LANARK BIRD LIST
(1956–96)
compiled by Murray Gunn,
with John and Cicely Fenton

1956

WOODLAND SPECIES
Whistling Kite
Brown Falcon
Peregrine Falcon
Red-rumped Parrot
Blue-winged Parrot
Barn Owl
Yellow-rumped Thornbill
Red Wattlebird
Willie Wagtail
Black-faced Cuckoo-shrike
Australian Magpie
Australian Raven
Little Raven
Welcome Swallow

WET GRASSLAND
Black Swan
Australian Shelduck
Pacific Black Duck
Grey Teal
White-faced Heron
White-necked Heron
Australian White Ibis
Straw-necked Ibis
Brolga (disappeared until '96)
Latham's Snipe
Masked Lapwing
White-fronted Chat
Magpie-lark
Fairy Martin

GRASSLAND
Stubble Quail
Black-shouldered Kite
Wedge-tailed Eagle
Black Falcon
Nankeen Kestrel
Banded Lapwing
Flame Robin
Richard's Pipit
Brown Songlark

AERIAL
White-throated Needletail
Fork-tailed Swift

1956–76 arrivals

WOODLAND SPECIES
Brown Goshawk
Australian Hobby
Diamond Dove
Yellow-tailed Black-Cockatoo
Long-billed Corella
Galah
Sulphur-crested Cockatoo
Musk Lorikeet
Purple-crowned Lorikeet
Crimson Rosella
Eastern Rosella
Budgerigar
Pallid Cuckoo
Fan-tailed Cuckoo
Horsfield's Bronze-Cuckoo
Shining Bronze-Cuckoo
Southern Boobook
Azure Kingfisher
Laughing Kookaburra
Superb Fairy-wren
Striated Pardolote
Brown Thornbill
Striated Thornbill
Little Wattlebird
Yellow-faced Honeyeater
Singing Honeyeater
White-plumed Honeyeater
White-naped Honeyeater
New Holland Honeyeater
Tawny-crowned Honeyeater
Eastern Spinebill
Jacky Winter
Scarlet Robin
Golden Whistler
Grey Shrike-thrush
Restless Flycatcher
Grey Fantail
Olive-backed Oriole
Masked Woodswallow
White-browed Woodswallow
Dusky Woodswallow
Grey Currawong
Red-browed Finch
Tree Martin
Rufous Songlark
Silvereye

WETLAND
Blue-billed Duck
Musk Duck
Australian Wood Duck
Australasian Shoveler
Chestnut Teal
Pink-eared Duck
Hardhead
Australasian Grebe
Hoary-headed Grebe
Great Crested Grebe
Darter
Little Pied Cormorant
Little Black Cormorant
Great Cormorant
Australian Pelican
Little Egret
Great Egret
Nankeen Night Heron
Australasian Bittern
Glossy Ibis
Royal Spoonbill
Yellow-billed Spoonbill
Swamp Harrier
Buff-banded Rail
Lewin's Rail
Baillon's Crake
Australian Spotted Crake
Purple Swamphen
Dusky Moorhen
Black-tailed Native-hen
Eurasian Coot
Common Greenshank
Common Sandpiper
Red-necked Stint
Sharp-tailed Sandpiper
Curlew Sandpiper
Black-winged Stilt
Red-capped Plover
Double-banded Plover
Black-fronted Dotterel
Red-kneed Dotterel
Silver Gull
Whiskered Tern
Clamorous Reed-Warbler
Little Grassbird

WET GRASSLAND
Cape Barren Goose
Golden-headed Cisticola

GRASSLAND
Spotted Harrier

1976–96 arrivals

WOODLAND SPECIES
Little Eagle
Common Bronzewing
Gang-gang Cockatoo
Rainbow Bee-eater
Spotted Pardalote
White-browed Scrubwren
White-eared Honeyeater
Pink Robin
Eastern Yellow Robin
Varied Sittella
Rufous Whistler
Rufous Fantail
White-winged Triller
White-winged Chough
Bassian Thrush

WETLAND
Magpie Goose
Plumed Whistling-Duck
Freckled Duck
Intermediate Egret
Spotless Crake
Wood Sandpiper
Banded Stilt

WET GRASSLAND
Brolga (returned '96)

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Bushcare has the ambitious goal of reversing the long-term decline in the quality and extent of Australia's native vegetation communities, in order to conserve biodiversity and contribute to the ecologically sustainable management of natural resources. The vision and commitment of the Fenton family at Lanark shows that ambitious goals are achievable within acceptable time-frames, even in seriously degraded landscapes.

