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Research Paper

Regrowth provides complementary habitat for woodland birds of conservation concern in a regenerating agricultural landscape

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HIGHLIGHTS

- Bird species diversity was increased by the presence of regrowth.
- Regrowth provided complementary habitat for threatened woodland birds.
- Regrowth presents opportunities to connect remnants and restoration planting on farms.
- Appropriate management could maximise benefits of regrowth for conservation goals.

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ABSTRACT

Farmland abandonment often leads to an increase in vegetation cover in formerly cleared landscapes. In regions where forests and woodlands were cleared for agriculture, regrowth could be an effective way to increase species diversity by re-constructing a variegated landscape. Our study investigated the conservation outcomes for birds across a regenerating agricultural landscape. We compared bird composition across a range of land use and gradient of vegetation cover from cleared pasture, through regrowth sites of varying structure, to remnant forests. Bird community composition differed significantly among vegetation classes, with regrowth providing habitat for a complementary group of high conservation value species, rather than simply providing extra habitat for species that were otherwise well represented in the region. Variations in bird community composition were best explained by site variables that contributed to vegetation structure and internal patch variation. Regrowth had a higher diversity of cover than forest or pasture, and this created habitat for many woodland bird species. Regrowth vegetation may be slower to proceed, but it has the potential to complement active revegetation activities in adjacent production areas and enhance connectivity between remnant forest patches. While the benefits of regrowth are context specific, where regrowth improves landscape heterogeneity, there is great potential for conservation gains for birds.

1. Introduction

Woodland birds have declined in many agricultural landscapes due to large-scale clearance of their preferred habitat (Barrett, Ford, & Recher, 1994; Bennett & Ford, 1997; Ford, Barrett, Saunders, & Recher, 2001; Gregory et al., 2007; Hewson et al., 2007; Montague-Drake, Lindenmayer, & Cunningham, 2009; Murphy, 2003; Watson, 2011). Consequently, there has been much focus on restoration, primarily through revegetation, to halt species declines and restore ecosystem functions. Direct seeding and planting approaches require large investments and may provide only small increases in vegetation cover (Lindenmayer et al., 2012; Rey Benayas, Bullock, & Newton, 2008). However, in areas where traditional agriculture is declining, the abandonment of farmlands often leads to large areas of regrowth (also termed passive regeneration or old field succession), which has the potential to restore habitat and ecological functions over large areas (Dwyer, Fensham, Butler, & Buckley, 2009; Hobbs & Cramer, 2007a; Navarro & Pereira, 2012; Proença, Honrado, & Pereira, 2012; Rey Benayas, Martins, Nicolau, & Schulz, 2007). The addition of structural and spatial complexity from regrowth in the landscape may provide adequate habitat to help conserve woodland birds.

Numerous authors have recognised that in cleared landscapes, one of the best ways to achieve conservation gains is by re-constructing a variegated landscape with a mix of habitats to support regional species diversity (Bennett, Radford & Haslem, 2006; Hendrickx et al., 2007; McIntyre & Hobbs, 1999). In regions

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where forests and woodlands have been cleared for agriculture relatively recently (e.g. New world systems, Hobbs & Cramer, 2007a), regrowth vegetation provides great potential to achieve this. Conservation efforts tend to focus on large intact remnants and active restoration in production areas (Barrett et al., 1994); however regrowth could support these efforts, increase landscape variegation, and provide a variety of resources for birds, in addition to those present in large remnants.

Conceptually, regrowth on abandoned farmland may contribute to two conservation outcomes for birds at regional scales. It could provide supplementary habitat, and support species already present in the cleared pasture and/or the remnant forest, or it could provide complementary habitat, and support a different suite of species than in cleared pasture or remnant forests. In the latter case, regrowth would promote regional bird species diversity, rather than simply increasing the area of available habitat for species already well supported in other parts of the landscape (Arnold et al., 1999; Bowen, McAlpine, House, & Smith, 2007). Regrowth may not restore vegetation in the system to a condition that is structurally or compositionally similar to remnant vegetation (Hobbs & Cramer, 2007a). However it could provide 'novel' habitat with different resources to remnant habitats and cleared areas (Hobbs, Higgs, & Harris, 2009; McIntyre & Hobbs, 1999).

In Australia, the majority of research on bird conservation is undertaken in large reserves or planted restoration activities in production landscapes despite the potential for regrowth vegetation to support efforts in these areas (Neilan, Catterall, Kanowski, & McKenna, 2006). To date our investigation is one of the first exploring the value of regrowth vegetation for biodiversity in an 'amenity' landscape. These regions of rapid land-use change constitute a large proportion of SE Australia's transitioning agricultural landscapes (Argent, Smailes, & Griffin, 2005; Barr, 2005). Therefore it is important to understand the biodiversity value of regrowth in this landscape setting, how birds are using regrowth patches, and whether a variegated landscape with a mix of habitats can support regional species diversity. This is particularly relevant as different landholders move into the area, and there is a shift away from production (livestock grazing and cropping) to consumption uses (e.g. recreation, conservation, small hobby farms and retirement), which will influence the perceptions and the management of regrowth in the post-agricultural landscape (Mendham, Curtis, & Millar, 2012; Sharp, Spooner, Millar, & Briggs, 2012).

