

# Influence of Elevation on Bark Beetle Community Structure in Ponderosa Pine Stands of Northern Arizona

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**Abstract**—Bark beetles killed more than 20 million ponderosa pine trees in Arizona during 2002-2004. Historically, bark beetle populations remained endemic and ponderosa pine mortality was limited to localized areas in Arizona. Consequently, there is a lack of information on bark beetle community structure in ponderosa pine stands of Arizona. Furthermore, it is unknown how elevation influences the community structure of these bark beetles. Understanding the bark beetle complex at different elevations will enable development of more effective forest management guidelines.

Ten ponderosa pine stands were selected in each of three elevational zones in north-central Arizona: 1) Low ~5500 ft, 2) Mid~7000 ft, 3) High~8500 ft. Three Lindgren funnel traps were placed at each of the 30 sites. Each trap was baited with a different combination of commercially available lures developed for *Ips pini*, *I. lecontei* and *Dendroctonus* spp. Traps catches were collected weekly (April-November) during 2004. Beetles and associated insects (predators and wood borers) were identified and tallied in the lab.

A total of 31,010 pine bark beetles belonging to 15 species were trapped and identified in 2004. More than 3,000 associated invertebrate predators and woodborers were collected. Preliminary observations indicate that *Ips* species in aggregate were most abundant at low elevation sites; however, individual species showed different distribution patterns. *Ips pini* was evenly distributed across elevations while *I. lecontei* and *I. calligraphus* numbers decreased with increasing elevation. *Dendroctonus* species in sum were most abundant at mid elevations; however, again there was considerable variation in distributions on the individual species level. *Dendroctonus frontalis* was much more abundant at low to mid elevations compared with the high elevation sites, while *D. brevicornis* was the most abundant at mid elevations. Numbers of other *Dendroctonus*, such as *D. valens*, *D. adjunctus*, and *D. approximatus*, increased with increasing elevation. The two most abundant invertebrate predators collected, *Enoclerus* and *Temnochila*, also showed disparate distribution patterns across the elevation gradient. *Enoclerus* species increased with increasing elevation, while *Temnochila* were most abundant at low to mid elevation. The study will be repeated at the same sites in 2005, and will be used to determine seasonal flight periods for each species by elevation.

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In: Gottfried, Gerald J.; Shaw, John D.; Ford, Paulette L., compilers. 2008. Ecology, management, and restoration of piñon-juniper and ponderosa pine ecosystems: combined proceedings of the 2005 St. George, Utah and 2006 Albuquerque, New Mexico workshops. Proceedings RMRS-P-51. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

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