

PLOS Science Wednesday: Hi Reddit, my name is Ken Tape and I recently published a PLOS ONE study showing the moose habitat expanded into the tundra during the 1800s, likely due to global warming and climate change – Ask Me Anything!

PLOSScienceWednesday¹ and r/Science AMAs¹

¹Affiliation not available

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Abstract

Hi Reddit, My name is Ken Tape and I am a Research Scientist at the University of Alaska Fairbanks. My research focuses on the effects of climate change on the landscape, including its soils, vegetation, and wildlife. I recently published a study in PLOS ONE titled “Range Expansion of Moose in Arctic Alaska Linked to Warming and Increased Shrub Habitat”. The goal of our study was to examine the factors contributing to moose’s range expansion across the Alaskan Arctic during the 20th century. We accomplished this largely by estimating available moose habitat – tall shrubs along rivers and streams – during the late 1800s. We showed that moose habitat was greatly reduced during the 1800s, when moose were absent from the region. We think that warming increased moose habitat and caused its range expansion into the tundra. I will be discussing the study and answering questions at 1pm ET. I look forward to your questions!

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PLOSSCIENCEWEDNESDAY [R/SCIENCE](#)

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What is your "go to," 1-3 sentence, dinner conversation style argument for why climate change is man made? Would be helpful when talking to my Dad....

[anonymous_chimpanzee](#)

There is a webpage for this:

[www.skepticalscience.com](#)

Seems to be down at the moment, for some reason.

What environmental impact did the new introduction of moose into the tundra regions have? Were there any other animals that took advantage of the climatic changes that increased moose habitats?

[firedrops](#)

Good question. Other animals that often share shrub habitat with moose include snowshoe hares and ptarmigan. Ptarmigan require minimal shrub habitat and have been there since the 19th century and before, whereas snowshoe hares (and possibly lynx) appear to have colonized northern tundra regions of Alaska during the 1970s. So there seems to be a pattern of boreal forest species moving into the tundra in response to shrubbier vegetation. While the impacts are somewhat uncertain, species like

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ptarmigan may be experiencing greater competition for forage from newcomers like moose and ptarmigan. Browsing controls the architecture of shrubs, too, so introducing new browsers probably counteracts some of the increased shrub growth due to warming.

Are you worried about your research being co-opted by climate change denialists?

[iorgfeflkd](#)

Not too much. I think any objective study is an important contribution, whether the findings are positive or negative effects of climate change. What concerns me a bit about boreal forest species colonizing the tundra is that it might out-compete and squeeze out endemic tundra species.

I assume the warming and melting of the tundra has even larger effects than just the encroachment of moose. Are any species of plants or animals native to the tundra thought to be at risk because of the warming? Will moose have a detrimental impact on the tundra?

[shiruken](#)

I wish we knew the answer to that with some clarity. We are likely in the process of losing endemic tundra species, both plants and animals, but we don't know what they are (we lack long records to demonstrate this). A lot of studies are attempting to model this, with mixed success. Wolverines, the Alaska marmot, and the Alaskan hare come to mind as threatened by the types of changes underway. Sure, animals can adapt to some extent (some to a great extent), but in the extremely harsh arctic environment, many species are precisely adapted for certain conditions, and those conditions are changing.

What's the farthest north on the Slope a moose could reasonably sustain itself?

[smescarzaga3](#)

Well, using riparian shrub corridors on big rivers, moose have extended all the way to mouth of the Colville River, for example. There is also a small population occasionally on the Ikpikpuk River, though I don't think they reach the coast. The Colville is the only place I can think of where moose are consistently seen at the arctic coast, because there is a healthy riparian shrub corridor that they are exploiting for habitat. You can of course get the occasional wanderer anywhere, which makes drawing distribution maps difficult.

Is there anything being done to restore or protect local moose habitat?

[RavenXArisa](#)

No.

What was the most difficult part of conducting this study? This is extremely interesting by the way.

[Pro_copius](#)

The most difficult part of the study was weighing other factors, such as hunting and predation, in contributing to the observed expansion. Could hunting by Native Alaskans during the 19th century

prevented moose from being established in tundra regions? That's a tough question to answer and one that I lost a lot of sleep over, but that's also the fun of science. In the end, I thought we were able to show pretty convincingly that the shrub habitat wouldn't have been abundant during the 19th century, thus implicating habitat change as the cause of moose expansion into the tundra. We haven't laid this question to rest just yet, so hopefully ongoing efforts will clarify what we know so far.

Thanks again for stopping by, what are your thoughts on the aerial culling of wolves in Alaska and in the context of the re-introduction of wolves into the Yellowstone ecosystem?

[PHealthy](#)

I'm not a supporter of the aerial wolf killing, but it does boost moose populations in some areas, which is good for hunters and the harvest. I do wonder how much of the increase in moose pops during the 20th century has been attributed to predator control, but was actually related to improved habitat as shrubs increase their growth and forests shift toward deciduous species. This is a really tough problem to sort out.

What are the differences in habitat requirements between Caribou and Moose? Would Caribou similarly expand their range due to climate change? Also, more broadly, what are your thoughts about public perception of hunting and its benefits/drawbacks to wildlife and the environment?

[Schnellin](#)

Great question. Generally speaking, I would say that caribou and moose have different local habitats. Moose like shrubs and cover, whereas caribou prefer open expansive areas and little tundra plants like forbs and lichens (though they do eat willows). Caribou is likely to be a 'loser' in warming scenarios, but this is a tough question and has not been definitively answered. I think appropriately regulated hunting is fine.