Our objective was to examine the contribution of regrowth vegetation to bird conservation in a regenerating agricultural landscape (Geddes, Lunt, Smallbone, & Morgan, 2011), where land use is shifting away from traditional farming to more diverse land uses (Barr, 2005). In this paper, we tested the hypothesis that regrowth provides complementary habitat and different resources to forests and pastures for the bird fauna. We did this by comparing bird composition across a range of land uses and gradient of vegetation cover, from cleared pasture, through regrowth sites of varying structure, to remnant forests. We expect our results will provide valuable insights for conservation managers working in transitioning agricultural landscapes where regrowth is increasing vegetation cover lost from prior clearing for agriculture.

2. Methods

2.1. Study area

The study was in central Victoria, Australia, and covers approximately 110,000 ha between the townships of Rushworth (36°35′ S and 145°0′ E) and Heathcote (36°, 55′ S and 144°42′ E) (Fig. 1.). The centre of the region supports a large Eucalypt forest remnant on public land (43,615 ha) and the region surrounding the study area supports intensive agriculture including grazing and irrigated cropping. Since European settlement, the landscape within the study area has lost about 60% of native vegetation cover, mostly dry

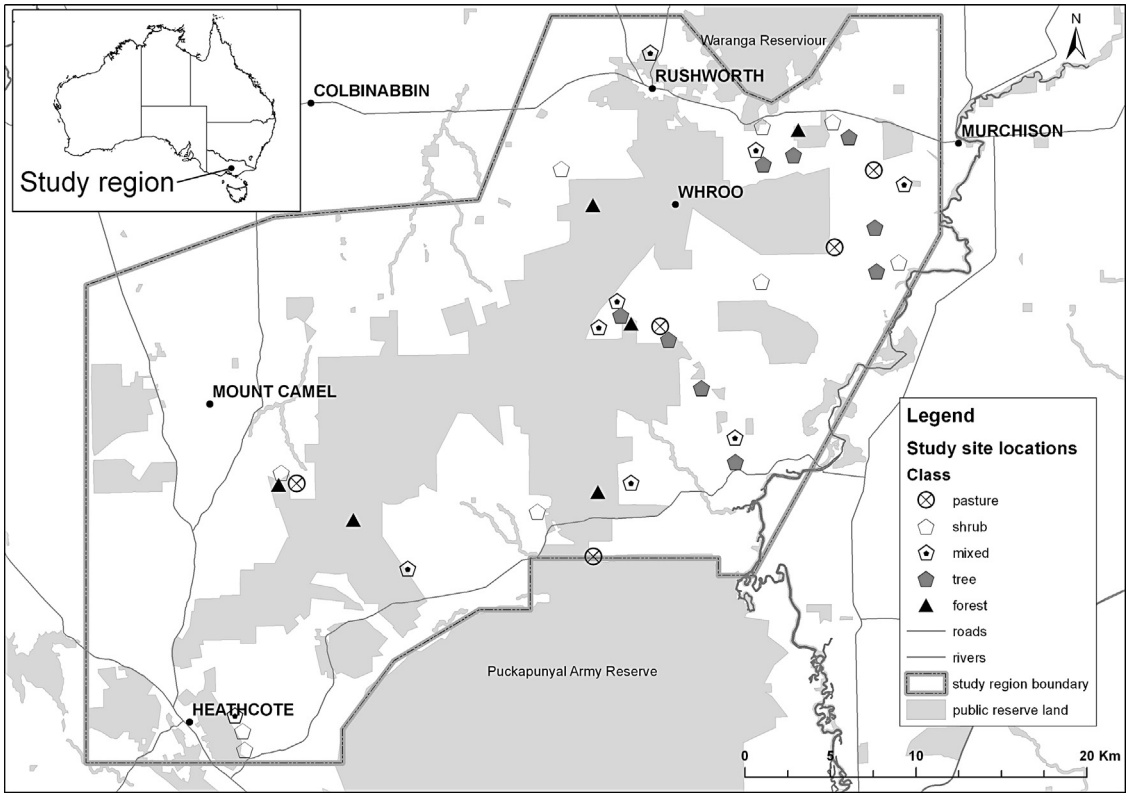

Fig. 1. Map of study region showing study region boundary, public reserve land, and the location of the 38 study sites using vegetation class.