

# Warm winters mean more pine beetles, tree damage

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(PhysOrg.com) -- Some populations of mountain pine beetles now produce two generations of tree-killing offspring annually, dramatically increasing the potential for bugs to kill lodgepole and ponderosa pine trees, CU-Boulder researchers have found.

Because of the extra annual generation of beetles, there could be up to 60 times as many beetles attacking trees in any given year, the study found. And in response to warmer temperatures at high elevations, [pine beetles](#) also are better able to survive and attack trees that haven't previously developed defenses.

This exponential increase in the beetle population might help explain the scope of the current beetle epidemic, which is the largest in history and extends from the Sangre de Cristo Mountains in New Mexico to the

[Yukon Territory](#) near Alaska, according to Professor Jeffrey Mitton and graduate student Scott Ferrenberg, both of the ecology and [evolutionary biology](#) department.

"This thing is immense," Mitton said. The duo's research, conducted in 2009 and 2010 at CU's Mountain Research Station, located about 25 miles west of Boulder, helps explain why.

"We followed them through the summer, and we saw something that had never been seen before," Mitton said. "Adults that were newly laid eggs two months before were going out and attacking trees" -- in the same year. Normally, [mountain pine beetles](#) spend a winter as larvae in trees before emerging as adults the following summer.

These effects may be particularly pronounced at [higher elevations](#), where warmer temperatures have facilitated beetle attacks. In the last two decades at the Mountain Research Station, mean annual temperatures were 2.7 degrees Fahrenheit warmer than they were in the previous two decades.

Warmer temperatures gave the [beetle larvae](#) more spring days to grow to adulthood. The number of spring days above freezing temperatures increased by 15.1 in the last two decades, according to Mitton and Ferrenberg. Also, the number of days that were warm enough for the beetles to grow increased by 44 percent since 1970.

The Mountain Research Station site is about 10,000 feet in elevation, 1,000 feet higher than the beetles have historically thrived.

"While our study is limited in area, it was completed in a site that was characterized as climatically unsuitable for (mountain pine beetle) development by the U.S. Forest Service only three decades ago," they wrote in the study.

But in 25 years, the beetles have expanded their range 2,000 feet higher in elevation and 240 miles north in latitude in Canada, Mitton said.

Provided by University of Colorado at Boulder

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