

BIRDS ON FARMS



ECOLOGICAL
MANAGEMENT FOR
AGRICULTURAL
SUSTAINABILITY



Birds Australia

CONSERVATION THROUGH KNOWLEDGE

BY GEOFF BARRETT

Supplement to *Wingspan*, vol. 10, no.4, December 2000

Sustainability in modern agriculture means ensuring that biodiversity is maintained and enhanced, and that ecological processes continue. The Birds on Farms survey has led to the development of 10 simple guidelines for attracting birds back to farms, and so improving the natural resource base on which agriculture depends.



Above: Isolated trees such as this one in a wheatfield near Kapunda in SA's Barossa Valley are unlikely to survive.

Photo by **Bill Bachman**

Insets, from left: Pine trees, often planted as windbreaks in the past (see background of photo) attract exotic birds such as sparrows and starlings, and are of limited value to native wildlife. Today, Landcare efforts mean that tree plantings are more likely to include local, native trees and shrubs.

Photo by **David Tatnall**

The sign says it all. Salt-affected farmland on the upper Fleurieu Peninsula, SA, is no longer productive.

Photo by **Bill Bachman**

IN THE TEMPERATE WOODLANDS of Australia, where agriculture is a dominant land use, most of the complex natural ecosystems have been replaced by human-managed systems. On many farms more than 90 per cent of the native vegetation has been cleared. Where five or six native tree species once grew, monoculture plantations and exotic species now exist. Understorey shrubs have been removed by grazing stock, and a small number of crops or managed pastures have replaced a great diversity of native herbs, grasses and other plants.

The result has been a simplification of the ecosystem and a reduction in biodiversity – the number of plant and animal species in the landscape. The effect of this change can be seen clearly in the loss of many of the ecosystem processes that farmers rely upon. Soil protection has diminished as salinity and acidification have spread. Water production and purification are compromised. Greater severity and frequency of floods, droughts, and infestation by pests are other effects.

Today it is universally recognised that protecting natural ecosystems and maintaining biodiversity are fundamental elements of sustainable agriculture in Australia.¹

Birds as indicator species

A farm with a rich diversity of birds will also have a relatively high diversity of trees, shrubs, mammals, reptiles, frogs and invertebrates. For this reason birds are recognised as 'indicator species'. Their presence indicates the presence of many other species, and thus the ecological condition of the farm.²

Throughout the world there are many examples of the role played by birds and other native wildlife in controlling agricultural pests. In Australia, for example, birds are critical to maintaining tree health. A major cause of eucalypt dieback on farms in eastern Australia is insect attack, which is associated with fertiliser use and over-clearing.³ A healthy bird community removes between 50 and 70 per cent of the leaf-feeding insects from patches of farm trees and so plays a valuable role in keeping those trees alive.⁴ In much of rural Australia, successful tree establishment depends on drawing birds back into the landscape, so that the birds can protect the new trees from insect attack.

The Birds on Farms survey

Over the last 20 years, 10 million hectares of native vegetation have been cleared in Australia. This clearing has brought about the loss of an estimated 150 million birds. Over this same 20-year period Australia has witnessed the rapid growth of the national Landcare

WHERE TO FROM HERE?

Involvement in the Birds on Farms survey increased participants' awareness of rural conservation issues. In 20 per cent of cases, this led to changed management practices, such as planting more native trees and shrubs and leaving fallen trees to break down naturally.

Feedback from participants suggests that a much greater proportion of farmers would be willing to implement the recommendations made here, were it not for the short-term costs involved. However, the responsibility for making agriculture sustainable lies with the whole Australian community, not just individual farmers, and needs to be considered against the estimated \$1 billion that land degradation costs the nation each year.

Many of the guidelines from the Birds on Farms project are being adopted by land managers, and incorporated into farm planning procedures. The survey methods have also been incorporated into Birds Australia's national Atlas of Australian Birds, currently monitoring changes to birds and the environment at more than 6000 sites around Australia.

The Birds on Farms book, available from Birds Australia, provides a fuller description of the results, including background information to the guidelines in this article. An interactive program, *Remnants*, is available at the Birds Australia website (www.birdsaustralia.com.au/remnants). This program can be used to diagnose the general health of your farm, and gives suggestions for improving bird diversity.

Below: This typical farmscape in Victoria's south Gippsland has about 5 per cent tree cover, not enough to halt the decline of woodland birds and preserve the ecosystem process on which long-term agricultural production depends.

Inset: With the help of community-based organisations such as Landcare, Greening Australia and Land for Wildlife, new ways must be found to continue agricultural production while protecting natural ecosystems.

Photos by David Tatnall



ACKNOWLEDGMENTS

We are indebted to the Thyne Reid Education Trust for providing the funding for the Birds on Farms project, and to Environment Australia whose Save the Bush Fund (Natural Heritage Trust) provided seed money to get the project started. The Norman Wettenhall Foundation also provided valuable assistance during the analysis and writing stages. A special thank you to Brenda Newbey, who as the Western Australian Co-ordinator for the Birds on Farms survey, was crucial to the success of the survey in that region. Also to Ken Hancock who spent long hours vetting the survey data and cleaning up the database. The following people were on the Steering Committee for the project and provided valuable advice throughout the project: Stephen Ambrose, David Baker-Gabb, Ian Davidson, Doug Robinson, Neil MacFarland, Andrew Bennett, Richard Loyn, Stephen Platt, Helen Alexander, Kate Mashford and Susan Wright. Thank you also to the 500 or so participants who took part in the survey or offered their farms for others to survey. Edited by David Meagher and Merrilyn Julian; layout and production by P.A.G.E. Pty Ltd; printing by Jenkin Buxton Printers Pty Ltd.

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Cover photo: Rural landscape near Mansfield, northeastern Victoria;
inset from top: New Holland Honeyeater; Red-capped Robin;
Pacific Black Ducks.

Photos: (landscape) by Bill Bachman; (honeyeater) by Dave Watts;
(robin) by Rob Drummond; (ducks) by Graeme Chapman



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Funding for the Birds on Farms project and publication of this supplement was generously provided by the Thyne Reid Education Trust.

Additional funding was also generously provided by Environment Australia (National Heritage Trust) and the Norman Wettenhall Foundation.



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movement. Today there are more than 4000 Landcare groups, all committed to restoring farm sustainability in various ways, including re-establishing and maintaining native ecosystems.

Birds Australia's Birds on Farms survey was commenced in 1995 to assess whether the environmental work carried out by organisations such as Landcare was drawing birds back into rural landscapes. The survey addressed a number of

questions, with a view to producing guidelines for increasing bird diversity. For example:

- How much tree cover should I have on my farm?
- Should the use of fertilisers and cropping be limited?
- What effect does grazing by livestock have on birds?
- What kinds of trees and shrubs should I plant to encourage birds?
- How do I attract birds to my farm?

(cont.)

Small foliage-gleaning birds such as this Spotted Pardalote keep farm trees healthy by removing insects.

