Science for Saving Species

Research findings factsheet

Project 1.2.1.2

Threatened Species Recovery Hub

National Environmental Science Programme

Can culling noisy miners save declining small woodland birds in fragmented temperate woodlands?

In brief

Since European arrival, the noisy miner, a hyper-aggressive Australian honeyeater, has become overabundant. This honeyeater's preferred habitat is small patches of open woodland with limited understorey, and it is very successful in the fragmented and degraded open woodland habitats common in agricultural landscapes in eastern Australia.

Noisy miners work in groups to aggressively drive other birds away from their territory. The high numbers of this native species have had a negative impact on small woodland birds that feed on insects and nectar, many of which are declining and threatened.

Noisy miners are associated with breeding failure for vulnerable species of small woodland birds, mainly through aggressive disruption of their nesting activity, but also through active predation of nests.

We undertook an experimental cull of noisy miners, and rigorously monitored rates of harassment to determine whether this is the reason that small woodland birds are not able to access resources in sites colonised by noisy miners.

We also monitored changes in foraging and breeding success of small woodland birds after the culls, as improved opportunities for foraging and breeding will be essential if vulnerable species are to recover in the longer term.

We found that culling is ineffective and did not reduce the numbers of noisy miners or their impact on small woodland birds. We recommend well-designed ecological restoration that promotes a shrubby understorey as a more effective method of deterring noisy miners and improving the prospects of declining small woodland birds.

The noisy miner cull underway. Photo: Jenny Pierson

Background

Competition between species is an essential part of evolution, and can strongly influence which species occur where and their numbers. When competition is influenced by human-induced modification of habitats, however, this natural process can become a threatening process.

Since European arrival, about 85% of temperate eucalypt woodlands have been lost in what is now the sheep–wheat belt of eastern Australia. This reduction of habitat has caused drastic declines in the abundance of many small (< 63 g) native woodland birds. The type of landscape created when native woodland is cleared for grazing – small (under 300 ha) patches of eucalypt woodland with minimal understorey – favours one hyperaggressive native bird, the noisy miner, and its populations have greatly expanded.

Noisy miners are a medium-sized bird (around 70 g) that live in these woodland fragments all year round. They live in colonies and defend their territories co-operatively and persistently from other species that present competition, mostly smaller woodland birds. So concerning is the way noisy miners aggressively exclude declining small woodland birds from woodland habitat that

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Background (continued)

this was listed in 2014 as a Key Threatening Process under federal conservation legislation (the EPBC Act).

Noisy miners also disrupt nesting of small woodland birds, including some species of conservation concern, causing breeding failure. The negative impacts of noisy miners on woodland birds begin at low densities of noisy miners (0.6–0.8 birds per ha) and apply across an area of more than 1 million km^2 of eastern Australia.

Some ecologists in recent decades have advocated culling of noisy miners to help make woodland habitat available to small woodland birds to avert their further decline and possible extinction. However, while such culling is an intuitively attractive response that is already being practised to manage this Key Threatening Process, poor monitoring has meant that its ability to improve outcomes for woodland birds, in particular their breeding success, was not well understood.

A further concern about culling overabundant or invasive species, observed in studies worldwide, is that it can be ineffective or have unwanted consequences, such as the species responding in compensatory ways or an increase in other species with problematic impacts.

Experimental work in the 1990s showed some benefits to other woodland birds following translocation or culling of noisy miners, but the studies used only a few replicates, one had no control, and they included the responses of some birds that are little impacted by noisy miners, such as white-winged choughs, red wattlebirds and friarbirds. While those species are sometimes attacked by noisy miners, they are larger birds that can coexist with them. Additionally, one researcher reported on the effects of two uncontrolled unofficial culls, but the results are not applicable to a larger scale. A more recent large-scale study in an agricultural landscape conducted concurrently with this one reported immediate recolonisation following culling. Localised targeted culling of noisy miners may be effective in areas where connectivity with sources of noisy miners is limited as this slows the rate of colonisation. Sustained localised culling has also been shown to be effective.

Appropriate ecological restoration has been shown to deter noisy miners and support populations of small woodland birds. Such actions are slower and costlier than culling but likely to be more successful in the long term.

BELOW RIGHT: Noisy miners aggressively exclude small woodland birds from their woodland habitat. Image: Pete Richman CC by 2.0 Flickr

Research aims

We aimed to establish whether patch-scale culls of overabundant noisy miners benefit small woodland birds. In particular, we wanted to see whether culling noisy miners increases the breeding success of small woodland birds by reducing predation by noisy miners on nests or by increasing habitat availability.

