

Svalbard reindeer populations rebounding from centuries of hunting

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Mathilde Le Moullec on Edgeøya. Le Moullec and her field partner Morgan Bender spent weeks hiking and camping across Svalbard to tally reindeer. Credit: Morgan Bender

As reindeer go, the animals living on the Norwegian arctic archipelago of Svalbard might not be Santa's first choice. They're a smaller subspecies of their common mainland relatives, and to save energy they basically never run. But because they were nearly exterminated from Svalbard around 1900—and were then protected in 1925—the animals provide unique insights into how conservation can help species thrive.

Mathilde Le Moullec and her colleagues have walked more than 2,000 kilometers over four field seasons in the high-Arctic Norwegian archipelago of Svalbard, all in a quest to count [reindeer](#).

She can now quite confidently state that Svalbard is home to approximately 22,000 of the animals.

It's a number that was hard won.

In some places, Le Moullec and her colleagues walked 30-40 kilometers a day, day after day after day, on a constant lookout for both reindeer and [polar bears](#). During her second field season, she sailed on a small boat with three colleagues to difficult-to-reach research sites in the east and southwestern part of Svalbard.

"I don't think we got more than 5 hours of sleep a night that summer," she said. "The nautical charts aren't good enough to find anchorages for a small boat." That meant everyone on the boat had to help watch for shallow water and icebergs, and find places where the boat could spend the night safely.

Now, Le Moullec, who received her Ph.D. from NTNU's Department of Biology this year, can describe the long, surprising history of this unusual subspecies of reindeer. It's a story that demonstrates how protecting a species enables their populations to recover from past overexploitation.

It's also a story about how [climate change](#) and other human-caused environmental problems might affect the animals in the near future.

The results have recently been published in the *Journal of Wildlife Management*.

Old bones and antlers

Svalbard is a Norwegian territory, a collection of nine islands at 78 degrees N, halfway between mainland Norway and the North Pole.

As improbable as it seems, given the great distances from Svalbard to anywhere else, reindeer have lived here for thousands of years. During their four field seasons wandering inland Svalbard to count reindeer, Le Moullec and her colleagues documented where she found ancient bones and antlers from the animals—hundreds of them.

You might be tempted to ignore these weather-beaten, moss-covered fragments of antlers and bones, buried among miniature arctic plants, but Le Moullec and her colleagues realized immediately that the old reindeer remains were a treasure trove of information—because they could be dated using radiocarbon dating.

"I call them my treasures," she said. "Walking all those kilometers, you get to places you would otherwise never go. So we started finding and collecting these ancient bones."

Although it has been known since the 1950s that reindeer have inhabited Svalbard for centuries, the bones and antlers tell researchers exactly where on the different islands the animals have lived over the centuries—and how long ago they lived there. Their oldest find is an antler (or bone) that is 3600 years old—or roughly from about the time Europe was entering the Bronze Age.

These dates are important because they tell the researchers which parts of the archipelago were capable of supporting reindeer populations. Le Moullec can compare that information to where Svalbard reindeer are found now, so she knows how extensively the animals are recolonizing areas where they once lived.

Food for whalers, explorers, miners and trappers

The big problems for Svalbard reindeer likely began after the Dutchman Willem Barents reported the existence of the archipelago in 1596. After his discovery, whalers, fisherfolk and explorers began to visit the islands and hunted reindeer.

Hunting pressures exploded with an influx of miners and trappers in the late 1800s, when coal was first discovered on Svalbard. Overwintering sailing expeditions also relied on reindeer for food. Svalbard reindeer are unlike their southern cousins in that they tend to be docile and extremely sedentary, making them easy targets.

The result was by 1900, the animals were more or less locally extirpated, Le Moullec said, although there were a few isolated areas where small populations persisted.

Those few reindeer were important, however, because they provided the animals that could slowly recolonize Svalbard after the Norwegian government extended full protection to the animals in 1925.

Now, almost one hundred years later, Le Moullec's research can tell us how well that protection worked.

