Maximising woodland bird diversity
in Brigalow Belt forests

This fact sheet written by Alison Howes and Dr Martine Maron presents findings from a project undertaken in the Brigalow Belt bioregion in central Queensland. Primary study sites were on Bush Heritage Australia's Carnarvon Station Reserve and the adjoining Carnarvon National Park.

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The Brigalow Belt is a national biodiversity hotspot, and its extensive forests and woodlands are potentially significant refugia for fragmentation-sensitive birds. But our understanding of optimal management for biodiversity conservation and the specific threats facing woodland birds in the area is limited. In particular, management of the aggressive noisy miner is a major challenge throughout the region, despite the species typically being associated with fragmented landscapes.
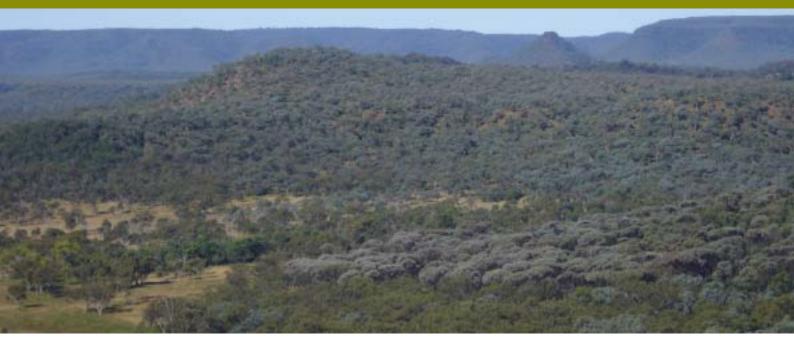
This project aimed to determine the interactions among fire, grazing and habitat structure, and their influence on noisy miner presence and woodland bird assemblages. Outcomes from the study will aid in development of land management principles and intuitive, user-friendly decision-support tools with the potential for application across the Brigalow Belt region.

Project results and significance

- While noisy miners are typically associated with highly fragmented and degraded vegetation, the species was abundant throughout 90% of the intact woodland study region.

- Small passerines (a category which included several threatened and declining species) were most abundant in sites with high understorey cover, low grazing pressure and few noisy miners.

- Although habitat structure was important in determining small passerine abundance, noisy miner abundance, independent of habitat structure, was the most influential factor.

- Grazing by feral herbivores and an open habitat structure (often indicative of frequent burning) were the most important factors determining noisy miner abundance.

- The ability of the Bayesian Belief Networks (BBNs) to correctly predict outcomes for temporally and spatially independent cases was high, confirming the usefulness of the models across a large area.
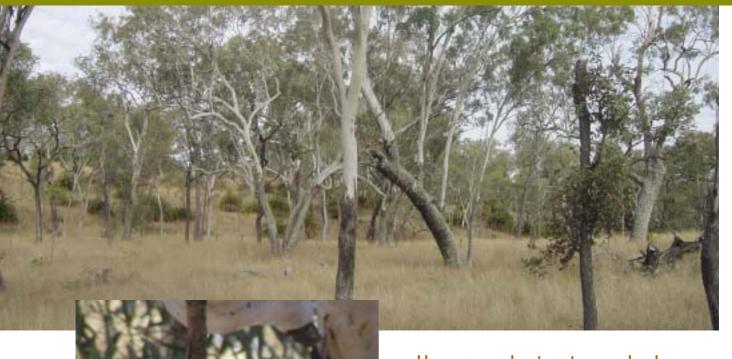
Management options

1. Reduce grazing pressure from feral horses and cattle across conservation land in the Brigalow Belt.

2. Remove cattle and feral herbivores from state forests being converted to conservation tenure as a matter of priority.

3. Allow the development of more structurally complex vegetation through modification of burning regimes, including those currently implemented in state forests which will be converted to a conservation tenure.

4. Investigate the potential for incentive payments to graziers to reduce grazing pressure on ecologically significant parts of their properties.

How do extensive land management practices interact with noisy miners to impact woodland bird ecology in subtropical forests and woodlands?

Small passerine birds have received relatively little attention across subtropical Australia compared with the more fragmented landscapes of the temperate agricultural zone. Extensive research has emphasised the negative impacts of habitat fragmentation and clearing, and it is easy to assume that the relatively intact, continuous forests and woodlands of the Brigalow Belt must represent high-quality habitat about which we need not be particularly concerned.

