

American pika disappears from large area of California's Sierra Nevada mountains

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Pikas are related to rabbits and live at high elevations in the mountains of North America. Climate change is shrinking the areas where they can live. Credit: Alison Henry

The American pika, a small mammal adapted to high altitudes and cold

temperatures, has died out from a 165-square-mile span of habitat in California's northern Sierra Nevada mountains, and the cause appears to be climate change, according to a new study published August 30 in *PLOS ONE*.

Researchers surveyed pika habitat throughout the north Lake Tahoe area and found that pikas had disappeared from an area that stretches from near Tahoe City to Truckee, more than ten miles away, and includes Mount Pluto. This local extinction is the largest area of pika extinction yet reported for the modern era.

"The loss of pikas from this large area of otherwise suitable habitat echoes prehistoric range collapses that happened when temperatures increased after the last ice age," said lead author Joseph Stewart, a Ph.D. candidate at UC Santa Cruz. "This time, however, we're seeing the effects of [climate change](#) unfold on a scale of decades as opposed to millennia."

Hikers and backpackers can still see pikas in the mountains surrounding the area of extinction. "Mount Rose and Desolation Wilderness are still great places to see pikas," Stewart said. But not for long—the study forecasts that by 2050 climate change will cause a 97 percent decline in suitable climate conditions for pikas in the Lake Tahoe area.

Pikas, related to rabbits and hares, are about eight inches long with a stout body and round ears. They spend their summers carrying mouthfuls of grass and wildflowers from mountain meadows to "haypiles" tucked away in the rocky habitat they call home.



With high metabolic rates and thick fur, pikas are well adapted to the cold temperatures at high elevations, but these same adaptations make them vulnerable to global warming. Credit: Joseph Stewart

"The classic image of a pika is one hopping from rock to rock with a little 'bouquet' of wildflowers in its mouth," said coauthor David Wright, recently retired from the California Department of Fish and Wildlife.

Pikas don't hibernate, but rather use their furnace-like metabolism and thick coat of fur to stay warm during winters under the snow. "A larger haypile acts as insurance policy against winter starvation," explained Stewart. "But the same adaptations that allow them to stay warm during winter make them vulnerable to overheating in the summer, and when summer temperatures are too hot, they can't gather enough food to survive and reproduce."

In order to confirm that pikas are now extinct from the 165-square-mile area, the authors searched for pikas over the course of six years, from 2011 to 2016, looking for evidence of pika activity and camping next to pika habitat to listen for the animal's distinctive calls. "We found old pika fecal pellets buried in sediment in nearly every patch of habitat we searched," said Stewart. "But the animals themselves were conspicuously absent."

Pika scat, which is small and round, can last a long time because the pika's rocky habitat shelters it from sunlight and rain, Wright explained. "Their fecal pellets resemble peppercorns," he said. "It's distinctive. It doesn't resemble feces from any other species in the area."

The study used radiocarbon dating to track the timeline of pika retreat from the area. "Above-ground nuclear arms testing, from before the 1963 Partial Nuclear Test Ban Treaty, resulted in an elevated concentration of radiocarbon in the atmosphere, and we used this signal to determine an age range for the relict pika scat," explained study coauthor Katherine Heckman, a radiocarbon scientist with the U.S. Forest Service. Radiocarbon dating indicates that pikas likely disappeared from many of the lower elevation sites surrounding Mount Pluto before 1955, but persisted near the peak as recently as 1991.



Pikas spend the summer gathering grasses and wildflowers to store in "haypiles" for winter subsistence. When summer temperatures are too high, they are forced to stay underground. Credit: Chris Ray

"The pattern is exactly what we expect with climate change," Stewart said. "As the hottest, lowest-elevation sites became too hot for pikas, they became restricted to just the mountain top, and then the mountain top became too hot as well."

The local pika extinction opens a large gap in the species distribution north of Lake Tahoe, and the authors believe this gap indicates the complete loss of population and genetic connectivity between [pikas](#) to the east and west.

The American pika is just one of many species threatened by a changing climate, Stewart said, listing salmon, wolverines, tigers, walruses, coral reefs, elephants, and redwood forests as other examples of iconic species vulnerable to climate change. A 2015 meta-analysis published in Science found that about one in six species could be vulnerable to extinction from climate change this century.

The authors note that while management actions such as habitat protection, restoration, or assisted migration may be helpful for some climate-imperiled species, management options for the pika appear to be limited.

"Our hope is that simply getting the word out there that climate change is causing iconic wildlife to disappear will get people talking and contribute toward political will to reign in and reverse climate change," Stewart said. "There's still time to prevent the worst impacts of climate change. We need our leaders to take bold action now."

Provided by University of California - Santa Cruz

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