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Rapid Increase in Log Populations in Drought-Stressed Mixed-Conifer and Ponderosa Pine Forests in Northern Arizona

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ABSTRACT

Down logs provide important ecosystem services in forests and affect surface fuel loads and fire behavior. Amounts and kinds of logs are influenced by factors such as forest type, disturbance regime, forest management, and climate. To quantify potential short-term changes in log populations during a recent global- climate-change type drought, we sampled logs in mixed-conifer and ponderosa pine (*Pinus ponderosa*) forests in northern Arizona in 2004 and 2009 ($n = 53$ and 60 1-ha plots in mixed-conifer and ponderosa pine forests, respectively). Over this short time interval, density of logs, log volume, area covered by logs, and total length of logs increased significantly in both forest types. Increases in all log parameters were greater in mixed-conifer than in ponderosa pine forest, and spatial variability was pronounced in both forest types. These results document rapid increases in log populations in mixed-conifer forest, with smaller changes observed in ponderosa pine forest. These increases were driven by climate-mediated tree mortality which created a pulse in log input, rather than by active forest management. The observed increases will affect wildlife habitat, surface fuel loads, and other ecosystem processes. These changes are likely to continue if climate change results in increased warmth and aridity as predicted, and may require shifts in management emphasis.

KEYWORDS

Climate Change; Fuels; Logs; Mixed-Conifer Forest; Ponderosa Pine Forest; Spatial Variability

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