Local action on a national scale, with the support of Bushcare and other programs of the Natural Heritage Trust, can make a real difference in restoring our rich heritage of plant and animal wildlife communities; maintaining the productive capacity of our land and water; and ensuring prosperity and quality of life for future generations.

LANDCARE VICTORIA
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RENAISSANCE ON LANARK

The return of almost all the birds that once inhabited the region to the Fentons' grazing property in Victoria's Western District is perhaps the greatest of Lanark's many miracles.

by Graeme O'Neill

Main photo: Wetlands, woodlands and grazing sheep: Lanark is a model of sustainable farming.
Photo by **David Neilson**
Insets (from left): Stubble Quail, Eastern Spinebill, Straw-necked Ibis
Photos: (quail and spinebill) by **Graeme Chapman**; (ibis) by **Tom Putt**

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LANARK IS A GRAZING PROPERTY like no other in Victoria. It's not just the visual differences – the patchwork of farm forestry plantations, the angular lines of shelter belts interspersed with pockets of native woodland, or the chain of restored natural wetlands curving north and east around the homestead.

The green, tree-filled landscape initially commands attention, but it is only when the visitor's car engine falls silent that Lanark's distinctive signature becomes audible: birds – hundreds of birds, of many species. Their calls emanate from every quarter, the cheerful symphony of an environment in irrepressible health, inviting – insisting – that the visitor be silent, be still … and listen.

Something remarkable has occurred on Lanark, in the undulating basalt country of Victoria's Western District, south-west of Branxholme. In little more than four decades its owners, John and Cicely Fenton, and their family, have transformed their once-ravaged sheep property. Through the diversification of traditional grazing and cropping with large-scale farm forestry, and the restoration of natural habitat, they have demonstrated that it is possible to develop systems of farming that are both more ecologically and agriculturally sustainable.

Below: October 1992 view of Lanark, with wetlands at high water mark. Note the indigenous plantings and aquatic species around the wetlands, and sheep, shelterbelts and farm forestry plantations in the background. All these systems – agricultural, forestry, aquatic habitat, wildlife habitat, etc. – are intrinsically interlinked to create a more ecologically and agriculturally sustainable system overall. Photography by **Lindsay Stepanow**/photo supplied by Thomson Hay & Associates

Inset: Cicely and John Fenton. Photo by **David Neilson**

Transformation

Thirty years ago Lanark was a typical Western District grazing property. The wool industry was booming. In good years, the Fentons were producing nearly 200 bales of wool from the property's 800 hectares, and raising fat lambs for the domestic market on its improved pastures.

But like most Australian rural properties, it could veer wildly between plenty and hardship. On a wall of the Fentons' home is an aerial photo, taken in late summer, 1963. The image shows a property ravaged by inappropriate grazing, almost bereft of grass or tree cover. The homestead is marooned in a stark red landscape, estranged from the green, living world.

In 1967, an El Nino-induced drought sent Lanark spiralling into economic and environmental crisis. During the drought, many of John's close friends, leading farmers and graziers, suffered considerable physical, emotional and financial hardship.

John Fenton was chastened: if the 'best' graziers could be so vulnerable to nature's vicissitudes, there had to be something seriously wrong with the way in which the grazing industry operated. It was a salutary warning that the production levels of the occasional 'boom' years were unsustainable, and that the human and environmental costs of pursuing these levels through the lean years in-between were too high.

That insight, and Lanark's own plight, precipitated a radical change in the way John managed his farm, and with it, his attitude to the land, to his business, to family – to life itself.

He embarked on a program that went beyond drought-proofing the property, and sought to 're-create the balance' between the farming enterprise and the natural environment, to the overall benefit of both. At a time when other Western District farmers were still clearing native vegetation and draining wetlands on their properties, John set about doing the opposite – reinstating the wetlands that had once been a natural feature of the local landscape, fencing off large parts of existing paddocks and planting trees. By creating an environment in which wildlife could co-exist with livestock, he hoped to buffer Lanark's production systems and its profitability against climatic diversity and so ensure his family's – and the land's – future.

