



# facing extinction

The birds of southern Australia's agricultural zone are running out of places to live and breed. Steve Davidson counts the losses.

Australia's bush birds are in trouble. Only one mainland Australian bird species has gone extinct since Europeans arrived, but bird faunas in many regions are in decline, and more species will vanish if trends continue. An essential first step to reversing the decline is to cease broad-scale land clearing in heavily-cleared parts of southern Australia, at least until its effects are better understood.

This is the collective view of leading Australian ecologists, ornithologists and biologists following recent reviews of the causes and extent of bird declines across the southern agricultural zone.

The researchers include Professor Hugh Ford of the University of New England, Dr Geoff Barrett of Birds Australia, Dr Denis Saunders of CSIRO Sustainable Ecosystems, and Professor Harry Recher of Edith Cowan University.

They say many species typical of the cropping and sheep-grazing belt are threatened, and others have retreated north. Some once widespread species are locally and, in some instances, regionally extinct.

Harry Recher predicts Australia will lose half of its terrestrial avian biodiversity in the 21<sup>st</sup> Century.

'Over most of southern Australia, entire avifaunas are threatened with extinction and,

when allowance is made for regional habitat loss and degradation, 30–90% of bird species across the continent have declined in abundance,' he says.

Other birds, such as the currawong and galah, have increased greatly, a factor seen by Recher as further evidence of ecological malaise.

He says our impact on the bird fauna at local, regional, state and continental scales has been underestimated, despite almost one in five bird species being listed as threatened or of 'special concern'.

Part of the problem is that we tend to focus on a small number of easily identified, conspicuous or charismatic birds, while most land birds are small, brown and barely noticed.

Species that have declined across southern Australia include nectar-sipping honeyeaters, seedeaters, birds of prey, ground-nesters and ground-foraging insectivores. In the wheatbelt of Western Australia, birds that feed on invertebrates and depend on native vegetation have been especially hard hit.

Regardless of the threats they face, this silent majority of inconspicuous little birds may never be officially recognised as threatened, yet many of them are struggling, and they are crucial to healthy ecosystems.

The southern emu-wren inhabits the heathlands, grasslands and woodlands of coastal south-eastern and south-western Australia and is vulnerable to land clearing and habitat fragmentation.



# Hollow histories

DESPITE that fact that Australia has no woodpeckers or similar feathered tree excavators, 18% of our birds, including some duck species, nest in tree hollows and 11% are obligate hollow nesters.

The Australian bird fauna is three times more dependent on hollows for nest sites than North American birds.

Clearly, old trees with nest hollows, usually constructed by fungi or termites, are an important resource for many native birds. But it takes about 130 years for a gum tree to develop hollows large enough for a cockatoo, so existing aged trees are a valuable natural asset.

Nearly 25 years ago, Denis Saunders and some colleagues examined a 15-hectare patch of remnant woodland in the WA wheatbelt as part of a study into the ecology of black cockatoos.

The remnant, dominated by salmon gum but also containing other eucalypts and a shrub understorey, was an important nesting area for the district's cockatoos, including two endangered species, Carnaby's cockatoo and the Major Mitchell cockatoo.

In 1978, the scientists searched the patch for trees having hollows at least 90 mm in diameter and 90 mm deep and the condition of these trees was rated on a scale ranging from good and healthy to dead.

In 1981, more data on the size and condition of 682 gums were recorded and, in 1997, the scientists revisited the area to record the condition of surviving trees.

During this time the unfenced woodland, in a paddock used for cropping and sheep grazing, was treated in a manner typical of remnants in the wheat-sheep zones of Australia. No further clearing occurred after the 1970s.

So how did trees in the patch of woodland change over two decades?

Unfortunately, the condition of the trees seriously declined. Few of the large trees fell into the 'good' category by 1997. Worse still, there was no evidence of any regeneration (seedlings or suckers) of woodland trees since 1929, when the patch was isolated and livestock allowed in to graze.

The researchers say this deterioration of dominant trees, many bearing hollows, is typical of native vegetation remnants across vast areas of the continent in the extensively cleared wheat-sheep regions. And the future looks bleaker still.



Above: A purple-crowned lorikeet.

Right: Cockatoo eggs in a tree hollow.

Many Australian birds rely on tree hollows for nesting, but too many of these venerable trees are disappearing and are not being replaced.



Based on the rate of decline between 1978 and 1997, statistical analysis of the data predicts that only 11% of the salmon gums present in 1981 will survive to 2125. For less abundant York gums, the figure is 17%, with only one lone tree predicted to be in good condition by then.

Looking at hollows, by 2016, there are likely to be no salmon gums with large hollows in good condition.

This pitiful outlook for trees in remnant patches of grazed woodland also presents a grim picture for birds relying on woodland trees for shelter, food or nest sites.

