

Ptarmigan in Colorado have varied reproduction, not likely linked to warming trends

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Ptarmigan are grouse that live in cold ecosystems, such as alpine and tundra

habitats. Credit: Cameron Aldridge, Colorado State University and U.S. Geological Survey

Animals that live at high elevations are often assumed to be at risk for extinction as habitats warm and change. But a new study led by Colorado State University researchers found that ptarmigan, which live in cold ecosystems, are not strongly affected by fluctuations in seasonal weather at two populations studied in Colorado.

The results, published July 15 in the journal *PLOS ONE*, are surprising, given the general perception of alpine animal populations as vulnerable to recent climate warming, study authors said.

Ptarmigan are grouse that live in cold ecosystems, such as alpine and tundra habitats, said Greg Wann, Ph.D. candidate in CSU's Graduate Degree Program in Ecology and a member of the Natural Resource Ecology Laboratory.

The birds are well-known for changing colors seasonally. In late spring and summer, ptarmigan are brown, and in the fall, they molt into a white plumage to match the surrounding snow. The white-tailed ptarmigan is the smallest species of this type of grouse and is endemic to North America. It is the only ptarmigan that exists in Colorado.

Wann and study co-authors, including CSU Associate Professor Cameron Aldridge, analyzed 45 years of reproductive data for two Colorado populations of white-tailed ptarmigan. The team did not track seasonal temperatures, but noted warming at study sites during the spring and summer, based on data from Niwot Ridge Long Term Ecological Research.

Among the findings: ptarmigan annual reproduction did not change at Mt. Evans, which was one of the two sites studied. It declined significantly at the other site, Rocky Mountain National Park.

"We can't fully explain this decline, but we did not find any strong indications it was due to recent warming," Wann said.

"Climate did affect when ptarmigan bred, and warmer spring temperatures have led to ptarmigan nesting earlier than they did at the beginning of the study in the 1960s. We don't know if earlier breeding will be a good or bad thing for ptarmigan in the future, but our continued research will help address some of these questions," he added.

Aldridge, who is also a scientist with the U.S. Geological Survey, said researchers were surprised that weather did not explain variation in reproductive rates of white-tailed ptarmigan.

"Ptarmigan can only raise one brood in a season, and the breeding period in the alpine is so short," he explained. "In addition, reproductive rates in many other grouse species are strongly linked to weather. Other factors, like variation in predators or changes in habitat quality due to drying habitats or loss of alpine willow, must be at least as important, if not more important," he said. "We are continuing to investigate those mechanisms at our long-term study sites."

Study authors said predators might be more abundant in the alpine during years with less snow cover, or prolonged hot summers may reduce the abundance of plants that ptarmigan rely on for food. The team is currently looking at these other factors through a study by tracking individual birds to measure reproductive rates and the associated habitat quality and predator abundance impacts on the number of young produced.

While the study findings appear to downplay the effects of climate change, Wann said it is something that should still be of concern to the public.

"Climate change is a very big challenge wildlife populations are currently facing and will continue to face over coming decades," he said. "Species that exist on mountaintops may be particularly vulnerable because they are adapted to cold, and, as temperatures increase, they cannot move to cooler environments at higher elevations. Fortunately, the ptarmigan populations we studied appear to be handling the warming summers, at least given the warming that has happened so far. As warming in alpine habitats increases and advance snowmelt even further in the coming years, we hope [ptarmigan](#) in Colorado will continue to cope with these changing environments."

Provided by Colorado State University

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