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Received 18 January 2007; accepted 16 February 2007

Challenges in managing miners

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Abstract
Three of the four members of the genus Manorina have been linked to declines in bird diversity and abundance; they are the Noisy Miner *M. melanocephala*, the Bell Miner *M. melanophrys*, and the Yellow-throated Miner *M. flavigula*. The negative influence of these species in remnant vegetation appears to be spreading in eastern Australia. Some habitat restoration and revegetation programs have the potential to exacerbate the problems associated with these species by inadvertently creating additional habitat for them to dominate. Better understanding of the habitat preferences of miners can guide restoration efforts so that they decrease the likelihood of undesirable outcomes. This contribution is based upon an article that appeared in the *State of Australian Birds Report 2006*, as a supplement to *Wingspan* vol 16, no. 4, 2006. (*The Victorian Naturalist*, **124** (2), 2007, 102-105)

Watching a Noisy Miner *Manorina melanocephala* saunter confidently down a Macquarie Street footpath in central Sydney, picking up lunchtime scraps, one gets the distinct impression that this bird 'owns the place'. Regrettably, for much of eastern Australia this has become the case, to the detriment of many other native birds. Noisy Miners belong to the genus *Manorina* (not to be confused with the introduced Common Myna *Acridotheres tristis* from India). Members of this genus of native honeyeater are renowned for living in complex colonies of kin (Dow and Whitmore 1990; Painter *et al.* 2000) which aggressively defend their communal territory from virtually all other species of bird (Dow 1977). While the Noisy Miner is probably the most familiar member of the genus to most Australians, its close relatives the Bell Miner *M. melanophrys* and the Yellow-throated Miner *M. flavigula* have also been implicated in major changes in bird communities and habitats in different parts of the country (Chandler 1922; Loyn *et al.* 1983; Loyn 1987; Clarke and Schedvin 1999; Ewen *et al.* 2003). Ironically, expansion of the range of the Yellow-throated Miner into formally continuous mallee habitats, has contributed to the decline of the fourth member of the genus, the endangered Black-eared Miner *M. melanotis* (Joseph 1986).

The Noisy Miners' communal defence is so effective that they commonly achieve a virtual monopoly on any piece of habitat they choose to colonise (Dow 1977). Unfortunately, their domination of both rural and urban landscapes is increasing. They are what author Tim Low (2002) has labelled one of the native 'winners' from white settlement, and their ascendancy has

contributed to many other species becoming 'losers'. Although their range within Australia does not appear to be increasing dramatically according to the New Atlas of Australian Birds (Barrett *et al*. 2003), it is their increasing domination of remnant vegetation *within* that range that is of major concern. Some researchers suggest the vast majority of remaining Box woodlands in northern Victoria and southern NSW are already dominated by Noisy Miners (I. Davidson, pers. comm.).

Although it is hard to determine, Noisy Miners were probably much less common prior to white settlement than they are today. Their preferred habitat was probably clumps of eucalypts adjacent to open grassy clearings, not too far from water. Clearing of woodlands and forests for agriculture and urbanisation has inadvertently created tens of thousands of hectares of prime Noisy Miner habitat: lots of grassy clearings edged by eucalypts. Being the adaptable generalists they are, they continue to colonise more and more habitat, to the exclusion of many other native species, some of which, like the endangered Regent Honeyeater, are left with few places to forage unmolested by Noisy Miners.

For many years researchers recognised that where Noisy Miners were present in small remnant woodlands, other small insectivorous birds were less abundant (Dow 1977; Ford and Bell 1982; Ford 1985, 1986; Loyn 1985, 1987; Catterall *et al.* 1991). However, it was unclear whether the absence of small birds was due to the habitat being so degraded that only Noisy Miners could live there, or that the Noisy Miners were excluding the other species. An experimental study conducted by Grey *et al.* (1997, 1998) demonstrated categorically that Noisy Miners were excluding the other species. Upon removal of Noisy Miners from small remnant woodlands, a multitude of small insectivorous birds immediately flooded in and utilised the resources previously unavailable to them. Our research in Grey Box remnants indicated that the level of leaf damage from herbivorous insects decreased following the removal of Noisy Miners, compared to control sites (Grey *et al.* unpubl. data). Through excluding small insectivorous birds from remnant woodlands, Noisy Miners may be contributing to rural tree decline if their territorial behaviour ultimately reduces the level of predation upon defoliating insects. It is likely that the spread of eucalypt dieback will accelerate if there is a further decline in avian diversity in rural and urban landscapes. This is an issue of economic importance to agricultural communities, not just one of aesthetics.

Widespread removal of Noisy Miners from the landscape is not feasible. However, if we understand what makes a site attractive for colonisation by Noisy Miners, we can at least attempt to avoid creating more habitat that suits them. Although Noisy Miners have long been regarded as an 'edge species', until recently there has been little research done to identify how far from edges they will penetrate into remnant vegetation (Piper and Catterall 2003), nor the kind of edges they prefer. Work in both Queensland (Piper and Catterall 2003) and Victoria (Clarke *et al.* unpubl. data) has revealed the disturbing picture that Noisy Miners will commonly dominate as much as 150-300m in from a remnant's edge. This has profound implications for: a) the size remnants need to be to have any 'Noisy-Miner-free' core habitat (> 36 ha) and b) for the width habitat corridors need to be if they are to avoid being dominated by Noisy Miners (> 600 m). Additional research has shown that along remnant edges Noisy Miner colonies typically occur at corners of the remnant, where corridors join the remnant or where clumps or protrusions of canopy vegetation extend into the paddock from the remnant (Taylor 2005).