Their old trees with hollows are disappearing and younger trees are failing to reach the age at which they would begin to form hollows. These vanishing trees are not being replaced by regeneration.

'The first rule of management of these woodlands should be to protect all

remaining vegetation, in the first instance by fencing remnant patches to exclude grazing,' Saunders says. 'Instead of benign neglect, they need active management that fosters regeneration of vegetation and counters various threatening processes.'

'Landholders need incentives to look after remnants on their properties in this way. Without a change in attitude, the future looks bleak for woodlands and wildlife alike.'

## More about remnant habitat

Saunders DS Smith GT Ingram JA and Forrester RI (in press) Changes in a remnant of salmon gum *Eucalyptus salmonophloia* and York gum *E. loxophleba* woodland, 1978 to 1997. Implications for woodland conservation in the wheat-sheep regions of Australia. *Biological Conservation*.

## Why the decline?

At a broad level, ecologists agree that the main causes of bird decline in agricultural regions are habitat loss, fragmentation and degradation due to human activities.

Each of these can reduce bird numbers, isolate populations and deprive them of key resources such as food and nest sites. They can also influence processes such as nest and other predation, weed invasions and competition for nest hollows.

The disproportionate loss of some habitat types, such as woodlands and species-rich riverbank vegetation, has favoured some species over others.

Species that flit between several habitats are also at risk. Many nectar-feeding honeyeaters and lorikeets move between habitats that, over time, provide a sequence of flowering plants offering nectar. Lose one such habitat, perhaps a crucial area of a particular banksia or eucalypt, and these birds will struggle. The regent honeyeater is one example.

The effects of habitat loss can be compounded by extreme events such as drought and fire. During drought in the early 1980s, the peaceful dove, red-browed finch and double-barred finch all disappeared from a well-studied vegetation remnant in the New England district.

## Fragments of living space

In most agricultural regions, remnant native vegetation exists in thousands of patches. Each patch varies in size, shape, position in the landscape, ownership, plant and animal composition, management history and degree of degradation.

For example, most vegetation remnants in the WA wheatbelt span less than 20 hectares, are grazed by livestock, retain little understorey, and have altered microclimates. Different bird species view these fragmented landscapes in different ways.

Some species don't dare to cross even narrow gaps between habitat patches. To them the landscape appears highly fragmented, with yawning gaps that trap and isolate them.

The singing honeyeater, however, sees a continuous range of habitat patches. It will happily visit fragments more than a kilometre apart, a trait that has aided its survival in the WA wheatbelt.

Another species undeterred by fragmentation is the noisy miner, a loud and aggressive honeyeater that harasses other



birds. It has prospered because it is a bird of forest edges, and vegetation fragments have relatively more edge.

This has become a significant determinant of bird diversity. Where the noisy miner occurs, few birds dare cohabit. Small insectivorous songbirds and honeyeaters are particularly poorly represented near noisy miners.

On the other hand, experimental removal of noisy miners from patches of eucalypt forest and woodland, by La Trobe University scientists, has led to increases in abundance of other birds.

## Neighbourhood watch

Lesley Brooker and Michael Brooker of CSIRO Sustainable Ecosystems have studied the blue-breasted fairy-wren in the WA wheatbelt. They found the landscape they studied could be divided into neighbourhoods, based on degrees of connectivity.

**Top:** A typical landscape in the agricultural zone: fragments of native vegetation along roadsides and in paddocks.

**Above:** Michael Brooker and Lesley Brooker of CSIRO Sustainable Ecosystems have found that female blue-breasted fairy-wrens are more likely to move between habitat remnants in the wheatbelt than males and that bird losses are greater when neighbouring remnants are poorly connected.

About 14% more dispersing birds were lost from the poorly connected areas than from a 'well-connected' neighbourhood. These losses, due to mortality during dispersal, or birds leaving altogether, would cause population decline if the whole landscape was poorly connected.

The researchers suggest that for bird species with poor dispersal capacity living in fragmented habitats, the absence of an adequate network of corridor vegetation could be the most important factor contributing to a species' decline.

A Queensland Parks and Wildlife study conducted in the heavily cleared Brigalow woodlands found that animals tolerant of disturbance usually occupied small patches and isolated strips of remnant vegetation.

The more abundant bird species were mostly large and highly mobile, with broad diets, and needs met by simplified vegetation. The disadvantaged species included those with specialised nesting and feeding requirements: birds needing a large home range and a mixture of vegetation layers.

Research across southern Australia confirms that many birds have a tenuous hold on life as a collection of small populations, confined to remnant patches.

These populations are often too small to be viable, and the remnants too isolated to be recolonised if the population expires. They are likely to decline over time. If they continue to disappear, we will inevitably witness loss of species from whole regions.

