

As Arctic warms, caribou and muskoxen slow biodiversity loss

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A muskox is seen from the motorcade of US Secretary of State Antony Blinken in Kangerlussuaq, Greenland, May 20, 2021.

Rapidly warming conditions in the Arctic and the loss of sea ice caused by climate change are driving a steep decline in biodiversity, including among plants, fungi and lichen.

But a new study out Thursday in *Science* found the presence of caribou and muskoxen help to reduce the rate of loss by roughly half, suggesting the large herbivores have an under-recognized role as ecosystem climate defenders.

Co-author Christian John of the University of California, Santa Barbara told AFP the results showed that "in some cases 'rewilding' (reintroduction of [large herbivores](#)) may be an effective approach to combating negative effects of [climate change](#) on [tundra diversity](#)."

The paper was the result of a 15-year-long experiment that began in 2002 near Kangerlussuaq, a small settlement of around 500 people in western Greenland.

An international team of scientists used steel fencing to set up 800-square-meter plots, or about a fifth of an acre, to exclude or include herbivores and measure the impact on the surrounding environment.

They also used "passive warming chambers," which act like miniature greenhouses to raise the temperature a few degrees, to see how biodiversity might fare under conditions even warmer than today. Herbivores were given access to some warmed plots and not others.

Each day, the team hiked for miles to tally up the ungulates.



A reindeer walks in the boreal forest, above The Arctic Circle, in Finnish Lapland.

"There were a lot of demands to the job, working long hours hiking across uneven terrain, living in a tent under a sun that doesn't set, all the while with the ubiquitous whine of mosquitos in the background," said John.

"But at the end of the day, none of these challenges ever overshadowed the joy of seeing the first caribou calf of the year."

Sadly, tundra community diversity declined across the board over the course of the study, both as a direct result of warming but also changing precipitation patterns associated with melting ice, and the increasing

shrub cover in the tundra squeezing out other species.

However, "tundra community diversity dropped at almost double the rate in plots where herbivores were excluded compared to plots where herbivores were able to graze," said John.

In the warmed plots, the difference was yet more dramatic. Diversity declined by about 0.85 species per decade when herbivores were excluded, whereas this decline was only about 0.33 species per decade when they were allowed to graze.

The scientists attributed this to herbivores keeping species such as shrubs, dwarf birch and gray willow in check so that other plants could better flourish.

"Efforts focused on maintenance or enhancement of large [herbivore](#) diversity may therefore under certain conditions help mitigate climate change impacts on at least one important element of ecosystem health and function: tundra diversity," wrote the team.

More information: Eric Post et al, Large herbivore diversity slows sea ice–associated decline in arctic tundra diversity, *Science* (2023). [DOI: 10.1126/science.add2679](https://doi.org/10.1126/science.add2679)

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