Today, the Fentons still produce wool, raise fat lambs, and grow occasional cereal crops. But since 1967, in an intensive program of farm forestry and revegetation, the family have planted over 80,000 trees and shrubs in shelterbelts, plantations and native woodlands featuring species endemic to the local area.

Through their kitchen window, they can now watch ducks, waterhens and Black Swans gliding on Lake Cicely, the largest water body in the system of wetlands surrounding the homestead site. Eastern Swamp Rats *Rattus lutreolus* delving for roots and invertebrates in the moist ground between the house and the lake's edge have brought the soil to a fine tilth – even if they have made a vegetable garden impossible.

At dusk one of mainland Australia's rarest mammals, the Eastern Barred Bandicoot *Perameles gunii*, forages quietly in the grassland and associated understorey of the native woodland around the homestead. At night, from the wetlands, frogs – among the most sensitive of all creatures to environmental disturbance – maintain a nocturnal racket. And by day, in the skies above the farm and from every tree across the property, birdsong attests to the miraculous transformation that has occurred on Lanark.

1963 view of Lanark, pre-wetland restoration and mass tree-planting – ravaged by inappropriate grazing. (Photo is taken from opposite angle to that on p. II. See shearing shed above house.)
Photo by **John Fenton**

Tree planting

When the NSW Surveyor-General, Major Thomas Mitchell visited the region in 1836, his description of western Victoria's sunlit eucalypt woodlands and grasslands as 'a nobleman's park on a gigantic scale' triggered a rush for grazing land in the area.

By the 1840s, the new settlers were systematically clearing western Victoria's woodlands and draining its wetlands. An extensive article from the *Hamilton Spectator*, dated 1886, chronicles the

Lanark: farm land use

Lake	7 ha	0.9 %
Amenity planting *(indigenous, native and exotic species)*	8 ha	1 %
Water meadows	12 ha	1.5 %
Shelterbelts *(indigenous, native and exotic species)*	14 ha	1.8 %
Habitat planting *(native and indigenous species)*	16 ha	2 %
Swamps	44 ha	5.5 %
Farm forestry *(indigenous, native, and exotic species)*	48 ha	6 %
Pasture *(native and exotic species)*	651 ha	81.3 %

Property size	800 ha		
Land use summary	Wetlands	63 ha	7.9 %
	Trees/shrubs	86 ha	10.8 %
	Pastures	651 ha	81.3 %
Rainfall	Reliable 700 mm pa		
Soils	Grey/brown silty loam over gravelly loam, with distinct clay subsoil.		
Stock	7500, predominantly 22 micron sheep, including Border Leicester x Merino and fat lambs. Small cattle breeding and fattening enterprise.		

Source: *'Lanark': Farm Forestry*, compiled by Rochelle Rudduck, Rochelle Rudduck & the Fenton Family 'Lanark', 1994. (Second edition, 1995)

This remnant bushland on an adjacent property, only a few hectares in area, is all that remains of the original local vegetation. Surrounded by improved pasture and grazed by sheep, it has little chance of surviving. Birds such as the Rufous Songlark, however, can hang on in remnants like these, and this may account for this species' early return to Lanark. Photos: (bush) by **David Neilson**; (songlark) by **Graeme Chapman**

recent changes on the 3240-hectare Bassett estate, of which Lanark was then a part. The whole area, originally 'heavily timbered with gum and honeysuckle [banksia]' was systematically cleared, burnt, ring-barked and drained. In fifteen years, the landscape was unrecognisable:

> I was not prepared for the transformation the place has undergone. The forests have almost disappared and with the exception of the bleached weather boats in trunks of the larger gum trees, there is nothing to indicate they ever existed; the main branches have all fallen and cleared away, while the honeysuckles have vanished, root and branch. The native grasses are thick and … their sweetness is proved by the manner with which they are grazed, and a complete absence of tussocks which were so prevalent in former days.

When John Fenton and his sister inherited Lanark from their father in 1956, it was almost devoid of trees. Typical of most Western District properties, its empty paddocks rolled to the horizon, unbroken except for a few radiata pines *Pinus radiata* and Sugar Gums *Eucalyptus cladocalyx*. In John's own words, he 'decided to get the whole place geared up' by ploughing in the existing hardy native pastures and replacing them with more productive, improved pastures.

