F}$ ," he recalled.

The new people due at Summit on 8 February cooled their heels in Kangerlussuaq as their put-in flight was cancelled repeatedly due to weather at Summit. They assisted Mark and Ed as they waited.

### Summit Station

After some 78 days of darkness, the sun rose into fair skies over Summit Station on January 29<sup>th</sup>. For the team keeping the lights on at the station, the event was made more meaningful by back-to-back winter stints (all four Summiters traveled to Greenland only a few weeks after finishing a winter at Palmer Station, Antarctica). "Sunrise was beautiful," wrote Robert Kummelehne, and the "crystal clear, calm and cold" weather allowed the team to pause and enjoy the scene.

Cold temperatures in the atmosphere led to additional science task-

ing as, beginning in mid-December, our team participated in the European-led "[match campaign](#)." This research seeks data on chemical ozone loss in the stratosphere via coordinated, balloon-borne sampling activities across the Arctic. Our Summiters launch sondes for the match campaign timed to sample parcels of air previously sampled at other stations; the information helps scientists to understand ozone-destroying chemistry processes.

As luck would have it, "the match launches tend to occur in the dead of night," wrote manager Robert Kummelehne. Low stratospheric temperatures (which support the creation of clouds that in turn promote ozone-destroying processes) make the balloons brittle, leading them to shatter long before they have reached the desired altitude of 30km. For one recent 3am flight, "it was  $-75^{\circ}\text{F}$  so Lana waxed the balloon [to insulate it] and launched it from the garage instead of the Balloon Barn," Robert wrote. The smaller garage heats up a bit better than does the barn.

In other news, during the week or so preceding the scheduled staff turnover, the Summit team finished preparations to welcome the next staff. Some tasks—skiway grooming and snow removal around the station's buildings, for example—were almost immediately undone by a fierce storm that hit Summit (canceling the planned flight) just as the phase three Summit crew arrived in Kangerlussuaq to catch the flight up. At this writing, we all await the news that the Twin Otter carrying the fresh staff has made it to Summit—none with more anticipation, we imagine, than the staff now on overtime there. ●



*If it looks buried now, imagine how it looked after the storm. Photo: Robert Kummelehne*

## in the media



*"Tabular Icebergs" by Maria Coryell Martin*

Drop by the University of Washington's third annual [Polar Science Weekend](#) March 6-9 at Seattle's Pacific Science Center. In addition to hands-on exhibits covering polar science, expeditionary artist [Maria Coryell Martin](#) (who recounted her 2005 visit to Summit Station in [this](#) newsletter) will exhibit some of her paintings.

Represent! Julie Brigham-Grette [talks](#) about the massive international collaboration known as the [Lake El'gygytgyn project](#), for which she serves as the US lead scientist. The project was one of a handful or two selected from thousands of NSF-funded efforts for showcasing at NSF's annual open house. Late in 2008, researchers will travel to the Russian Far East to begin drilling to bedrock a sediment core from under a lake formed by a meteor strike. The core should provide arctic climate information for the last three million years.

CPS-supported researcher Giff Miller (University of Colorado) made a splash earlier this month with [news](#) that the little ice caps on Baffin Island, Nunavut, Canada, have shrunk 50 percent in the last 50 years. ●



## Run with the big dogs: GoNorth! 2008

This time of year goes to the dogs, as the Yukon Quest gets underway this month in Fairbanks and [Iditarod](#) mushing teams prepare for the March classic. Sure, those races are exciting, but if you really want a howling good time, check out the [GoNorth! Web site](#) as polar huskies Disko, Lightning, Tucker, and Freja next week prepare to step into the harness with their humans, Paul Pregont and Mille Porsild. Here comes the 2008 GoNorth! dog-sledding adventure.

Adventure *learning*, that is. GoNorth! isn't a race. It's a giant natural sciences classroom, and millions of K-12 students and teachers around the world have participated in the expeditions for the last few years via an extensive 600+ page curriculum available to teachers on the Internet. The Web site is packed with information (on the dogs and the Arctic) and "there are lots of activities across all subject areas for classes to get involved with," Paul says. The team webcasts live from the trail and sends weekly photo journals and updates as well. Perhaps best of all, this trip to northern Europe is free to anyone with a computer and Internet access.

This year, the team travels through Fennoscandia. They'll hit the trail from Sweden's [Abisko Scientific Research Station](#) near the end of February. From there, the team will travel through parts of Finland and Norway, visiting with people (called Sami) in the communities through which they travel. The Sami traditionally have herded reindeer, following their stock as they graze the land. While Paul and Mille likely will spend some time learning about Sami animal husbandry, they will skirt the areas where the reindeer are grazing: "Spring

is calving season, and it can spook the herds if the dogs get too close," Paul explains.

They also may have to adjust their itinerary to meet the conditions. Winter weather has buried the land in snow in some areas and left it almost bare in others. "The full route is about 1000 miles," Paul says, "But the spring conditions may prevent us from traveling the whole distance via sled."

Paul and Mille and the dogs will be joined on the trail by GoNorth! team member Aaron Doering of the University of Minnesota, and this year's teacher participant Wendy Gorton, a fourth grade teacher from Los Angeles.

In addition to bringing the NSF-funded "[What's Climate Change to You?](#)" program to the communities they visit and learning about the Sami people, the team will explore another topic of great interest in the area: deforestation. The lichens festooning old-growth forests are an important nutrient source for the reindeer in winter; loss of this habitat is stressing the herds, and the traditional lifeways of the Sami in turn.

The GoNorth! team mostly plans to camp along the way. "Sometimes a community will invite us to stay with them, and that's great. But we need to be near the dogs, and they tend to draw a crowd. Lots of people and noise and snowmobiles—that can stress the dogs, so we often will camp on the edge of

a community where it's quieter," Paul says.

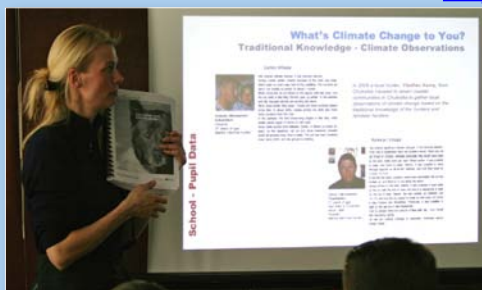
"We all enjoy the presentations," he continues. "We usually give them at the schools. The kids feed the dogs and we talk and trade stories. It's a great time."

Dark-faced [Disko](#) will lead the pack, the most important position in the harness. "He's the most experienced, and he's really intelligent," Paul explains. Cream-colored [Freja](#) will mostly run point

(the position right behind the leader) to encourage those behind her to keep up. One of the most experienced pack leaders in the kennel, Freja lost some toes to a fox trap last year in Nome, Alaska, while waiting to begin the

2007 learning adventure in Russia. "I didn't think she'd be able to come this year, but she's been running really well," Paul says. Two more huskies may spell Disko in the leader position: [Lightning](#), a gorgeous, strawberry-blonde freshman, and [Tucker](#), an experienced goofball. Another 12 dogs complete the team.

Paul has been training with his polar huskies since October, and estimates that they've run about 1000 miles so far this season—"We finally had a nice winter here in Minnesota, with lots of snow and cold conditions, so they're ready to go." If you want to tag along, visit the GoNorth! Web site: [www.polarhusky.com](#). But don't say the dogs ate your homework. Say the dogs *are* your homework. ●



Top: Disko, leader of the pack & students from Chukotka, Russia. Here: Mille Porsild presents *What's Climate Change to You?* in Russia in 2007. All photos copyright [www.polarhusky.com](#). Used with permission.