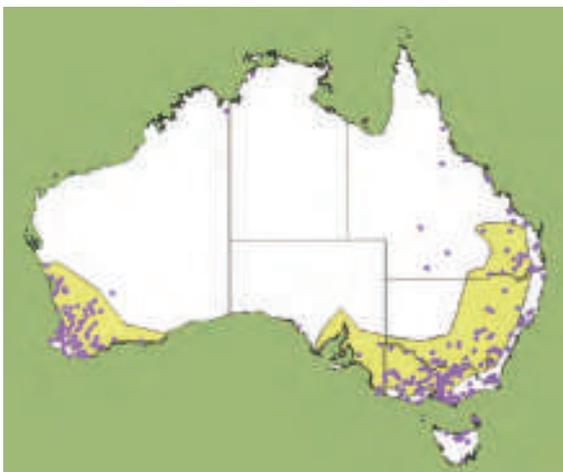
Photo by **Dave Watts**

Where diverse ecosystems become simplified, as in many agricultural landscapes, native species such as these Little Corellas can become pests.

Photo by **Dave Watts**

As Noisy Miners spread through farm landscapes, they force out other insect-feeding birds. Miner territories are often associated with increased eucalypt dieback.

Photo by **Graeme Chapman**

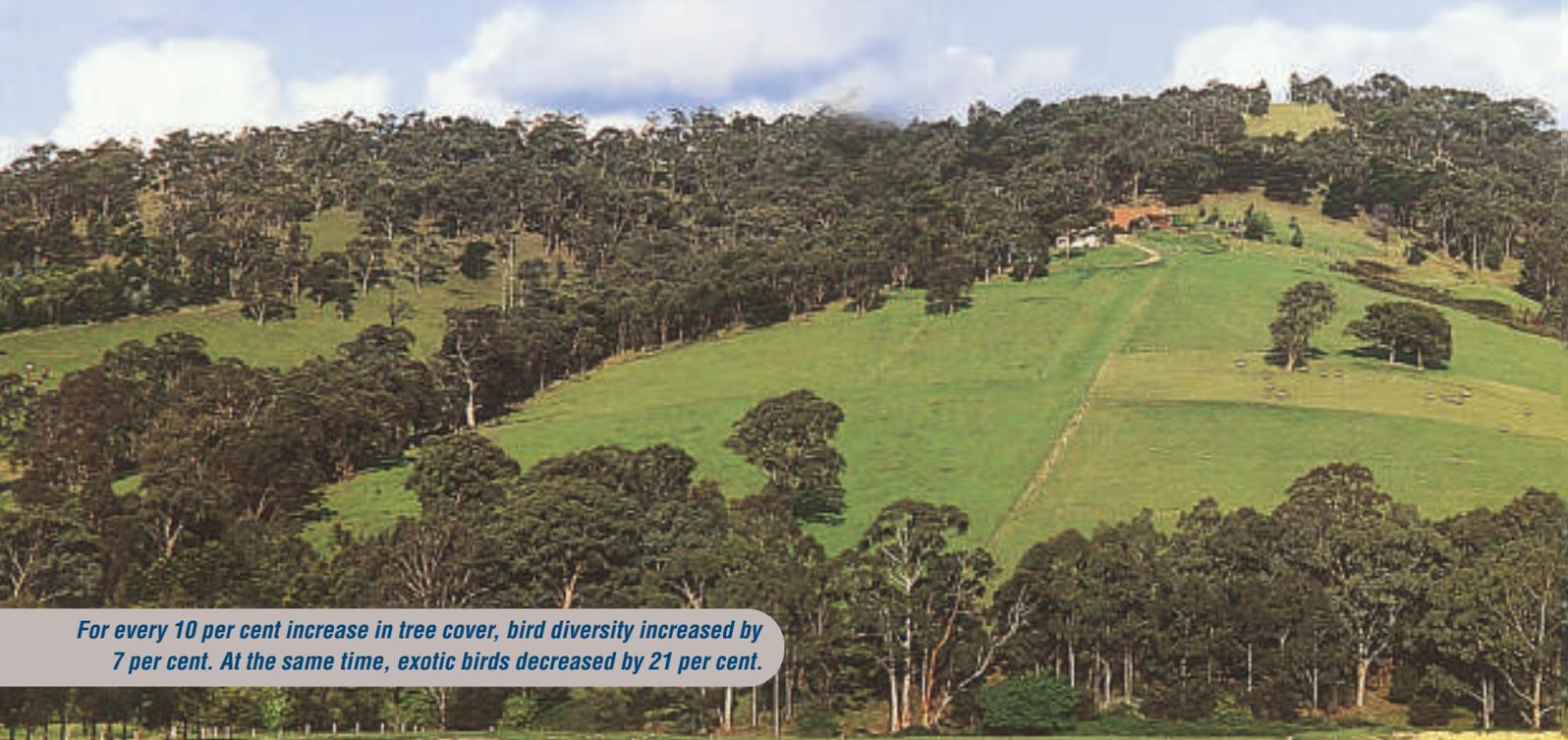


Location of the 330 farms involved in the survey. The yellow area indicates the extent of temperate woodlands before agricultural development.

Some 430 bird species were recorded over two years on 330 farms in southern and eastern Australia (see map). The average size of the farms was 608 ha (excluding the 10 largest farms), and most were beef, sheep, or wheat–sheep properties. Around 500 volunteers were involved in the survey – mostly farmers or people working with farmers (76 per cent).

This supplement presents information for farmers who want to attract birds onto their farms. It is based on the results of Birds Australia's five-year Birds on Farms survey, backed by other research and expert opinion. Ten simple guidelines for making your property more bird-friendly are presented, each with suggested goals for management. Data from the Birds on Farms survey indicate the likely effects of following each guideline.

GUIDELINES FOR



For every 10 per cent increase in tree cover, bird diversity increased by 7 per cent. At the same time, exotic birds decreased by 21 per cent.

Where more than 80 per cent of the farm trees were local native species, the diversity of woodland-dependent birds was 43 per cent greater.



What is 'sustainable agriculture'?

In 1991 the Federal Government's Working Group on Sustainable Agriculture defined *sustainable agriculture* as:

'the use of farming practices and systems which maintain or enhance:

- the economic viability of agricultural production;
- the natural resource base (including air, soil, water, plants and animals); and
- other ecosystems which are influenced by agricultural activities.'⁵

From this definition five principles for sustainable agriculture were developed, against which management policies could be assessed:

1. Farm productivity is sustained or enhanced over the long term.
2. Adverse impacts on the natural resource base of agriculture and associated ecosystems are ameliorated, minimised or avoided.
3. Residues resulting from the use of chemicals in agriculture are minimised.
4. The net social benefit derived from agriculture is maximised.

5. Farming systems are sufficiently flexible to manage risks associated with the vagaries of climate and markets.

Australia has been in the forefront of some essential elements of sustainable agriculture, such as the use of legume-based pastures and legume crops in rotations, minimum tillage and stubble retention. Other approaches include whole farm planning, integrated pest management and biological control.

