Western forests decimated by pine beetles not more likely to burn

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Credit: Wikipedia.

Western U.S. forests killed by the mountain pine beetle epidemic are no more at risk to burn than healthy Western forests, according to new findings by the University of Colorado Boulder that fly in the face of both public perception and policy.

The CU-Boulder study authors looked at the three peak years of Western

wildfires since 2002, using maps produced by federal land management agencies. The researchers superimposed maps of areas burned in the West in 2006, 2007 and 2012 on maps of areas identified as infested by mountain pine beetles.

The area of forests burned during those three years combined were responsible for 46 percent of the total area burned in the West from 2002 to 2013.

"The bottom line is that forests infested by the mountain pine beetle are not more likely to burn at a regional scale," said CU-Boulder postdoctoral researcher Sarah Hart, lead study author. "We found that alterations in the forest infested by the mountain pine beetle are not as important in fires as overriding drivers like climate and topography."

A paper on the subject is being published this week in the *Proceedings of the National Academy of Sciences*. The study was funded by the Wilburforce Foundation and the National Science Foundation. The Wilburforce Foundation is a private, philanthropic group that funds conservation science in the Western U.S. and western Canada.

Co-authors on the new study include CU-Boulder Research Scientist Tania Schoennagel of the Institute of Arctic and Alpine Research, CU-Boulder geography Professor Thomas Veblen and CU-Boulder doctoral student Teresa Chapman.

The impetus for the study was in part the severe and extensive native bark beetle outbreaks in response to warming temperatures and drought over the past 15 years that have caused dramatic tree mortality from Alaska to the American Southwest, said Hart. Mountain pine beetles killed more than 24,700 square miles of forest across the Western U.S. in that time period, an area nearly as large as Lake Superior.

"The question was still out there about whether bark beetle outbreaks really have affected subsequent fires," Hart said. "We wanted to take a broad-scale, top-down approach and look at all of the fires across the Western U.S. and see the emergent effects of bark beetle kill on fires."

Previous studies examining the effect of bark beetles on wildfire activity have been much smaller in scale, assessing the impact of the insects on one or only a few fires, said Hart. This is the first study to look at trends from multiple years across the entire Western U.S. While several of the small studies indicated bark beetle activity was not a significant factor, some computer modeling studies conclude the opposite.

The CU-Boulder team used ground, airplane and satellite data from the U.S. Forest Service and the U.S. Geological Survey to produce maps of both beetle infestation and the extent of wildfire burns across the West.

The two factors that appear to play the most important roles in larger Western forest fires include climate change—temperatures in the West have risen by about 2 degrees Fahrenheit since 1970 as a result of increasing greenhouse gases—and a prolonged Western drought, which has been ongoing since 2002.

"What we are seeing in this study is that at broad scales, fire does not necessarily follow mountain pine beetles," said Schoennagel. "It's well known, however, that fire does follow drought."

The 2014 Farm Bill allocated $200 million to reduce the risk of insect outbreak, disease and subsequent wildfire across roughly 70,000 square miles of National Forest land in the West, said Hart. "We believe the government needs to be smart about how these funds are spent based on what the science is telling us," she said. "If the money is spent on increasing the safety of firefighters, for example, or protecting homes at risk of burning from forest fires, we think that makes sense."

Firefighting in forests that have been killed by mountain pine beetles will continue to be a big challenge, said Schoennagel. But thinning such forests in an attempt to mitigate the chance of burning is probably not an effective strategy.

"I think what is really powerful about our study is its broad scale," said Hart. "It is pretty conclusive that we are not seeing an increase in areas burned even as we see an increase in the mountain pine beetle outbreaks," she said.

"These results refute the assumption that increased bark beetle activity has increased area burned," wrote the researchers in *PNAS*. "Therefore, policy discussions should focus on societal adaptation to the effect of the underlying drivers: warmer temperatures and increased drought."

More information: Area burned in the western United States is unaffected by recent mountain pine beetle outbreaks, *PNAS*, www.pnas.org/cgi/doi/10.1073/pnas.1424037112

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