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Biological Conservation

Volume 142, Issue 12, December 2009, Pages 3182–3190

Extinction debt or habitat change? —“ Ongoing losses of woodland birds in north-eastern New South Wales, Australia

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<https://doi.org/10.1016/j.biocon.2009.08.022>

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Abstract

The loss, fragmentation and degradation of native vegetation are major causes of loss of biodiversity globally. Extinction debt is the term used to describe the ongoing loss of species from fragmented landscapes long after the original loss and fragmentation of habitat. However, losses may also result from habitat changes that are unrelated to fragmentation, which reduce breeding success and recruitment. Many woodland birds have declined in fragmented landscapes in Australia, probably due to loss of small, isolated populations, though the ecological processes are poorly understood. We record the progressive regional loss of two ground-foraging, woodland birds, the Brown Treecreeper *Climacteris picumnus* and Hooded Robin *Melanodryas cucullata*, in northern New South Wales, over 30 years. This has happened despite most habitat loss occurring over 100 years ago, suggesting the payment of an extinction debt. Our

observations suggest that several ecological processes, caused by habitat loss, fragmentation or degradation, and operating over different time scales, have led to both speciesâ€™ declines. Female Brown Treecreepers disperse poorly among vegetation remnants, leaving only males in isolated populations, which then go extinct. In contrast, Hooded Robins suffer high nest predation in fragmented landscapes, producing too few recruits to replace adult mortality. Foraging by both species may also be affected by regrowth of ground vegetation and shrubs. We found little support for a major role played by drought, climate change or aggressive Noisy Miners *Manorina melanocephala*. We propose that both extinction debt in the classical sense and ongoing habitat change frequently contribute to speciesâ€™ decline in modified landscapes. Management to arrest and reverse such declines needs to consider these multiple causes of decline. For instance, reconnecting isolated populations may be inadequate alone, and activities such as appropriate grazing, fires and the addition of woody debris may also be required.



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Keywords

Habitat fragmentation; Brown Treecreeper Hooded Robin; Eucalypt woodland; Habitat change; Dispersal

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