SUSTAINABILITY



1 Local native vegetation should cover at least 30 per cent of the total farm area

Over large areas of rural Australia less than 10 per cent of the original vegetation remains, and the goal of increasing this to 30 per cent on every farm might seem unrealistic. But research indicates that such a measure is necessary to keep farm trees healthy, halt problems such as salinity and soil deterioration, and maintain optimum long-term productivity.^{1,6,7}

Opposite: This catchment in the Dalgety Monaro/Snowy Mountains district, NSW, has at least 30 per cent native tree and shrub cover: the new vision of a healthy landscape.

A rich diversity of birds indicates that a diversity of trees and shrubs, and other types of wildlife are likely to be present; *inset from left:* Eucalypt blossom; Weebill; Southern Water Skink; Short-beaked Echidna; Grey Shrike-thrush; Spotted Marsh Frog.

Photos: (landscape and blossom) by **Bill Bachman**; (weebill) by **Graeme Chapman**; (skink) by **David Meagher**; (echidna) by **Fiona Smith**; (shrike-thrush) by **Rob Drummond**; (frog) by **Nick Clemann**



Far left: This grazing country near Mansfield in Victoria might be aesthetically pleasing, but is over-cleared and unsustainable.

Left: Integrated pest management recognises the value of native biodiversity in controlling agricultural pests. As part of the Granite Creeks Landcare project (Euroa Victoria), DNRE Research Officer Tom Morley talks to Dookie Agricultural College students about the use of boring weevils to control Pattersons Curse. Photos by **Bill Bachman**

2 Re-create local conditions

The context of the farm is important. Look to the trees, shrubs and herbs in patches of remnant scrub and along roadsides to find out what the original vegetation was like, then try to recreate this habitat over at least 30 per cent of your farm. Ask your local nursery to provide local trees and shrubs for planting. For re-establishing tree and shrub cover, the following strategies are ranked in order of desirability:

- 1 **Protect existing remnant vegetation.** This provides the best habitat for wildlife and should be the first option considered.
- 2 **Allow local trees and shrubs to regenerate by removing grazing stock.** It costs up to \$10 to plant a tree, so allowing trees to regenerate naturally is an attractive option.
- 3 **Plant native, locally occurring trees and shrubs.** If regeneration is no longer possible, planting may be necessary. Bird diversity is greater when a mix of local native trees and shrubs are planted.
- 4 **Plant native non-local trees.** Bird diversity is lower where a monoculture stand of non-local species is planted; for example, Southern Blue Gums planted in Western Australia.
- 5 **Plant introduced trees.** Some common selections are Radiata Pine *Pinus radiata* and exotic shrubs such as hawthorns *Crataegus* spp. and cotoneasters *Cotoneaster* spp. This is the least attractive option for native birds and contributes to the spread of exotic species such as European Starlings and House Sparrows.

Insets, from top: This eroded creekline would be a good area to fence off to encourage natural regeneration. The large trees will provide seed for regenerating trees and draw insectivorous birds to the site. The regenerating trees will control soil erosion. Woodland birds such as this Rufous Whistler (*centre*) and Grey Fantail (*below*) are more diverse where native tree cover consists of two or more types of tree species.

Below: Fencing to moderate grazing pressure by livestock allows tree regeneration to occur.

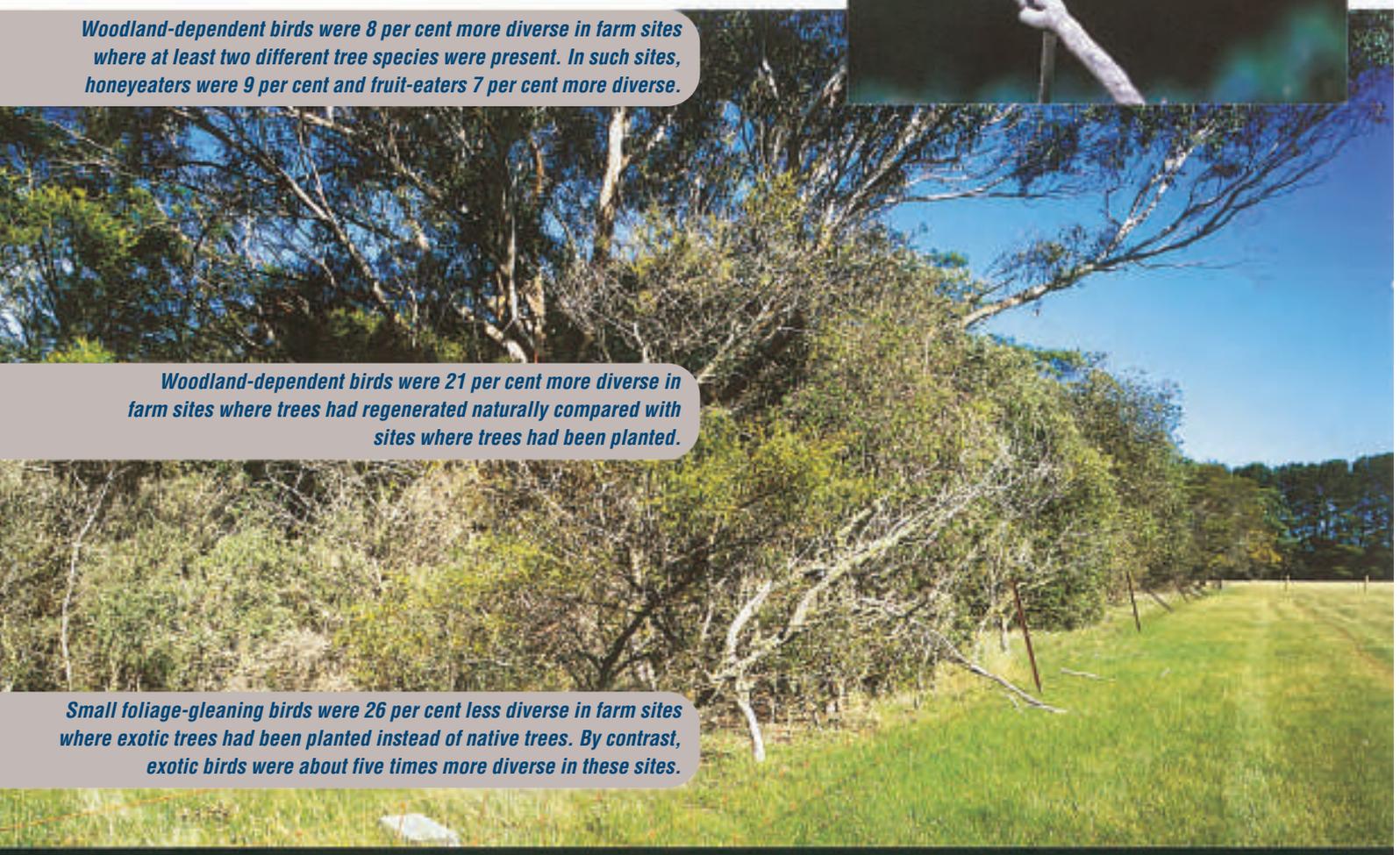
Photos: (eroded creekline) by David Tatnall; (whistler and fantail) by Graeme Chapman; (fenceline) by David Neilson



Woodland-dependent birds were 8 per cent more diverse in farm sites where at least two different tree species were present. In such sites, honeyeaters were 9 per cent and fruit-eaters 7 per cent more diverse.

