

New study shows effects of climate conditions on bark beetle outbreaks

November 12 2012

A recent study by a team of scientists from the U.S. Forest Service's Pacific Southwest and Pacific Northwest research stations, and the University of Idaho confirms the important role climate plays on bark beetle outbreaks. Based on three decades of bark beetle outbreaks in Oregon and Washington, the researchers developed a statistical probability model to quantify the contribution of various climate conditions, such as temperature and precipitation, on outbreak levels and to estimate expected amounts of damage to lodgepole pine forests (e.g. total area with beetle outbreaks).

Key findings, which appeared in the journal *Ecology*, include:

- Warmer winter temperatures of -5 degrees Celsius and above were associated with increased probabilities of large outbreaks and higher beetle survival.
- Optimal mean annual temperature for large outbreaks ranged from 1 to 4 degrees Celsius. Optimal temperatures are associated with synchronized emergence of beetles from parent trees leading to mass attacks of new <u>host trees</u>.
- Lower cumulative precipitation in two prior years (200mm) were associated with an increased likelihood of outbreaks. The first being likely due to <u>drought stress</u> on trees while the second is likely because of thickness of tree phloem, and hence, quantity of beetle food resource.
- A weather suitability index developed from the statistical model



indicated a 2.5 times increase in the odds of an outbreak at locations with high suitability versus locations with low suitability.

The findings of the study contribute to the broader understanding of drivers of landscape level <u>mountain pine beetle</u> outbreaks in lodgepole <u>pine forests</u>, particularly in view of future climate change projections that could significantly alter key climate related factors.

"This study was partly motivated by the need to develop a statistical model for evaluating laboratory-derived bark beetle suitability indexes at the landscape level," says Pacific Southwest Research Station scientist Dr. Haiganoush Preisler, who co-authored the report.

More information: To read the full report, "Climate and Weather Influences on Spatial Temporal Patterns of Mountain Pine Beetle Populations in Washington and Oregon," go to: <u>treesearch.fs.fed.us/pubs/42241</u>

Provided by USDA Forest Service

Citation: New study shows effects of climate conditions on bark beetle outbreaks (2012, November 12) retrieved 27 April 2024 from <u>https://phys.org/news/2012-11-effects-climate-conditions-bark-beetle.html</u>

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