Yet even then, he recognised the value of trees as shelter, and planted a few lines of cypresses across Lanark's windswept landscapes. His first tentative foray into farm forestry was made in spring, 1961, when he planted 642 radiata pines to screen the house from the roar of trains passing along the railway line which forms the property's south-eastern boundary. At the time, the Forests Commission Victoria advised that it was not economically viable to establish *P. radiata* in the district commercially, and so the trees were left unmaintained.

The Forests Commission maintained their position that the Hamilton district was not suitable for commercial farm forestry for nearly 20 years. Twice – in 1973 and 1974 – they knocked back the Fentons' application for a farm forestry grant.

Nevertheless, for nearly two decades the Fenton family continued with substantial plantings for shelter, and for woodland and wetland habitat – often in the face of considerable scepticism from some in the neighbourhood. Learning by trial and error, from a few knowledgeable nurseries and what little was left of the original vegetation in the district, they tried to piece back what was growing in the area before it was cleared in the 1860s.

A radio broadcast on the potential of native trees on farms inspired John to begin small-scale experimental plantings of eucalypts and wattles. By the late 1970s, his advice on farm tree planting was much sought after by farmers in western Victoria and New South Wales.

The Fentons' big break came in 1984, when the Forests Commission changed its view and declared Lanark now suitable for farm forestry after all. John obtained a loan from the Commission and began establishing plantings of cutting-grown *P. radiata* and some eucalypt species.

Many other trial plantings have followed, including native hardwoods, Monterey Cypress *Cupressus macrocarpa*, a potentially valuable source of high quality timber, and provenance trials of eucalypts and acacias. Each plantation includes carefully selected indigenous habitat species, often from local sources.

Today, trees cover some 85 hectares (10.8 per cent) of the property, 48 hectares of which are commercial plantations of native, indigenous and exotic species. Shelterbelts account for 14 hectares, while a further 16 hectares are managed as wildlife habitat (see chart, p. III). Lanark resembles a patchwork quilt of tree plots across the landscape, each one individually managed in the Fentons' constantly evolving farming experiment.

Native pasture

Fifty per cent of the property is sown to improved pasture, and stocked at around 14 dry sheep equivalent (DSE) per hectare. Thirty per cent is native pasture, interspersed with clover and ryegrass, stocked at a maximum of eight DSE per hectare.

But the native pastures are also managed, indirectly, for wildlife, providing buffer zones between improved pastures and sensitive areas of wildlife habitat that are vulnerable to contamination and nutrient runoff.

'We're trying to find a balance,' says David Fenton, who has taken over management of Lanark from his father. 'The more fragile areas of pastured land have not been fertilised since 1969.

'Except for low concentrations of herbicide to control thistles and for weed control associated with our revegetation program, we don't use pesticides, because we don't have a serious problem with red-legged earth mites or other pests. The sheep on the native pastures are drenched only once a year because the low stocking rates minimise worm infestation. On the improved pastures, we drench four times a year.'

Farm economics

When the decision was made in the late 1960s to diversify the property's production base, there was a dearth of information about the economics of farm forestry. Alienating a substantial area of land for 25–50 years, in the uncertain prospect of future profits, could jeopardise Lanark's short-term viability as a grazing property.

John and Cicely have spent nearly 40 years – most of their adult life – planting trees, for very little financial reward. At a nominal cost of $4 per tree, and excluding the cost of re-establishing the wetlands, they estimate that their investment approaches $320,000. Little of this will be returned in their lifetime.

According to Jeff Tombleson, from the New Zealand Forest Research Institute, by the year 2009, the area of Lanark planted to high quality, clear (pruned) radiata pine could exceed 52 hectares. At that time, approximately 2 hectares on average could be harvested annually. That is, the approximately 6 per cent of Lanark planted to high quality clear wood could generate up to 70 per cent of the net farm income – thus eventually creating the financial conditions for an overall lowering of stocking pressure, especially in the more environmentally sensitive areas of the property.

In 2009, John will be 74. Thus it is John and Cicely's children – or rather, their grandchildren – who will ultimately directly benefit financially from their commitment.