Woodland-dependent birds were 21 per cent more diverse in farm sites where trees had regenerated naturally compared with sites where trees had been planted.

Small foliage-gleaning birds were 26 per cent less diverse in farm sites where exotic trees had been planted instead of native trees. By contrast, exotic birds were about five times more diverse in these sites.



Cereal cropping reduced the diversity of woodland-dependent birds, particularly understorey birds and ground-nesters.

Bird diversity, especially of ground-foraging birds, was lower in farm sites to which fertiliser was applied over the last five years.



Above: Intensive land uses such as this ploughing in the Clare Valley of SA result in a loss of ground-dwelling birds.

Far left: Moderate to light grazing levels and native pastures favour native pigeons such as the Common Bronzewing.

Left: Trees and shrubs, placed as windbreaks around fields, reduce visibility, deterring potential crop pests such as Sulphur-crested Cockatoos.

Bottom left: Planted, native trees and grazing on native pastures can serve to buffer remnants of native vegetation against high impact land uses.

Photos: (ploughed land) by **Bill Bachman**; (bronzewing) by **Rob Drummond**; (cockatoo) by **Dave Watts**; (sheep) by **David Neilson**

3 Exclude high-impact land uses from at least 30 per cent of the farm area

Management of one-third of the farm should be sympathetic to the local vegetation, and will depend on the location of the farm. A property in eastern Australia is likely to have grassy woodlands that can tolerate (and might even benefit from) moderate levels of grazing by livestock. But a farm in the Western Australian wheatbelt is more likely to have woodland with a healthy understorey that, as well as being of low production value, is damaged by livestock grazing.

Low-impact land uses such as limited seed, timber and honey collection are probably acceptable, regardless of the location of the farm. However, land uses that have a high impact on native vegetation, such as cropping, fertiliser application or frequent grazing should be excluded from at least 30 per cent of the farm area. Depending upon the sensitivity of the rural environment, for example in steep country, high-impact land uses might be altogether inappropriate.



The diversity of birds, particularly ground-nesting and understorey birds, was less on farm sites where ploughing had occurred over at least 25 per cent of the area.

Clockwise from right: The healthy understorey that occurs naturally in this WA Salmon Gum woodland is of low production value and sensitive to grazing.

Effects of continuous, heavy grazing in Salmon Gum woodland.

The tufted growth structure associated with native pastures that are not heavily grazed favours ground-dwelling birds such as the Splendid Fairy-wren (*above*) and Diamond Firetail (*below*).

When selecting areas of the farm to set aside for wildlife, include areas of native pasture on the flatter, richer country, as well as on the poorer sloping country.

Photos: (Salmon Gum woodland and firetail) by Graeme Chapman; (fairy-wren): BA collection; (native pasture) by David Tatnall

4 Maintain native pastures and avoid heavy grazing

More than 50 per cent of the declining bird species in temperate Australia forage at least partly on the ground, and depend to some extent upon native pastures. Not surprisingly, native grasslands associated with richer farming soils are among the most endangered ecosystems in Australia.

In higher rainfall areas, native pastures with a history of superphosphate and sub-clover application carry an average 80 per cent of the stocking rate of pastures sown with introduced grasses. In fact, for long-term pasture productivity, it has been recommended that at least 50 per cent of the pasture be made up of native grass species.⁸

By maintaining a range of grazing regimes across the property and avoiding heavy, continuous grazing, pasture and understorey diversity will be greater and bird diversity enhanced.



Bird diversity is re-established about 15 years after the removal of stock from a heavily grazed site. This increase in diversity continues, reaching a maximum diversity after about 25 years.

Ground-foraging birds were 16 per cent more diverse in sites with native pasture. Diversity was lowest where fertiliser had been applied.



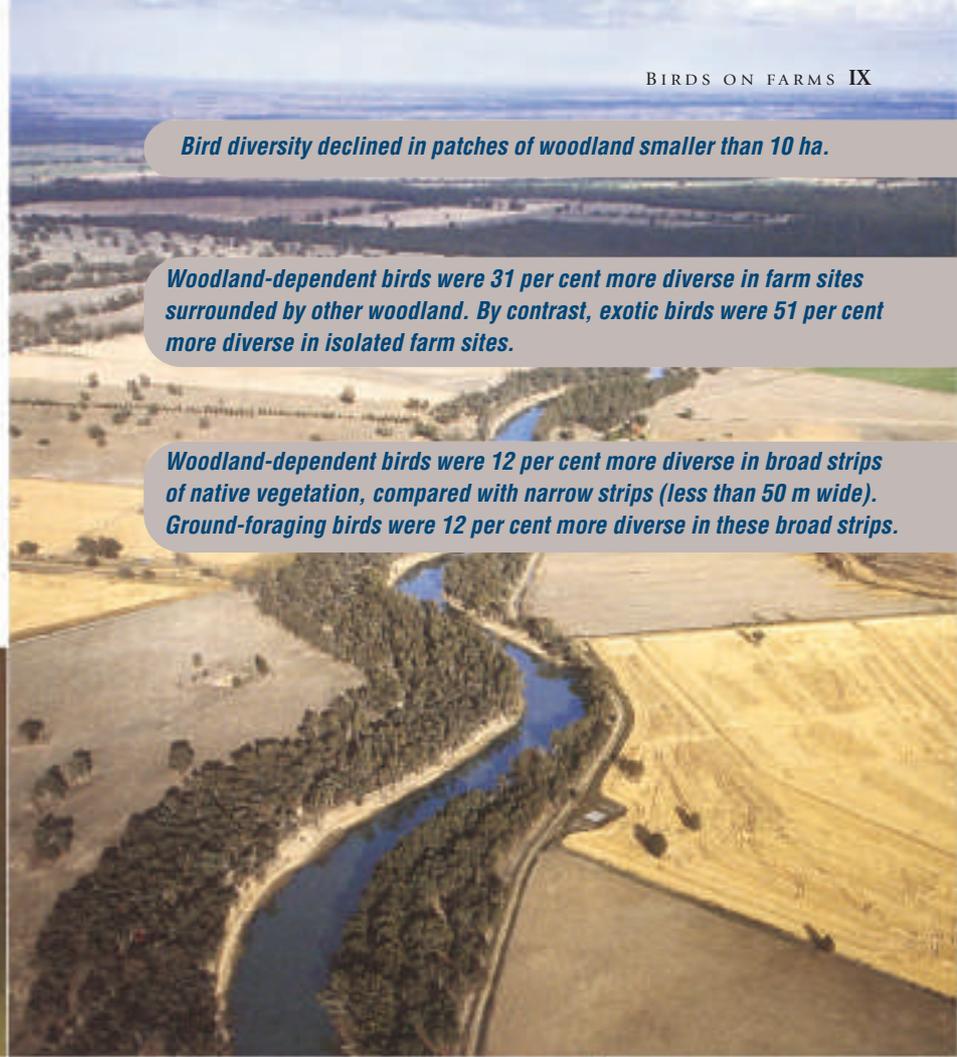
Understorey birds were most diverse in farm sites that were never grazed (5 per cent increase) and were 9 per cent less diverse in sites that were mostly grazed.

