Warmer Arctic could increase threat of disease for caribou, other foods

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Climate change in the Arctic could change the balance of power between humans, animals and the germs or pathogens that make them both sick, according to a paper by University of Alaska Fairbanks microbiologist Karsten Hueffer.

Hueffer, an assistant professor at the UAF Institute of Arctic Biology, published his findings in a recent issue of the online journal Acta Veterinaria Scandinavica, according to a press release from UAF.

"Interestingly, people and animals can reach a point of equilibrium in which the pathogens that affect them do not cause a lot of disease," said Hueffer, who studies zoonotics, infectious diseases that spread between humans and animals. "Day length and temperature are thought to play a significant role in regulating this equilibrium."

The rates of predicted climate change for the Arctic could spell disaster for this longstanding host-pathogen balance. A warmer Arctic could increase survival of organisms that carry disease and decrease survival of the animals they infect - including animals used as subsistence food by people living in the Arctic.

"What happens when a caribou has its calf on ground warm enough to have pathogens the calf cannot fight off?" said Hueffer. "The same issue could face bears giving birth in dens."

Muskoxen are affected by a lung worm known to develop much faster when it's warmer. "The faster the worm grows the more generations are born, which increases the disease pressure on the muskoxen," said Hueffer.

Humans are at risk as well. A warmer Arctic and the prospect of an ice-free Northwest Passage is expected to drive an increase in development and other human activity in the North, all of which will increase contact among wildlife, humans and domesticated animals.

One potential outcome of increased human-animal contact is rabies.

Hueffer and colleagues from IAB, North Slope Borough, Alaska Department of Fish and Game, Alaska Department of Public Health and U.S. Centers for Disease Control plan to begin a large-scale project on the movement of red fox, arctic foxes and rabies this year.

"Arctic fox carry rabies, they move long distances and congregate where they find food," said Hueffer. "One infected fox can infect other foxes and if they congregate near humans, the opportunity for rabies to infect domestic dogs and possibly humans increases."

Both arctic and red foxes carry rabies. Arctic foxes spread the disease because they roam over large areas, while red foxes tend to be more territorial.

"The general presumption is that the reds will replace arctic fox in large areas of the Arctic, as we've seen happen in Europe and Canada," said Hueffer. "We're
studying that movement and want to know if the reds will continue to remain territorial or start to move around a lot and spread rabies like the arctic fox."

Red and arctic foxes are the primary wild carriers of rabies in Alaska. The Alaska State Virology Lab has 50 years of rabies data on foxes.

"With rabies, if we had a good understanding of the interaction between red fox and climate and how that affects rabies epidemics, we could be better at surveillance and prediction and be more proactive in issuing public health advisories to protect people, their domestic animals and wildlife," Hueffer said.

Much of the research on host-pathogen interactions has been conducted at lower latitudes and may not be applicable in the Arctic. Hueffer and co-authors Todd O'Hara, UAF associate professor of wildlife toxicology, hope their paper can garner attention for a topic they believe will be of significant importance to Alaskans in the near future.