

# New study links the decline of alpine bees to climate change

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A new study by Webster University Biology Associate Professor Nicole Miller-Struttman, University of Missouri at Columbia Professor Emerita Candace Galen and University of Missouri Ph.D. student Zack

Miller has identified a critical piece of the puzzle for a question that has troubled scientists tracking biodiversity as the climate warms—why are once abundant species declining?

Their study, compiling many years of observation from three peaks in the Rocky Mountains, found that at [high elevations](#) above timberline—referred to as "alpine" regions—bumble bees are losing ground in a process that reflects their low tolerance to warming temperatures. As the alpine climate warms, colonizing bumble bees from [lower elevations](#) thrive, potentially displacing alpine resident species. If the trend continues, populations of the alpine bumble bees could become extinct, and soon.

"We predict the local extinction of species in areas where the alpine bees can't migrate further upslope, where the weather is cooler and the growing season still remains short," Miller-Struttmann said. "They are not responding to the temperature changes fast enough because they are stuck in an evolutionary trap."

To grasp the issue, one must understand how alpine bumble bees have adapted over millennia to high elevation living. Because temperatures have historically been very cold at high elevations, the summer growing season has been short. Alpine bumble bees likely adapted by packing their foraging activity and reproductive phase into a rapid burst that now misses out on flowers at later times in a longer, warmer season.

Lower-elevation bumble bees are more flexible in their foraging schedules and have moved upward with climate change. Their more opportunistic habits allow them to exploit resources that their alpine relatives miss out on.

And here's the big problem—the alpine bumble bees are "stuck in a rut" because of the way they have been programmed by evolution. These

[high elevation](#) species still only collect nectar and pollen from flowers during a short time period that was the normal growing season in high elevations 50 years ago.

In other words, alpine bumble bees are being heated out of their homes and replaced by subalpine bees with more flexible life history schedules.

"As the climate warms and becomes more variable, organisms specialized to past conditions are declining, be it bumble bees or penguins," Galen said. "We are losing biodiversity at a rapid clip, and with it the ecological services including pollination services that enrich and sustain our lives."

The study was launched in 2012 and completed this year. In it, the professors looked at 60 years of data regarding alpine plants and [bumble bees](#) in the Colorado Rocky Mountains.

The study was published in *Global Change Biology*.

**More information:** Nicole Miller-Struttman et al, Climate driven disruption of transitional alpine bumble bee communities, *Global Change Biology* (2022). [DOI: 10.1111/gcb.16348](https://doi.org/10.1111/gcb.16348)

Provided by Webster University

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