### Turning the tide

The inexorable decline of birds in woodlands has not gone unnoticed. Community groups around the country – Birds Australia, Greening Australia, landcare groups, farmers, and many others – are tackling the problem through habitat restoration, wildlife monitoring and research, education, species recovery, and other projects.

The Bushcare program of the Natural Heritage Trust is attempting to reverse vegetation decline, but losses still exceed

the gains. And birds are continuing to decline even after clearing ceases. Further research is needed to determine ways of reversing the decline, and to address the fundamental question of how much native vegetation should be retained.

Experience tells us that keeping just 10% of the native vegetation cover in a landscape equates to large local loss of species (see story opposite).

Some biologists suggest that retaining at least 30% of each habitat type in a region is closer to the mark, a threshold already exceeded in many parts of Australia. They add that this should be in addition to a comprehensive and representative reserve system across the continent.

Others believe that 50% or more of the landscape should remain under natural vegetation to protect biodiversity, while a few are reluctant to nominate any percentage as it could be misinterpreted or because it will vary with the circumstances.

Certainly, where less than 30% of vegetation remains, it will be beneficial to birdlife to restore native habitat and establish wildlife corridors.

After years of research, Denis Saunders urges a well-planned series of steps for communities wishing to undertake nature conservation and habitat reconstruction.

They include retaining and protecting all remnant vegetation and aiming for a range of diverse patches, where possible linked together to form larger woodlots that emulate the uncleared landscape.

Professor Possingham and Dr Michael Westphal, of the University of Queensland, recommend a business-like, cost-effective approach to minimising loss of biodiversity that will attract public and private-sector investors in the 'business of biodiversity'.

They have developed a series of principles for habitat restoration, such as 'Patch shape is important where less than 30% of a region is vegetated'. They say these principles are useless, however, without a decision-making framework for solving complex conservation problems. They describe how this can work on the web at [www.plevin.on.net/GIR/](http://www.plevin.on.net/GIR/).

It is not too late to act on behalf of our native birds and in many respects grassroots communities are ahead of governments. While dedicated groups of people plant trees, shrubs and fences, land clearing continues apace.

**Below:** The flame robin has almost disappeared from SA's Mt Lofty Ranges.

**Main picture:** Glossy black cockatoos nest in tree hollows from Queensland to Victoria. Their numbers are declining.



Graeme Chapman





The barking owl is one of eight bird species to become locally extinct due to land clearing in the Mt Lofty Ranges.

## A lesson from Mt Lofty

THE story of land clearing and subsequent bird declines in the Mount Lofty Ranges of South Australia offers a salutary tale to other regions, according to Professor Hugh Possingham of the University of Queensland.

Mount Lofty Ranges is essentially an island of forest and woodland, isolated from similar areas by much drier mallee habitat. Less than 10% of the original native vegetation remains intact.

According to the well-established Theory of Island Biogeography, a 10% reduction in habitat area eventually results in the loss of half of its dependent species.

In 1980, Hugh Ford and Bob Howe used the theory to predict that almost 50 (about 40%) of the original 120 terrestrial bird species in the Mount Lofty region would become extinct.

Eight species have already disappeared, including the king quail, swift parrot, glossy black cockatoo, swamp parrot and barking owl. This is bad enough, but what about the other 42?

Possingham says the apparent mismatch is no cause for celebration.

The Theory of Island Biogeography also predicts a long lag between habitat loss and

consequent species loss. This has been observed in parts of Victoria and WA, where bird species have become locally extinct long after clearing ceased.

For long-lived species such as Australian birds, the time lag is likely to be hundreds of years (many generations) and in this case could amount to another 40 or so bird species. So who's next?

Actually, another eight birds already have populations low enough to be considered unviable. Species such as the square-tailed kite, bush stone curlew, little lorikeet, brown quail and flame robin are almost gone.

Possingham says most of these will disappear from the region within 50 years. Their demise is predictable and will take the total loss to 16 species, or 13% of the original quota.

Then there are the 'living dead': species with total populations of less than 500 individuals. Ornithologists reckon that another sixteen bird species fall into this category in the Mt Lofty region and are likely to go within 200 years.

They include such species as the painted button quail, beautiful firetail, southern emu-wren, brown tree creeper, tawny frogmouth

and restless flycatcher. If these species are indeed doomed, the toll will rise to 32 species, or 27%.

And the theory predicts a further 20 species will eventually disappear – species including the scarlet robin, diamond firetail, crested shrike-tit, eastern spine-bill and yellow-tailed black cockatoo – which are now common.

If the Mt Lofty community can find a way to prevent these losses, possibly by well-planned, strategic revegetation and other projects, their experience will be invaluable to other regions of Australia facing similar losses of birds and grappling with the question of vegetation clearing policy.