However, this research has highlighted that the major mechanism through which fragmentation impacts small passerine populations in fragmented, temperate Australia is equally important throughout the Brigalow Belt woodlands. Sites without noisy miners had on average 3.5 times more small passerine species and 5.5 times more individuals than sites with noisy miners. Noisy miners are advantaged by habitat disturbance which results in a more open vegetation structure, and this research has demonstrated that such disturbances are facilitating high noisy miner abundances even throughout protected areas in which pastoral activities have long ceased.

3

How can we best restore and enhance habitat values for subtropical woodland birds, especially during transition from production to conservation tenure?

There is a common perception that the vegetation of subtropical Australia prior to European intervention had an open, grassy structure, and that therefore, managing the vegetation to achieve such a structure should result in multiple conservation outcomes. This research suggests that from the perspective of woodland birds, this is far from ideal. The denser, 'thickened' vegetation provides an important refuge for small passerine birds.

To improve conservation outcomes for woodland birds in the Brigalow woodlands, fire management needs to allow for some areas to develop a shrub layer and a general thickening of vegetation. As more open parts of the woodlands are important habitat for grassland species such as bustards, an optimal management strategy would create a mosaic of habitats of varying structural complexity.

Although cattle were removed from part of the study area as part of the restoration process on Carnarvon Station Reserve, the impact of feral grazers (especially horses) is still significant. The reduction in ground cover and understorey density as a result of feral grazing affects many bird species and reduces the availability of important nesting materials, shelter and food resources. Feral grazing must be addressed for effective habitat restoration to be achieved in the Brigalow Belt woodlands.

In particular, this study has demonstrated how habitat structure, habitat disturbance and management through burning regimes influence avian biodiversity, largely through their interaction with noisy miners. Reducing the complexity and density of vegetation through frequent burning, in combination with feral grazing, produces a habitat structure highly suitable for the noisy miner. The avifauna of woodland that is subject to regular burning and grazing therefore consists mostly of large-bodied species tolerant of the noisy miner and few small woodland-dependent species.

Complexity in understorey shrub species provided features which favoured small passerines over noisy miners. Mt Moffatt National Park. Photo Rob Ashdown.

How can we best communicate and disseminate knowledge about optimal woodland management practices for avian biodiversity to a variety of land managers?

The management strategies discussed above have been incorporated in a credible and fully validated predictive Bayesian Belief Network model for woodland bird responses to habitat alteration in woodlands of the Brigalow Belt, providing a useful communication tool for land managers. The BBN acts as a graphical representation of the system, and has the ability to predict species responses to habitat change under hypothetical management scenarios. This means land managers can easily assess hypothetical management actions and determine the most desirable course of action. BBNs also have the ability to incorporate new data and information in the form of collected empirical data and/or expert knowledge. Thus the models can constantly be updated in light of new information.

The BBN model is being used to discuss with land managers management options for reducing the abundance of noisy miners and improving habitat quality for woodland birds. Considerable interest in the decision tool has been expressed, and it is anticipated that with the dissemination and wide use of the model and accompanying recommendations for woodland management, significant improvements in habitat suitability for woodland birds can be achieved across large areas of the Brigalow Belt.

Conclusion

In the context of widespread ongoing woodland bird declines, realising the conservation potential of the Brigalow Belt woodlands is a challenge of national significance. The noisy miner is a key obstacle to achieving this, and vegetation management must aim to reduce its abundance through reducing the impact of feral grazers on conservation land and potentially other public land across the region. Incentives could be provided for private graziers to establish low-intensity grazing on parts of their properties with potential for re-establishment of an intact shrub layer. As the noisy miner is so strongly linked to both management activities and target bird assemblages, it can act as a useful and easily detected indicator of woodland suitability for small passerines. Its status as a 'reverse keystone' means that changes in management could be easily assessed for their effectiveness through monitoring of noisy miner densities.

In addition to managing woodlands for a reduction in noisy miner abundance, conservation managers need to consider strategies that achieve a mosaic of different habitat structures that accommodate a suite of different species' requirements. Varying the timing, frequency and intensity of burning will be important in creating such a habitat mosaic. Allowing some areas to 'thicken' will provide a variety of resources and nesting materials, as well as shelter from noisy miners, for threatened and declining small passerines, while other areas can be managed for priority species with different requirements.