A major focus of many revegetation efforts to date has been the creation of habitat corridors connecting patches of remnant vegetation to facilitate the movement and dispersal of wildlife across the landscape. Although the studies mentioned above suggest Noisy Miners are very likely to dominate such corridors and diminish their value as dispersal routes for small insectivorous birds, such habitat connections are still extremely important for the conservation of other wildlife such as small mammals and reptiles. In addition to planting corridors of eucalypts, habitat restoration efforts should consider measures for making corridors and the edges of remnants less attractive to Noisy Miners.

Hastings and Beattie (2006) suggest eucalypt plantings supplemented with both bipinnate acacias and a shrubby understorey are less attractive to Noisy Miners. Taylor's (2005) research suggests we should be avoiding the creation of corners, clumps and protrusions in revegetation efforts. Steps could also be taken to enclose protrusions within 100 m of the edge and revegetate out to these new boundaries, with the objective of 'rounding' and 'smoothing' the perimeter of the remnant (Fig. 1). Such extensions of the boundaries of remnants could also preserve isolated hollow-bearing trees in paddocks.

Research we have conducted in the Mallee regions of north-west Victoria suggest the Yellow-throated Miner of the semi-arid and arid zone is having a somewhat similar impact to that of the Noisy Miner (Clarke *et al.* unpubl. data). Yellow-throated Miners are monopolising the thin road-side strips of remnant vegetation that run between the vast paddocks cleared for cereal cropping and grazing. Even small groups of miners (5-10) can successfully exclude the majority of small insectivorous birds that would otherwise move along these vitally important habitat corridors. There is an urgent need to create miner-free refuges in these landscapes, if we are to maintain the remaining diversity of birds.

A third member of the genus, the Bell Miner, has long been linked to eucalypt dieback in forest habitats along the east coast of Australia from Melbourne to Bundaberg (e.g. Chandler 1922). The expansion of the dieback associated with the presence of Bell Miners over the last decade has been so dramatic that it has earned its own acronym – BMAD – Bell Miner Associated Dieback! Tens of thousands of hectares of forest in north-eastern NSW and south-eastern Queensland are affected (Wardell-Johnson *et al.* 2005). Removal experiments by Loyn *et al*. (1983) and Clarke and Schedvin (1999) demonstrated that through their territorial exclusion of other insectivorous species of birds, Bell Miners allow sap-sucking bugs called psyllids to multiply into major infestations that contribute to the death of some canopy tree species. While it is tempting to blame the Bell Miners for this habitat degradation, that begs the question of what it is about a site that predisposes it to hosting an infestation of psyllids (Bell Miner-enhanced or otherwise). It is known that psyllids are phloem feeders that gain their nitrogen from free amino acids and other soluble nitrogen compounds. Young and epicormic foliage of eucalypts is rich in these compounds. This has led people to postulate many different kinds of disturbances that might result in eucalypts putting on a flush of young or epicormic growth that is inadvertently attractive to psyllids, and then Bell Miners (see review by Wardell-Johnson *et al.* 2005). These include stress due to changed hydrological conditions (water-logging or drought), soil pathogens (such as Cinnamon Fungus

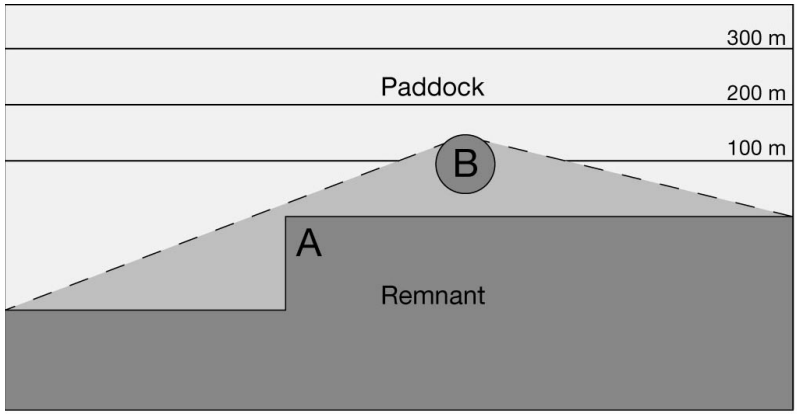

Fig. 1. The edge of a large remnant with two projections: A – a corner and B – a clump. The broken lines highlight the perimeter of the proposed revegetation extending into the paddock, enclosing both projections, and smoothing the remnant

Phytophthora cinnamomi), elevated nutrient levels in the soil, the absence of frequent low-intensity fires, competition from weeds, and micro-climatic changes associated with forest fragmentation and clearing.

While some have advocated the removal of Bell Miners, this does not always result in the recovery of the trees (Clarke and Schedvin 1999). If the psyllid burden is not the primary reason the trees are stressed on a site then they are unlikely to recover just because the psyllid burden is removed. Much more research is needed to identify the factors that predispose a site to infestation by psyllids and colonisation by Bell Miners. Such research should clarify what role, if any, human activities have in making a site attractive and what can be done to avoid or redress any imbalance created.

In conclusion, it must be stressed that these three species of native miner are not behaving in some aberrant manner. They are simply behaving as miners have probably behaved for millennia on this continent. It just happens that we have altered landscapes in ways that have profoundly tipped the balance in their favour – at great cost to many other species. How we have changed the landscape to favour Noisy Miners and Yellow-throated Miners and what can be done to limit the impact these birds have is becoming clear. Whether we will take responsibility for rectifying the mess we have created is less certain.

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Received 12 October 2006; accepted 25 January 2007