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Mountain Pine Beetles and Fire Injured Trees

Utah Study Provides New Findings

Darren Blackford, a Forest Service entomologist in Forest Health Protection's Ogden Field Office noticed a few fire-injured trees infested with mountain pine beetles following a 2007 wildfire in northeast Utah. That observation led to a 3-year study that is providing forest managers with new and important information about how mountain pine beetle populations interact with fire-injured pine trees.

Darren notes the study—led by University of Wisconsin and Forest Service researchers and a graduate student—is a significant advance in what is known about mountain pine beetle activity in fire-injured ponderosa and lodgepole pine trees.

While it had been understood and documented that increased populations of other bark beetles, such as Douglas-fir or spruce beetles, could be expected after forest fires, up until now, significant attacks from mountain pine beetle on fire-injured pine trees in the northern Rocky Mountains had not been documented.

Once Darren and the researchers looked further at the 40,000 acres affected by the fire in the Ashley National Forest, they recognized there were significant numbers of ponderosa and lodgepole trees that were colonized by mountain pine beetles. They wondered if it was possible to predict, through statistical modeling, the likelihood of increased beetle colonization and resulting tree mortality they were seeing after the wildfire, to better understand beetle population dynamics. Such information could then be used by forest managers to reduce the potential for increased mountain pine beetle activity and tree mortality following wildfires and prescribed fires.

The goal of the study, *Evaluating and Monitoring Mountain Pine Beetle Infestation in Fire-Damaged Ponderosa and Lodgepole Pine Stands,* is to develop models to predict the probability of mountain pine beetle colonization and tree mortality based on the level of fire injury to trees. Roughly 1,800 lodgepole and ponderosa pine trees were monitored for 3 years.

Mountain pine beetles were found to be colonizing fire-injured ponderosa and lodgepole pine trees in the year following the fire, and then beetle colonization started showing up in unburned lodgepole pines 2 to 3 years after the fire.

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The study is a significant advance in what is known about mountain pine beetle activity in fire injured ponderosa and lodgepole pine trees.

"Right now, we have a nice 3- year synopsis of how the mountain pine beetle interacts with fire-injured pines, but to continue the study until populations fully collapse in the area would give a more complete understanding of the mountain pine beetle/fire-injured tree interaction."
Darren Blackford, Forest Service entomologist

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Fire injured ponderosa pine trees, and pitch tubes produced by a fire injured tree to protect from itself mountain pine beetle attack.

That finding suggests that beetle populations were initially attracted to fire-injured hosts but then became indiscriminate in host selection in following years; activity that had not been documented before. The statistical models developed through the study have identified pertinent tree and fire injury factors that influence beetle attack and subsequent mortality.

There are immediate and practical applications of the findings of the study, both for prescribed fire and post-fire salvage harvest. Forest managers considering the use of prescribed fire in forests with high populations of mountain pine beetle can use the model to look at the characteristics of fire-injured trees and local beetle populations.

They can then predict what could happen in terms of subsequent beetle activity and related tree mortality. In preparing for fire salvage harvest, forest managers can use information from the study and model to better identify trees likely to be attacked and killed by mountain pine beetles in the years following the fire.

The results of the 3-year study, funded through approximately $100,000 in forest health monitoring grants, will be submitted to professional journals for publication and presented at national forestry and entomological meetings.

Darren would like to see the study continue for a few more years until the mountain pine beetle population in the study area diminishes. That proposed continuation of the study would provide forest managers with extremely valuable information about what to expect following fires in ponderosa and lodgepole pine forests—forests that cover roughly 50 million acres across the western United States.