What we did

To ensure that we could distinguish the effect of the cull from natural annual fluctuations, we used a rigorous experimental design that included detailed monitoring before and after culls at multiple sites and at un-culled "control" sites.

In the winter of 2016, we removed noisy miners from eight small fragments (average 13 ha) of remnant box gum woodland on farmland in the South West Slopes Bioregion of New South Wales in the sheep–wheat belt of eastern Australia. We matched these treatment sites with eight similar control sites on the same farms.

We removed birds by shooting, until there was no response to a 45-minute playback of their call, a good indicator that none of the species is in hearing range.

During the breeding season before the cull and for 12 months after it, we set the following clear, measurable goals for monitoring:

- the abundance of noisy miners
- the rates at which noisy miners predated on artificial nests (as a measure of impact on real nests)
- the foraging rates of small woodland birds
- the rates at which noisy miners harassed all species.

We also did modelling to show the responses of these variables to noisy miner abundance.

Key findings

Our key finding was that in this highly fragmented agricultural landscape, which is the dominant landscape type in which noisy miners impact small woodland birds, culling noisy miners is not an effective way of increasing habitat availability for small woodland birds.

The cull had only a minimal effect on the abundance of noisy miners, as they immediately recolonised the sites, likely due to a "vacuum effect", where birds in marginal habitat around treatment patches move into the vacant territory post-cull.

We attempted to remove noisy miners a second time within three weeks of the first cull, but again the birds recolonised immediately. This finding is similar to results from a number of other culls of different scales in Victoria, New South Wales and Queensland. We retained the bodies of all culled birds for future genetic studies, which could help us better understand relationships between the birds culled and those of the two waves of recolonisation.

Our modelling showed that the abundance of noisy miners declined by 22% at the culled sites, while it increased by 4% in the control sites during the post-cull period. Although this shows that culling reduced the abundance of noisy miners, the density of noisy miners remained three to five times higher than the 0.6–0.8 birds per ha threshold at which noisy miners begin to have a negative impact on small woodland birds.

Even low densities of noisy miners have an extreme effect on small woodland birds, so the small reductions achieved by culling points to culling having little real benefit.

Richard Beggs setting up a motion detection camera to monitor predation rates of an artificial nest. Image: Richard Beggs

We found no decline in the rate at which noisy miners predate on artificial nests following culling. While they are not the only bird that predates the nests of smaller birds, we found that noisy miners accounted for 18.3% of total artificial nest predation, where we could identify a predator. This suggests that culling noisy miners is unlikely to improve the breeding success of small woodland birds.

While noisy miners are likewise not the only species that display aggressive behaviour towards other birds in these woodland settings, we found that they were, however, responsible for 66% of all aggressive interactions in the pre-cull period. Unexpectedly, we found no decline in the rate at which noisy miners harassed small woodland birds post-cull, and even a small increase in total harassment rates.

We observed a doubling in foraging rates of a small number of small woodland birds post-cull for up to six months – the white-plumed honey-eater, weebill and willie wagtail. These are among the most common small woodland birds, and are apparently better able to coexist with noisy miners than other less common species. White-plumed honey-eaters and willie wagtails are themselves aggressive species, and the only small woodland birds that we observed harassing noisy miners.

However, it is difficult to draw firm conclusions about any relationship between the consistent rates of harassment and the increased rates of foraging, due to low detection rates of incidents of harassment and of foraging by small woodland birds, and the generally high density of noisy miners at sites after culls.

BELOW: Richard Beggs surveys one of his woodland treatment sites for noisy miners. Image: Jenny Pierson

Implications and applications

These findings are relevant for environmental managers with responsibility for maintaining biodiversity in agricultural landscapes. Such degraded, fragmented areas may have only a limited capacity to support the recovery of threatened woodland birds without active conservation action.

For such landscapes, culling noisy miners is of very limited benefit to small woodland bird communities. Well-designed ecological restoration is a far more expensive and resource-intensive activity than culling but is likely to be a more successful long-term strategy for improving habitat for small woodland birds. Habitat restoration that includes a shrubby mid-storey has been found in other studies to provide the benefit of deterring noisy miners.

Our findings also highlight how important it is to have experimental evidence to inform management responses before attempting to apply intuitively attractive but untested methods to the conservation of species.

Trialling unproven methods using a rigorous experimental approach is important to prevent the waste of large amounts of conservation effort and funding.

The noisy miner, possibly Australia's most successful native bird species. Unfortunately, its success is at the expense of many other woodland species. Image:JJ Harrison, CC BY-SA 3.0 Wikimedia Commons

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Further Information

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