For the financial sector, which – as John indicates – seems unable to fully cost or understand the value of the work done on Lanark, such economics make little sense. The Fentons have been urged to improve the property's profitability.

But if Lanark were to move to more intensive production by raising stocking rates and increasing their current fertilising and spraying regimes, it would threaten some of the environmental gains of the past 30 years – and perhaps compromise the direct benefits that are already occurring: sheep deaths from exposure after shearing are down, and lamb mortality has fallen as a result of the increased shelter; some of the plantations are already producing timber for fence posts, fodder and firewood, and are a valuable resource for local professional seed collectors.

The Fentons' long-term aim is to demonstrate that farm forestry, particularly clear wood production, is a viable option for western Victorian farmers – John believes many farmers do not need to be convinced of the environmental benefits of trees, but need to be persuaded that trees can also provide a reliable income. But for this, farmers – like agricultural economists – need to cultivate a long-term vision and commitment to the land.

Modern agricultural and economic systems do not look beyond a time horizon of one human lifetime, much less two or three. John talks of 'weaning people away' from the concept that a tree must be planted and felled during a person's working life.

The Fentons' own philosophy is perhaps best embodied in the 'Quercarium', a grove of 600 trees containing a dozen species of 'old world' oaks, planted in 1993. The oaks will not reach maturity for another 150 years.

Birds on Lanark

In 1954, two years before John Fenton took over Lanark, Murray Gunn, a naturalist from nearby Hamilton, began visiting Lanark regularly to observe birds and record their presence and abundance.

For nearly 45 years, Murray has meticulously monitored the property's bird fauna (see birdlist, p. XVI), and chronicled perhaps the greatest of Lanark's miracles: the renaissance of almost the entire suite of bird species that inhabited the region's native woodlands and wetlands more than a century ago.

Even at the current level of vegetation cover, 155 resident or itinerant species of native birds have been recorded in the property's woodlands, wetlands and pastures – compared with fewer than

40 species in 1956. With a few notable exceptions, the most recent census (1996) includes almost all the species estimated to have been present in the region in pre-European times (see 1840 bird chart, p. XI).

The birds are not merely passive beneficiaries of Lanark's restored environment – they have been an integral part of it. For Dr Geoff Barrett, Co-ordinator of Birds Australia's nationwide Birds on Farms project, the return of native birds to Lanark as a result of changed land management practices makes the property a model for a more enlightened era of farm management in Australia.

'Since birds occur close to the top of the food chain', he says, 'they are good indicators of the health of the environment.

'Their presence in a landscape indicates that mammals, reptiles, insects and a diversity of native trees and shrubs will also be present – all part of a healthy, functioning ecosystem. And if its native ecosystems are healthy, a farm is likely to have a long-term future.'

The return of birds to Lanark, he explains, reverses a trend seen virtually everywhere in rural southern and eastern Australia, where birds – like all other native fauna and flora – are declining at a precipitous rate. Across large tracts of land, less than 10 per cent of the original woodland remains, primarily as scattered trees, roadside vegetation and small, isolated remnants in a vast sea of agricultural land. Wetlands have been drained; native grasslands turned over to cropping or replaced with more productive 'improved' pastures.

Such a landscape is unsustainable. The isolated trees are dying because of the effects of the surrounding land management; the remnants are becoming degraded by insect and fungal attack, rising water tables, salinity, overgrazing, weed invasion and soil erosion. Water bodies are contaminated by pesticides or nutrient runoff, leading to eutrophication and algal blooms. Native grasslands are so depleted that they scarcely support their constituent species.

The loss of native birds to this landscape signals both the breakdown of native ecosystems and the wider loss of Australia's agricultural capacity.

'Birds and trees are mutually dependent', says Geoff. 'Their disappearance from Australia's rural landscapes has been disastrous both for the environment and for agriculture.'

Australia's grazing and cropping systems are dependent upon healthy ecosystems, which provide biological controls against insects that attack crops, pastures and farm trees. The farm trees and shrubs in turn prevent rising water tables and soil erosion, and prevent losses in productivity due to exposure to harsh climatic conditions.