Total bird diversity decreased by 25 per cent in sites where much of the ground cover had been removed, leaving smooth, lawn-like tufts.



5 Native vegetation cover should be in patches of at least 10 ha and linked by strips at least 50 m wide

For birds and wildlife, the 30 per cent of the farm that is managed to protect local native vegetation is best as a single large patch. This is because large patches are less susceptible to impacts from the surrounding agriculture. But land holders are likely to want the tree and shrub cover to spread across the property as windbreaks and smaller patches, which will serve to protect stock and pasture from adverse weather conditions. A compromise is to spread the 30 per cent of native vegetation across the farm, but make the patches as large as possible and linked by strips of native vegetation.



Bird diversity declined in patches of woodland smaller than 10 ha.

Woodland-dependent birds were 31 per cent more diverse in farm sites surrounded by other woodland. By contrast, exotic birds were 51 per cent more diverse in isolated farm sites.

Woodland-dependent birds were 12 per cent more diverse in broad strips of native vegetation, compared with narrow strips (less than 50 m wide). Ground-foraging birds were 12 per cent more diverse in these broad strips.

Clockwise from above: Strips of native vegetation such as this riparian belt along the Murray River, near Echuca, Vic., act as corridors, allowing birds and other wildlife to move through farmland.

Most birds will have difficulty getting into this small isolated patch of mallee in a winter wheatfield, near Sea Lake, western Vic.

Scattered, isolated trees appear to play an important role in preserving wildlife. Yet, as for this lone Salmon Gum in WA's wheatbelt, there are often no young trees to replace this valuable resource.

Birds such as this Jacky Winter (above) and Crested Shrike-tit (below) are generally absent from small, isolated patches of tree cover. They also use strips of trees as flyways rather than cross open fields.

Photos: (river and mallee patch) by Bill Bachman; (lone Salmon Gum, shrike-tit and Jacky Winter) by Graeme Chapman





6 Manage at least 10 per cent of the farm area for wildlife

Of the 30 per cent of the farm area that is local native vegetation, one-third should be managed primarily for wildlife; that is, 10 per cent of the farm area. This 10 per cent should include the ‘best’ habitat on the farm. As a general rule, the more complex the habitat the more bird species and other wildlife will be present. Managing for wildlife therefore means creating as much habitat diversity as possible, considering the structure of the original vegetation.

The location of the farm will influence the way the wildlife habitat is managed. Aim to re-create the ecosystem that occurs naturally in the local area. In eastern Australia, grassy woodland managed for wildlife would:

- have a mix of local tree and shrub species,
- include a dam or waterway,
- have a mix of different tree ages, including large, old trees and young, regenerating trees,
- have fallen trees left to decompose naturally,
- include native herbs, grasses and leaf litter
- be fenced off to manage stock grazing levels.

Woodlands in southwestern Western Australia tend to have a shrub understorey rather than herbs and grasses. In the bluebush (*Atriplex* spp.) country of South Australia, tree cover and fallen trees may be uncommon in the area.

Clockwise from top: This small patch of remnant woodland near Crows Nest in Qld, with its large trees, understorey shrubs and native pastures, could be managed for wildlife by fencing to moderate grazing and control of weeds and feral animals.

Birds such as the Purple Swamphen (*left*) and Banded Lapwing (*right*) breed near farm dams and waterways.

A farm dam close to tree and shrub cover provides water for birds and other wildlife.

Although they will feed on crop pests, small, insectivorous birds such as the Speckled Warbler also require patches of woodland with native grasses and fallen trees.

Photos: (woodland) by **Geoff Barrett**; (swamphen and lapwing) by **Rob Drummond**; (dam) by **David Neilson**; (warbler) by **Graeme Chapman**



7 Maintain a range of tree ages

Large, old trees carry a tangle of bark and leaves through which birds will forage for food, and when they flower, will draw birds from many kilometres away. The increase in bird diversity where large, old trees occur is associated with an increase in the diversity of mammals such as bats, gliders and possums, as well as lizards, frogs and bark invertebrates.



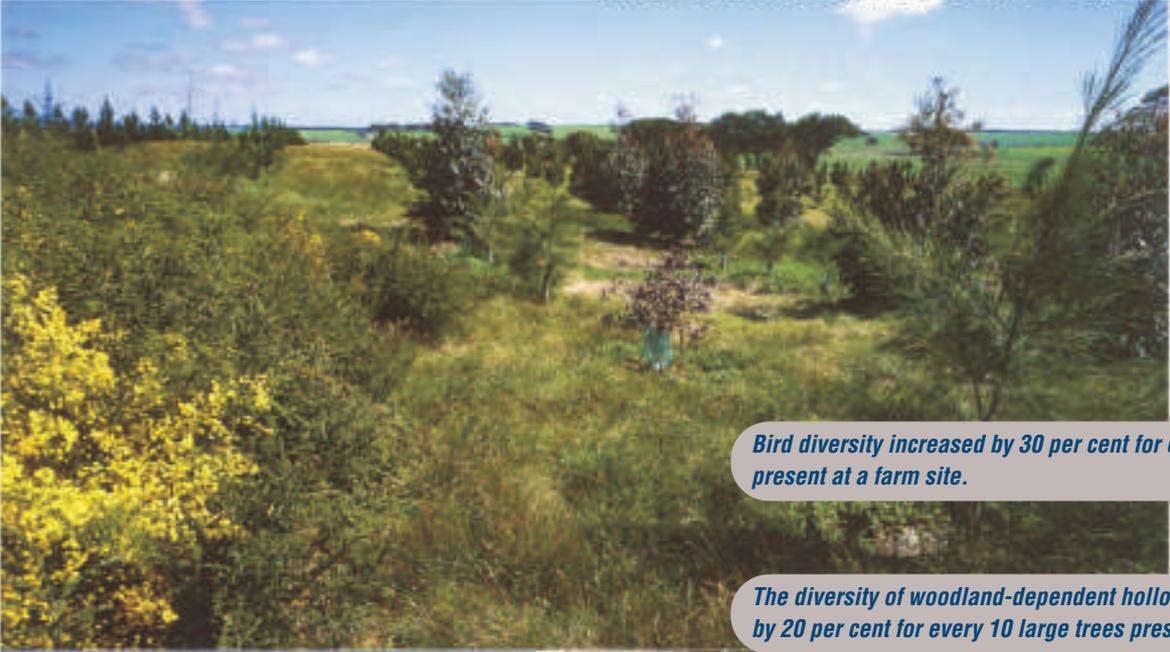
Clockwise from top: White-browed Babblers and other ground-feeding birds are associated with older trees.

