Occupancy Dynamics of Avian Species in Relation to a Mountain Pine Beetle Epidemic

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Recent epidemics of mountain pine beetles (*Dendroctonus ponderosae*) will fundamentally alter Rocky Mountain forests, impacting management decisions related to fire, logging, and wildlife habitat. We evaluated effects of a recent mountain pine beetle epidemic on occupancy dynamics of 46 avian species. Seventy-six point count stations were randomly located in four, 250 ha study units within pine (*Pinus* spp.) forests in the Elkhorn Mountains, Montana. Each point was visited 3 times during the breeding seasons (May-Jul) 2003-2006 (pre-outbreak) and 2009-2011 (post-outbreak). We used a Bayesian hierarchical model of multi-species occupancy that accounts for imperfect detection and allows for estimates of rare, as well as common species. Occupancy was modeled for all species with respect to pre-outbreak years, year since the outbreak, and proportion of ponderosa pine. Results supported our prediction that occupancy rates would increase after the outbreak for bark-drilling woodpeckers (*Picoides* spp.). Occupancy rates of foliage-gleaning chickadees (*Poecile* spp.) and bark-gleaning nuthatches (*Sitta* spp.) declined soon after the peak in beetle-induced tree mortality (2008); however, their rates began to rise within 3 years. Bark-gleaning species' occupancy relationships with ponderosa pine changed after the outbreak. Our results will help inform forest management activities for the persistence of species that evolved with large-scale disturbances.