Small, experimental woodlots test the effects on tree form and timber value of hardwoods grown in configurations other than traditional plantations. These 10-year-old native hardwood plantings with indigenous understorey, ready for harvesting in another 30 years, will attract canopy-feeding birds such as the New Holland Honeyeater (*above*) and provide habitat for ground feeders such as the Common Bronzewing (*below*).
Photos: (landscape) by **David Neilson**; (birds) by **Graeme Chapman**

What makes the Lanark experiment so instructive, explains Geoff, is that coupled with Murray Gunn's bird list and the Fentons' own bird record, the property's 40-year history provides us with the opportunity to test the interdependency of trees, birds and farm productivity (see 'Birds on Farms: lessons from Lanark', p. X).

When the bird record is aligned with the environmental changes on Lanark over the last four decades, a consistent pattern emerges: the timing and nature of the improvements on the property correlate with the return of particular bird species – indeed entire guilds of species.

From this, says Geoff, farmers can now virtually predict which birds are likely to return to their properties as they plant particular trees and shrubs or make other environmental improvements. And the subtle 'threshold effects' that shape the natural environment are illuminated: how much tree and shrub cover is required to support a diverse bird fauna? At what point do waterbirds decide that a wetland is good breeding habitat, rather than a convenient stopover on the way to somewhere else? When does vegetation diversity and structure begin to influence bird diversity?

Sustainable farming

For Geoff Barrett, Australian agriculture has no choice but to pursue sustainability – all the signs are that, if there is no change, many farms will not be viable in the future.

'If our agricultural system continues to increase applications of fertiliser on improved pastures, we will get a boom in productivity, and in the short term, the balance sheet will look great. But the longer term prospects are dubious, to say the least. With a more moderate strategy, we can have a better environment and economic stability into the far future.'

A more enlightened view of the place of farming in Australian life – for which, perhaps, Lanark is the pre-eminent model – will embrace not just the production of commodities like wool, wheat and meat, but will see farms as havens for native wildlife and flora.

Farms would gain direct benefits: protection for livestock against wind, and extremes of heat and cold, water conservation and protection against salinity, and environmental services such as pest control and nutrient recycling.

'The challenge for Australian farming is to repair our food-production systems and make them sustainable. We need to ensure we can continue to put food on the table 100 years from now.

'The connection between farm ecosystem health and productivity has to be made – we must understand that conserving birds on farms is securing our food future.'

Part of the 3.5 km *P. radiata* and habitat planting (established 1985) along the railway-line which forms the south-eastern boundary of the property. Managed according to silvicultural techniques, these pines will be ready for harvest in another 10–15 years. Sheep graze under the plantation, while the fenced indigenous species in the outer shelter rows (Drooping She-oak, *Bursaria* and *Melaleuca* sp.) provide a habitat corridor along Lanark's southern boundary. Many native birds such as the Rufous Whistler will forage in exotic tree plantations such as pines, as long as there are local native trees and shrubs nearby.
Photos: (plantation) by **David Neilson**; (whistler) by **Graeme Chapman**

Trees and shrubs interspersed with grazing pasture create an ideal rural landscape. Birds such as the Superb Fairy-wren (*left inset*) arrive early after tree planting, and are followed by species such as the Shining Bronze-Cuckoo (*right inset*), which require breeding birds as hosts for raising their young. Photos: (landscape) by **David Neilson**; (birds) by **Graeme Chapman**

The Lanark way

Lanark's transformation is a miracle in progress, and the costs have been high. Beyond the expense and physical effort, the Fentons have had to endure the costs of daring to be different – social alienation, even ridicule.

A few detractors may still regard them as dreamers in a harsh world in which economic forces rule everyday life. But in the age of Landcare, and the movement towards sustainable agriculture, there is an increasing recognition that the Fentons were – are – decades ahead of their time.

Their personal quest to reconcile the demands of their own economic wellbeing with that of the environment has been a 40-year experiment, conducted without benefit of formal controls. But, the success of their project – and the lessons learnt en route – signpost the way from Australian agriculture's profligate past to a more sustainable future.

Today, the grazing industry in Victoria's south-west is in deep economic and environmental strife. Figures from the Australian Bureau of Agricultural Economics show the average annual grazing profit for a 450-hectare grazing property in the region from 1993–96 was just $311, before tax and interest. Caught between falling commodity prices and creeping environmental degradation, many graziers have accumulated debts they can no longer service, and face an uncertain future.