Population is still recovering

With her thorough population count, and knowledge of where reindeer lived in centuries past, Le Moullec can say with confidence that Svalbard reindeer have recovered enough to recolonize virtually all non-glaciated areas in the archipelago. But because of their sedentary behavior and the barriers posed by crossing glaciers, steep mountains and open fjords, this recolonization took a century.

"Reindeer have recolonized their ancient grazing areas, based on the information we have from the antlers and bones," she said. "And their densities are thirteen times higher than the minimum numbers we have subsequent to protection, from the 1950s."

The researchers also had information from digital maps about the quality of vegetation in areas on the island that could potentially support reindeer.

That allowed them to estimate how many reindeer ought to be able to live in these different areas—because if the vegetation production in an area is high, that area is capable of supporting more reindeer than an area where the vegetation biomass is low.

The combination of all this information tells the scientists that although populations have grown enormously since the hunting ban was put in place, "we still see the effect of hunting from 100 years ago," Le Moullec said. "In the areas where they were extirpated, their numbers still have the potential to increase."

A look towards the future

Le Moullec and her colleagues, Åshild Pedersen from the Norwegian Polar Institute, Jørgen Rosvold and Audun Stien from the Norwegian Institute for Nature Research, and her supervisor from NTNU's Centre for Biodiversity Dynamics, Brage Bremset Hansen, aren't just looking

back in time. They're also interested in how their knowledge of reindeer recovery over time can help them evaluate how global warming will affect future populations of reindeer.

The current warming rates on Svalbard are the fastest on Earth. Other research conducted by Le Moullec's supervisor Hansen, who is also senior author on the new paper, shows that Svalbard reindeer are already being greatly affected by climate change. In some cases, reindeer are forced to eat seaweed during the winter, when ice, caused by rain-on-snow, covers their preferred foraging areas.

Currently, the researchers are seeing that reindeer populations inland are thriving more than their coastal brethren, because coastal areas are rainier and warmer during the winter, and more likely to experience rain-on-snow events.

Globally, however, Svalbard reindeer are in an enviable position. "This study represents a counter example to the many reindeer population status assessments reporting recent local or regional declines in abundance," Le Moullec and her co-authors wrote.

For example, the Rivière-George herd in northern Quebec, Canada, once the largest in the world, has declined >99% said Steeve D. Côté from Laval University in Quebec.

"Such large declines have never been reported since we developed the capacity to survey populations," Côté said. Although caribou and reindeer numbers have always fluctuated naturally, climate change may have contributed to this recent decline. For example, migratory caribou increased movements by nearly 30% due to changes in the freezing-thawing cycles of large water bodies in Nunavik (Canada), Côté said.

Everything is connected to everything

The Svalbard ecosystem contains just three overwintering creatures distributed across the archipelago: the rock ptarmigan (*Lagopus muta hyperborea*), Svalbard reindeer (*Rangifer tarandus platyrhynchus*) and the Arctic fox (*Vulpes lagopus*). What happens to one species, like the reindeer, has a ripple effect on all other species.

"Changes in reindeer abundance therefore have important top-down and bottom-up effects on the ecosystem," Le Moullec and her co-authors wrote.

For example, if there are more reindeer overall, that means there will be an increase in carcasses, which means more food for Arctic foxes, and eventually more Arctic foxes. If there are more foxes, they may eat the eggs and young of ground-nesting birds, like geese, which come to Svalbard to raise their young.

The extremely rapid climate change on Svalbard will continue to directly or indirectly affect all these animals through rainier winters, earlier spring and loss of sea ice as a travel route between islands. The long time it took Svalbard reindeer to recover from intense hunting suggests that future populations will need to be managed with great care, the researchers wrote.

"Bearing in mind that it took approximately a century for the subspecies to recover from overharvesting, the reindeer responses may be too slow to track the speed of future climate change," the researchers wrote.

More information: Mathilde Le Moullec et al. A century of conservation: The ongoing recovery of Svalbard reindeer, *The Journal of Wildlife Management* (2019). [DOI: 10.1002/jwmg.21761](https://doi.org/10.1002/jwmg.21761)

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