Planted trees, such as these near Branxholme in western Vic., are drawing birds back into rural landscapes.

Living treasures: it takes at least 80 years for trees to develop large nest hollows.

One in five Australian birds require nest hollows for breeding, including the (above) Laughing Kookaburra and (below) Barn Owl

Photos: (babblers) by Rob Drummond; (planted trees) by David Neilson; (tree hollow) by David Tatnall; (owl and kookaburra) by Dave Watts

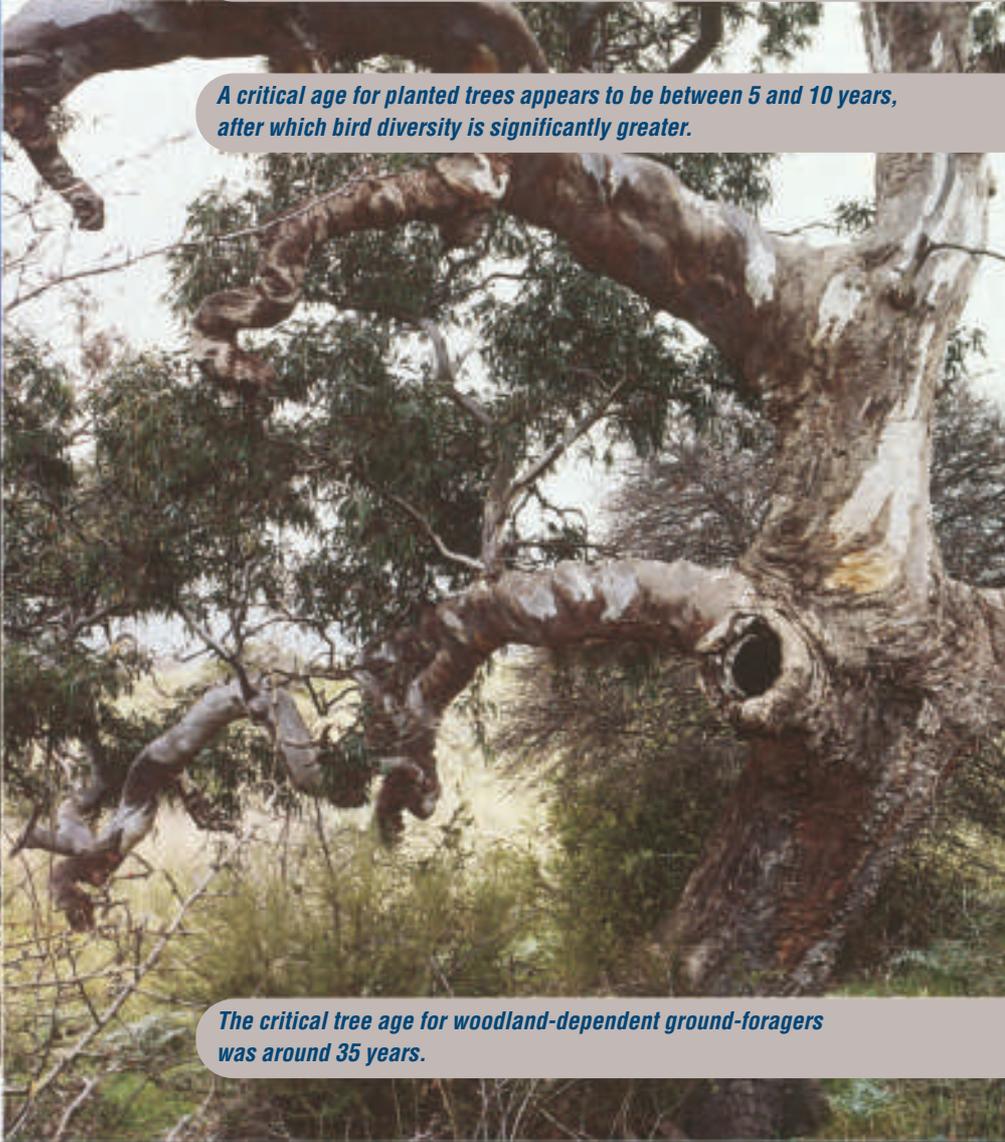


Bird diversity increased by 30 per cent for every 10 large trees present at a farm site.

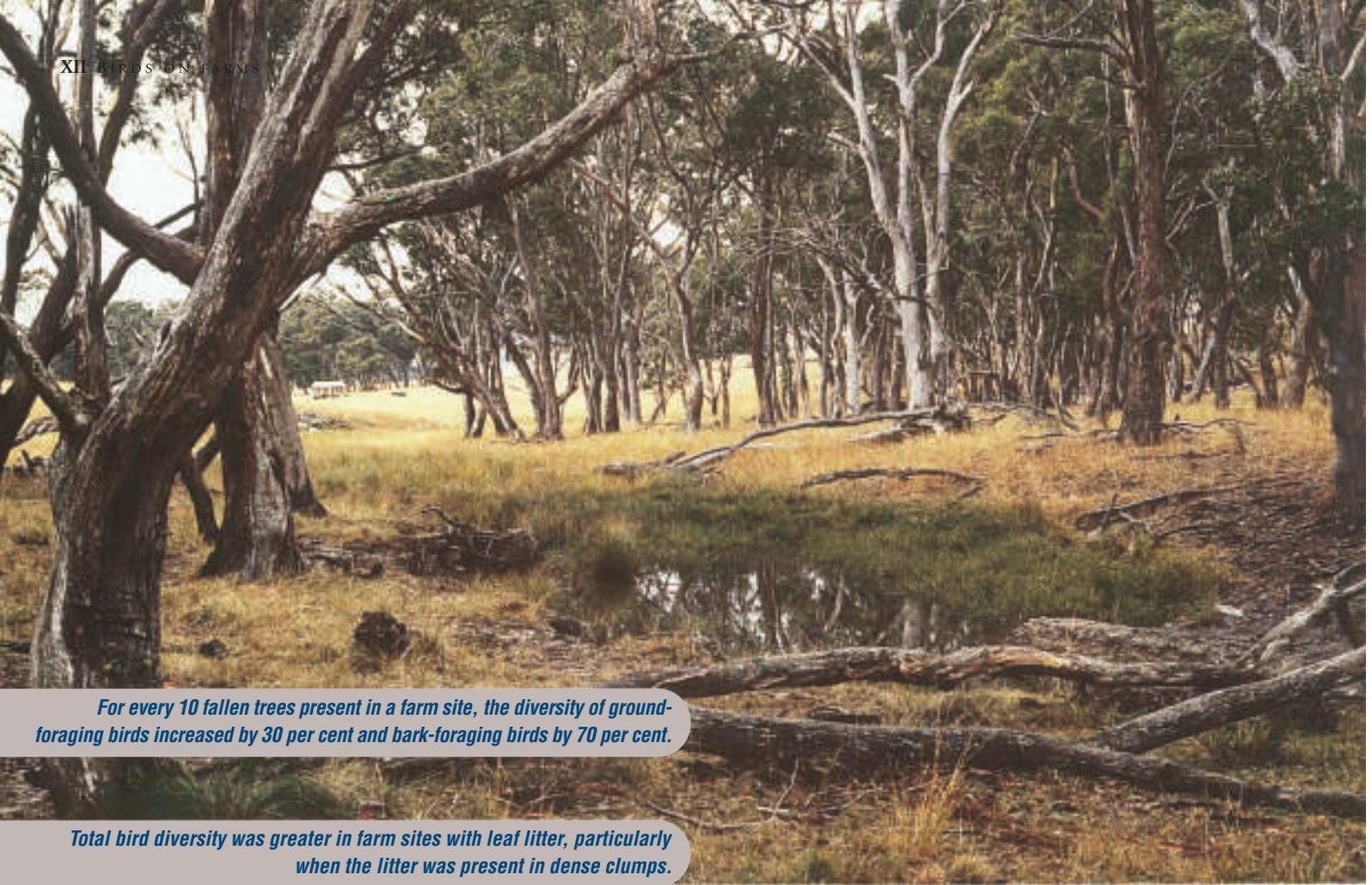
The diversity of woodland-dependent hollow-nesting birds increased by 20 per cent for every 10 large trees present.