It is disturbing that, despite the cessation of clearing in 1980, and tree-planting efforts since then, woodland birds have continued to decline in the region. This is strong evidence that stopping land clearing alone is not enough.

### More about regional extinctions

Possingham HP (2001) Regional bird extinctions and their implications for vegetation clearance policy. Community Biodiversity Network, [www.cbn.org.au/member/cbn/projects/LifeLines7.2/](http://www.cbn.org.au/member/cbn/projects/LifeLines7.2/)

Australia's rate of land clearing ranks fifth in the world, with more than half a million hectares of native vegetation cleared annually. It has the dubious reputation of being the only developed country in the top 10 land clearing nations (2001 *State of the Environment Report*).

Most ecologists agree that, as a first step towards reversing bird decline, removal of woodlands in already heavily cleared regions of southern Australia should cease.

This would not just help the birds, but the flora and fauna as a whole . . . and the agricultural systems that benefit from an infrastructure of healthy ecosystems.

#### More about bird decline

Ford HA Barrett GW Saunders DA and Recher HF (2001) Why have birds in the woodlands of Southern Australia declined? *Biological Conservation*, 97:71-88.

Hannah D and Thurgate N (2001) Lands of strips and patches. *Wildlife Australia Magazine*, Autumn Issue:38-39.

Possingham HP and Westphal MI (2001) Principles for prudent landscape change: minimising biodiversity loss for minimum cost. *Proc. Getting it right: what are the guiding principles for resource management in the 21<sup>st</sup> century?* Adelaide, 11-12 March.

Recher HF (1999) The state of Australia's avifauna: a personal opinion and prediction for the new millennium. *Australian Zoologist*, 31:11-27.

Saunders DA and Ingram JA (1995) *Birds of Southwestern Australia. An atlas of changes in the distribution and abundance of the wheatbelt avifauna*. Surrey Beatty and Sons, Chipping Norton, NSW.

**Abstract:** Australian bush birds are in decline. Both bird abundance and species numbers have fallen in many southern Australian agricultural regions, especially where woodlands have been cleared. Australia could lose half of its terrestrial bird species this century. The main cause is the loss, fragmentation and degradation of habitat due to human activities. This also influences predation, competition and the availability of nest sites. Community groups have been galvanised into action but land clearing continues apace. Leading ecologists agree that land clearing, especially in already heavily cleared regions of southern Australia, should cease immediately. They have also called for fencing off and active management of remnant patches.

**Keywords:** native birds, population decline, habitat fragmentation, remnant vegetation, Theory of Island Biogeography, tree hollows, revegetation, pied currawong.



The pied currawong.

## Jury out on currawongs

THE pied currawong has increased in abundance rather than decreased, and the species has been implicated in the decline of other native bush birds.

Large, conspicuous, omnivorous and comfortable in a wide variety of habitats, they are often cited as predators on nests (eggs, nestlings, fledglings) and can also prey on juvenile and adult birds.

But is the increase in currawong numbers really limiting bird populations or are their dastardly depredations exaggerated?

To throw some light on this controversial question, Karen Bayly and Dr Daniel Blumstein of Macquarie University reviewed information on the foraging and predation habits of currawongs and did some analysis of the types of birds reported as prey.

They concluded that predation seems to be greatest on 'introduced/common' species (introduced birds that are also common) and less than statistically expected on native/common species and native/rare ones. Species such as house sparrows, common blackbirds and common starlings, familiar introduced birds, featured prominently in the currawong prey list.

Few tears will be shed for these largely urban species, and currawong control in the suburbs could be counter-productive, reducing mortality in these alien species. Outside urban areas though, the story could be different.

Recent work by Graham Fulton and Hugh Ford, which involved placing 416

artificial nests in woodlands, found that overall nest predation was extremely high with 91% of nests preyed upon in just seven days. Many species, mostly birds, preyed on the nests. However, nest predation decreased significantly when pied currawongs were removed and the results suggest that predation on nests could be contributing to bird declines.

We know that common native species can nevertheless decline and Bayly and Blumstein say it is possible that currawongs may be having deleterious effects on populations of small birds. But on current evidence there can be no firm conclusion about the role of currawongs in bird declines. We just don't know yet.

There is firm evidence, though, that pied currawongs spread weeds such as privet, and their greater abundance is not regarded favourably.

Unfortunately, direct currawong control is difficult and may be a short-term solution in any case. Currawong populations could recover or move elsewhere.

Effective long-term control will probably require alteration of habitats to make them less appealing to currawongs and more attractive to small bush birds.

#### More about currawongs

Bayly KL and Blumstein DT (2001) Pied currawongs and the decline of native birds. *Emu*, 101:199-204.

Fulton GA and Ford HA (2001) The Pied Currawong's role in avian nest predation: a predator removal experiment. *Pacific Conservation Biology*, 7:154-160.