Insect-killed forests pose no additional likelihood of wildfire

23 July 2015

As mountain pine beetles and other insects chew their way through Western forests, forest fires might not seem far behind. Lands covered by dead trees appear ready to burst into flame.

However, an analysis of wildfire extent in Oregon and Washington over the past 30 years shows very little difference in the likelihood of fires in forests with and without insect damage. Indeed, other factors – drought, storms, and fuel accumulation from years of fire suppression – may be more important than insects in determining if fire is more or less likely from year to year.

Scientists reached this conclusion by mapping the locations of insect outbreaks and wildfires throughout Oregon and Washington beginning in 1970. Researchers discovered that the chances of fire in forests with extensive swaths of dead timber are neither higher nor lower than in forests without damage from mountain pine beetles.

The same comparison done on forests damaged by another insect – western spruce budworm – yields a different result. The chances of wildfire actually appear to be slightly lower where the budworm has defoliated and killed trees in the past. While the mechanics of such an association are unconfirmed, it's possible that budworm outbreaks could reduce the risk of wildfire by consuming needles in the forest canopy.

"Our analysis suggests that wildfire likelihood does not increase following most insect outbreaks," said Garrett Meigs, lead author of a paper published this week in the open-access journal *Ecosphere*. Meigs is a former Ph.D. student in the Oregon State University College of Forestry and now a post-doctoral researcher at the University of Vermont.

Across more than 49 million forested acres in both states, insects and fires typically affect less than 2 percent of the land in a given year. More forestland is usually disturbed by insects than by fire.

"Most forests have plenty of fuel already," Meigs said. "Green trees burn, not always as readily as dead ones, but they burn. The effects of insects are trumped by other factors such as drought, wind and fire management." For example, the 2002 Biscuit Fire, the region's largest at nearly 500,000 acres, occurred in an area with little tree damage from insects.

"Even if mountain pine beetle outbreaks do alter fuels in a way that increases flammability, the windows of opportunity are too small – and fire is too rare – for those effects to manifest at landscape and regional scales."

"In the case of the budworm, our findings suggest that there may be a natural thinning effect of insect-caused defoliation and mortality, and it is possible that insects are doing some 'fuel reduction' work that managers may not need to replicate," said Meigs. That possibility needs more research, he added.

These results are consistent with other studies that have investigated the likelihood of fire across the West. For example, a 2015 study published in the *Proceedings of the National Academy of Sciences* by University of Colorado scientists found that

despite extensive outbreaks of mountain pine beetles in the Rockies and the Cascades, fires in recent years were no more likely to occur in beetle-killed forests than in forests not affected by the insects.

Public perception may reflect our experience with starting campfires, said John Bailey, Oregon State professor of forestry and co-author of the Ecosphere paper.

"We choose dead and dry wood for kindling, not green branches," Bailey pointed out. "A dead branch with lots of red needles is ideal. At the scale of a forest, however, the burning process is different. Wildland fire during severe weather conditions burns less discriminately across mountainsides."

For managers of forestlands, these results suggest that emphasis needs to be put on fuel reduction, forests near communities and on preserving ecosystem services such as biodiversity and water quality. "Forests will continue to burn whether or not there was prior insect activity," Meigs and his co-authors write, "and known drivers like fuel accumulation and vegetation stress likely will play a more important role in a warmer, potentially drier future."

More information: "Does wildfire likelihood increase following insect outbreaks in conifer forests?" *Ecosphere* 6:art118–art118. DOI: 10.1890/ES15-00037.1

Provided by Oregon State University