A critical age for planted trees appears to be between 5 and 10 years, after which bird diversity is significantly greater.



The critical tree age for woodland-dependent ground-foragers was around 35 years.



For every 10 fallen trees present in a farm site, the diversity of ground-foraging birds increased by 30 per cent and bark-foraging birds by 70 per cent.

Total bird diversity was greater in farm sites with leaf litter, particularly when the litter was present in dense clumps.

Clockwise from top: On this farm near Armidale in northeastern NSW, fallen trees encourage shrubs to regenerate and leaf litter to build up, creating habitat for ground-foraging birds. Aquatic insects in streams and farm dams are also encouraged by the presence of logs, providing food for birds such as swamphens and kingfishers.

The Bush Stone-curlew needs a combination of moderate grazing pressure to keep the grass low and fallen branches for camouflage.

Large trees (right) create piles of decaying bark and leaf-litter, ideal for ground-foragers such as the (centre right) Eastern Yellow Robin and bark-foragers such as the (far right) White-throated Treecreeper.

Photos: (fallen logs) by Geoff Barrett; (stone-curlew) by Dave Watts; (treecreeper) by Graeme Chapman; (robin) by Dave Watts; (bark tree) by David Neilson

8 Leave fallen trees to break down naturally

A significant threat to farm birds and other wildlife is the impulse to ‘tidy up’ the farm – clear that messy scrub patch or remove that fallen tree. This is understandable given that understorey shrubs and fallen trees harbour pests such as rabbits and foxes, and can be a fire risk. But feral pests can be controlled using other means than removing the native habitat. And when positioned as windbreaks away from property, native trees, shrubs and fallen trees (particularly if they are associated with wetlands) can slow the progress of fires. For advice on farm fire risks, contact your local fire authority.



9 Maintain shrub cover over at least one-third of the area within a patch of farm trees

The location of the farm is important here: in the Western Australian wheatbelt, understorey shrubs may cover the whole of the area within a patch of woodland. Plant a diversity of locally occurring shrub species,⁹ but avoid planting too many nectar-producing shrubs. This may create a 'honey pot' that will be taken over by larger, aggressive honeyeaters such as Noisy Miners and Red Wattlebirds.



Clockwise from left: Superb Fairy-wrens, Brown Thornbills and Yellow-faced Honeyeaters are among the first birds to arrive when understorey shrubs are planted or regenerated.

Bottom left: Trees and shrubs shelter crops and stock against environmental extremes. They also provide protected nesting sites for understorey birds, and nectar and pollen for insects, birds and mammals such as Sugar Gliders.

Below: Fencing to moderate grazing pressure by livestock allows trees and understorey shrubs to regenerate.

Photos: (flowering shrubs) by **David Neilson**; (fenceline) by **David Tatnall**; (fairy-wren) by **Dave Watts**; (honeyeater and thornbill) by **Graeme Chapman**



In farm sites where understorey shrubs were present, there was a 31 per cent increase in diversity of woodland-dependent birds. Small woodland-dependent foliage-gleaners – birds that help to control the spread of eucalypt dieback – increased by 24 per cent.

Noisy Miners were 78 per cent less likely to occur in sites where understorey shrubs were present.

Ground-nesting birds were almost three times as diverse where understorey was present.

A river or creekline resulted in a 21 per cent increase in the diversity of woodland-dependent birds in a farm site.

Bird diversity increased by 3 per cent with each additional farm dam.

Small birds were 28 per cent more diverse and ground-nesters were 29 per cent more diverse when waterways were present.



Above right: Waterbirds can roost and breed in relative safety on this island, created when this farm dam was being build near Mansfield, Vic.



Right: The familiar White-faced Heron is often seen hunting in the shallows around the edges of farm dams.

