Climate change poses a threat to Arctic Caribou. *(Credit: Kevin Rawlings)*

Arctic Caribou on Thin Ice: Climate Change Threats Revealed

Caribou, among the most iconic species in the Canadian High Arctic, are facing new challenges in a world affected by climate change, according to a new study by Jenkins and colleagues. Subspecies like the Endangered Peary caribou and the Threatened Barren-ground caribou play a crucial role in the stability of high-Arctic ecosystems. These ungulates shape their environment through their grazing and serve as a vital food source for Arctic predators, scavengers, and humans. As herbivores, they rely on ground vegetation for sustenance and seasonal sea ice cover for navigation across the Canadian Arctic Archipelago. Once thriving across the region, recent population declines and threats of local extinctions are raising concerns for the subspecies, especially as their environment experiences some of the fastest warming rates in the world.

The study by Jenkins and colleagues, published in the Journal of Biological Conservation, paired genetic information with landscape features across 2 million square kilometers of the Canadian High Arctic using a machine-learning algorithm to identify factors that influence habitat connectivity for these subspecies. They found that for Peary caribou in the highly fragmented Canadian Arctic Archipelago of Nunavut, where a diversity of islands and jagged coastlines fraction the landscape, declines in sea ice cover as a result of global warming represents an impediment to caribou dispersal. The extended open-water seasons and less stable ice cover disrupt time-honoured dispersal routes between populations, which gradually isolates them from one another and compromises their ability to recover from disturbances like storms, disease, and hunting. With these findings, caribou in this

region join various other Arctic life facing the peril of diminishing sea ice - seals, polar bears, seabirds, and, notably, Inuit communities for whom sea ice holds profound cultural significance. The study also unveiled the Peary caribou's instinct in this region to sidestep human-made trails, etched by the tracks of ATVs and snowmobiles, perhaps as a learned response to avoid hunters. Conversely, on the more south-eastern Baffin Island, where caribou benefit from a greater abundance of contiguous habitats, their dispersal is less hindered by ice cover, but more by human developments and infrastructure that fragment the landscape. Just as caribou shape their own environment over time, these findings underscore how variations in environmental conditions between Baffin Island and the more northerly islands of the Archipelago have molded distinct vulnerabilities in their resident caribou populations. The more northern (Peary) subspecies' dependence on sea ice cover for cross-island navigation may imperil them with ongoing climate change, as research suggests that the high Arctic may be entirely devoid of summer and fall sea ice cover before the end of the century with current emission rates. Thus, Jenkins and colleagues conclude that conservation efforts for this subspecies require efforts to protect their habitat and its connectivity, including restrictions on ice-breaking and global greenhouse gas emissions to abate future ice losses. Without such efforts, a key ecosystem engineer of the Canadian High Arctic may slowly disappear as a result of our pollution and inaction.

// By **Ryan Guild** //

Link to the Research Article:

Jenkins, D. A., Schaefer, J. A., Yannic, G., Andrews, G., Koen, E. L., Peterman, W. E., & Lecomte, N. (2023). *Functional connectivity of an imperilled Arctic ungulate–where melting sea ice and human trails increase isolation.* Biological Conservation, 283, 110084.
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Dr. Deborah (Debbie) Jenkins, a postdoctoral research fellow in the WildCo Lab, University of British Columbia, earned her PhD at Trent University, ON, Canada, where she studied the response of Arctic caribou and muskoxen to a rapidly changing environment. As a conservation biologist, her research focuses on the ecology, genetics and evolutionary biology of large mammals, including caribou and muskoxen in the Canadian High Arctic, and carnivores in western Canada. Dr. Jenkins has a keen interest in spatial modelling to better understand species distributions, patterns of genetic diversity, and the ecological and functional connectivity of animal populations.