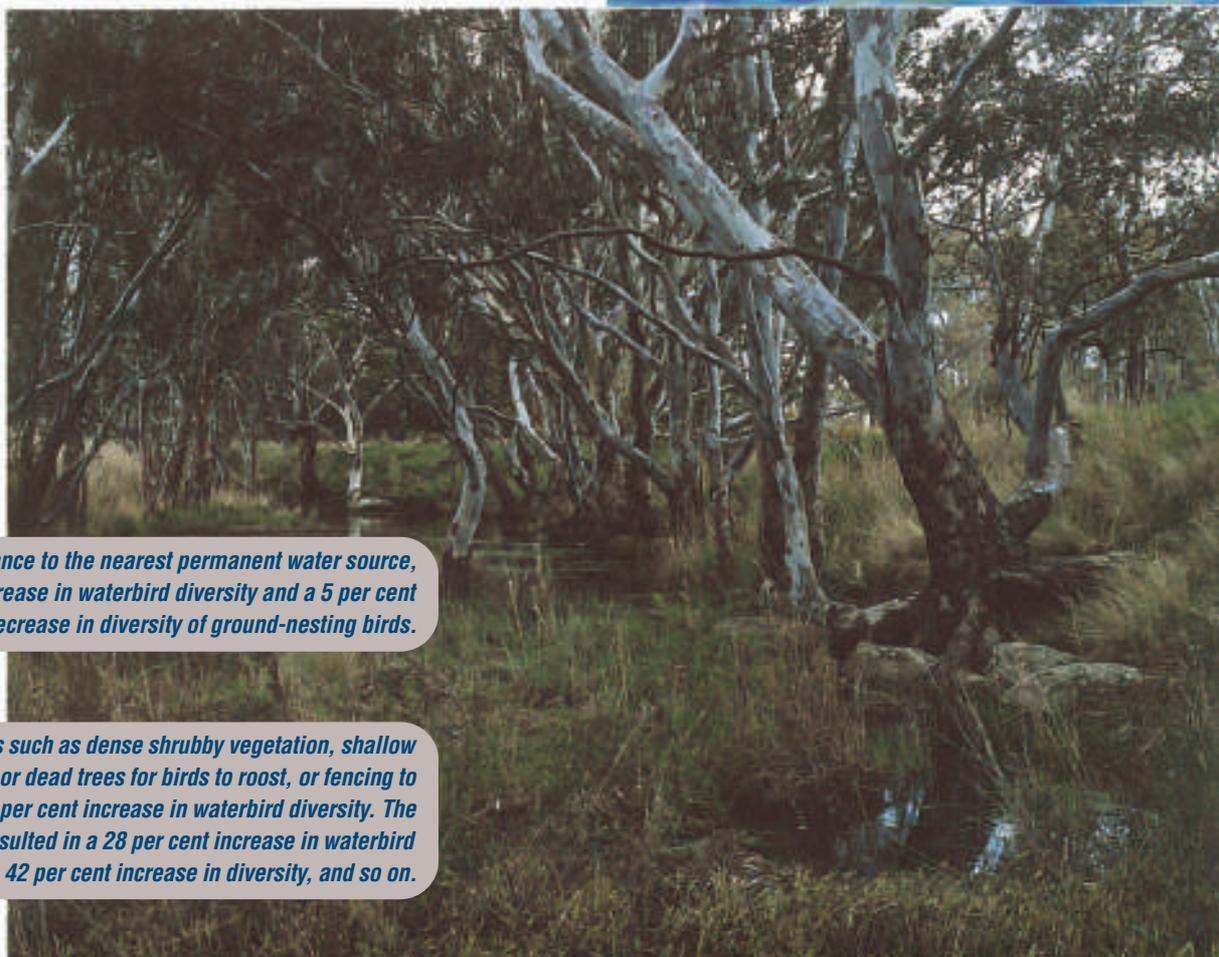
Centre right: A woodland bird that depends on large trees with nest hollows, the Sacred Kingfisher will take fish, shrimp, and other small animals and insects from the ground.

Far right: A diving duck that swims underwater, the Blue-billed Duck requires farm dams with both deep and shallow areas.

10 Maintain native vegetation around water

The health of farm dams and waterways can be improved by maintaining tree, shrub and native grass cover in the immediate catchment of the wetland. For rivers, it is advisable that this buffer zone of vegetation extend at least 100 m either side of the waterway. Along creeks and small gullies a minimum of 50 m is recommended.¹⁰

Bottom: Much of Australia's biodiversity is concentrated around creeks and billabongs, and is threatened by heavy grazing, and water being diverted for agricultural purposes.



Photos: (dam) by **Bill Bachman**; (ducks and kingfisher) by **Graeme Chapman**; (heron) by **Dave Watts**; (billabong) by **David Tatnall**

For every 10 m increase in distance to the nearest permanent water source, there was a 10 per cent decrease in waterbird diversity and a 5 per cent decrease in diversity of ground-nesting birds.

With the addition of features such as dense shrubby vegetation, shallow areas for birds to feed, islands or dead trees for birds to roost, or fencing to exclude livestock, there was a 14 per cent increase in waterbird diversity. The presence of two such features resulted in a 28 per cent increase in waterbird diversity, three resulted in a 42 per cent increase in diversity, and so on.

WHERE TO FROM HERE?

Involvement in the Birds on Farms survey increased participants' awareness of rural conservation issues. In 20 per cent of cases, this led to changed management practices, such as planting more native trees and shrubs and leaving fallen trees to break down naturally.

Feedback from participants suggests that a much greater proportion of farmers would be willing to implement the recommendations made here, were it not for the short-term costs involved. However, the responsibility for making agriculture sustainable lies with the whole Australian community, not just individual farmers, and needs to be considered against the estimated \$1 billion that land degradation costs the nation each year.

Many of the guidelines from the Birds on Farms project are being adopted by land managers, and incorporated into farm planning procedures. The survey methods have also been incorporated into Birds Australia's national Atlas of Australian Birds, currently monitoring changes to birds and the environment at more than 6000 sites around Australia.

The Birds on Farms book, available from Birds Australia, provides a fuller description of the results, including background information to the guidelines in this article. An interactive program, *Remnants*, is available at the Birds Australia website (www.birdsaustralia.com.au/remnants). This program can be used to diagnose the general health of your farm, and gives suggestions for improving bird diversity.

Below: This typical farmscape in Victoria's south Gippsland has about 5 per cent tree cover, not enough to halt the decline of woodland birds and preserve the ecosystem process on which long-term agricultural production depends.

Inset: With the help of community-based organisations such as Landcare, Greening Australia and Land for Wildlife, new ways must be found to continue agricultural production while protecting natural ecosystems.

Photos by David Tatnall



ACKNOWLEDGMENTS

We are indebted to the Thyne Reid Education Trust for providing the funding for the Birds on Farms project, and to Environment Australia whose Save the Bush Fund (Natural Heritage Trust) provided seed money to get the project started. The Norman Wettenhall Foundation also provided valuable assistance during the analysis and writing stages. A special thank you to Brenda Newbey, who as the Western Australian Co-ordinator for the Birds on Farms survey, was crucial to the success of the survey in that region. Also to Ken Hancock who spent long hours vetting the survey data and cleaning up the database. The following people were on the Steering Committee for the project and provided valuable advice throughout the project: Stephen Ambrose, David Baker-Gabb, Ian Davidson, Doug Robinson, Neil MacFarland, Andrew Bennett, Richard Loyn, Stephen Platt, Helen Alexander, Kate Mashford and Susan Wright. Thank you also to the 500 or so participants who took part in the survey or offered their farms for others to survey. Edited by David Meagher and Merrilyn Julian; layout and production by P.A.G.E. Pty Ltd; printing by Jenkin Buxton Printers Pty Ltd.

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Cover photo: Rural landscape near Mansfield, northeastern Victoria;
inset from top: New Holland Honeyeater; Red-capped Robin;
Pacific Black Ducks.

Photos: (landscape) by Bill Bachman; (honeyeater) by Dave Watts;
(robin) by Rob Drummond; (ducks) by Graeme Chapman



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Funding for the Birds on Farms project and publication of this supplement was generously provided by the Thyne Reid Education Trust.

Additional funding was also generously provided by Environment Australia (National Heritage Trust) and the Norman Wettenhall Foundation.



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