Like many Western District graziers, the Fentons live with debt. What makes their situation different is that they have built up a substantial reserve of what new-wave economists call 'environmental capital' – the soil, water, plants, mammals, birds, invertebrates, fungi and microbes on which agriculture depends. The natural environment works for them, not against them.

The real value of natural resources – natural capital – typically appears on farm balance sheets only after they have been so degraded that the damage is beyond the individual farmer's capacity to repair. The resilience of natural systems tends to mask such damage until it reaches a critical threshold beyond which the capacity for self-repair or renewal is rapidly lost.

Today, the Fentons' farm and its production systems seem well insulated against environmental adversity – drought, salinity, water contamination,

(continued on page XV)

View across Lake Cicely, the largest of Lanark's restored wetlands. Indigenous plantings around the lake's perimeter provide habitat for over 50 wetland bird species, including open water birds such as the Blue-billed Duck (*top inset*) and reed-loving species such as the Purple Swamphen (*bottom inset*). Photos: (lake) by **David Neilson**; (duck and swamphen) by **Graeme Chapman**

Birds on Farms: Lessons from Lanark

About seven years after planting a mix of native species, such as these she-oaks and acacias in the ibis rookery area, many small birds such as the Rufous Fantail (*above*) and the Red-browed Finch (*below*) will move into this habitat. Photo (bush) by **David Neilson**; (birds) by **Graeme Chapman**

In the 1980s, the Fentons' efforts to restore Lanark's natural environment attracted the attention of Professor Jim Sinatra, from the Royal Melbourne Institute of Technology's School of Landscape Architecture. Elizabeth Jacka, then a landscape architect student at RMIT, began visiting Lanark to observe the changes in its environment. Using Murray Gunn's bird records and the Fentons' own extensive bird and planting diaries from 1956–96, she has devised a series of birdcharts that graphically depict the changes occurring on the property since European settlement (see pp. XI–XIV, also bird list p. XVI).

Beginning with a hypothetical representation of the bird species thought to have been present on the property in 1840, prior to European settlement, the charts graph the return of birds to Lanark in 20-year intervals, until 1996. For Geoff Barrett, Co-ordinator of Birds Australia's Birds on Farms project, these charts together with the bird and planting record for the last 40 years, give us the opportunity to assess the benefits of both farm ecosystem health and productivity of pursuing a revegetation program.

The natural environment, he says, can be regarded as a set of building blocks that fit together in time and space: by setting aside areas of bushland, restoring natural wetlands, preserving old, large trees, and planting trees and shrubs, farmers like the Fentons are re-building the natural ecosystem on which agriculture depends. The land management goals for bird presentation are consistent with those for sustainable farming.

Tree cover

One of the key indicators of ecosystem health is the percentage of tree cover on a farm. Recent research suggests that if environmental and economic stability are to be balanced, the optimum tree cover on a grazing/cropping property is around 30 per cent. Within this 30 per cent, one-third should be dedicated wildlife habitat, and the rest could be managed for wood production.

Today, trees cover nearly 11 per cent of Lanark, as commercial plantations, shelterbelts and wildlife habitat. The return of birds that require healthy, dense tree cover, such as the Brown Goshawk, Restless Flycatcher, Olive-backed Oriole and Crimson Rosella (between 1956–76 – see bird list, p. XVI), and the Gang-gang Cockatoo, Rufous Fantail and Spotted Pardalote (between 1976–96), tracks the improvement of the woodland ecosystem on Lanark.

The Fentons' ultimate aim is to increase the tree cover on their property over the next 40 years, to around 280 hectares, or 35 per cent.

Wildlife habitat

Sixteen hectares on Lanark – 2 per cent of the property and just under one-fifth of the total tree cover area – are managed primarily for wildlife. The Fentons aim to increase this area to about 80 hectares (10 per cent) of the property.

Remnant vegetation

Prime wildlife habitat generally occurs in remnants of native vegetation that have never been cleared. One of the problems that John and Cicely faced when embarking on their revegetation program was that there were no native bushland remnants left on Lanark: the property had been cleared over 80 years beforehand, thus providing nothing to build on. The nearest indigenous seed source is often up to 10 km away.

Area and distance between habitat areas

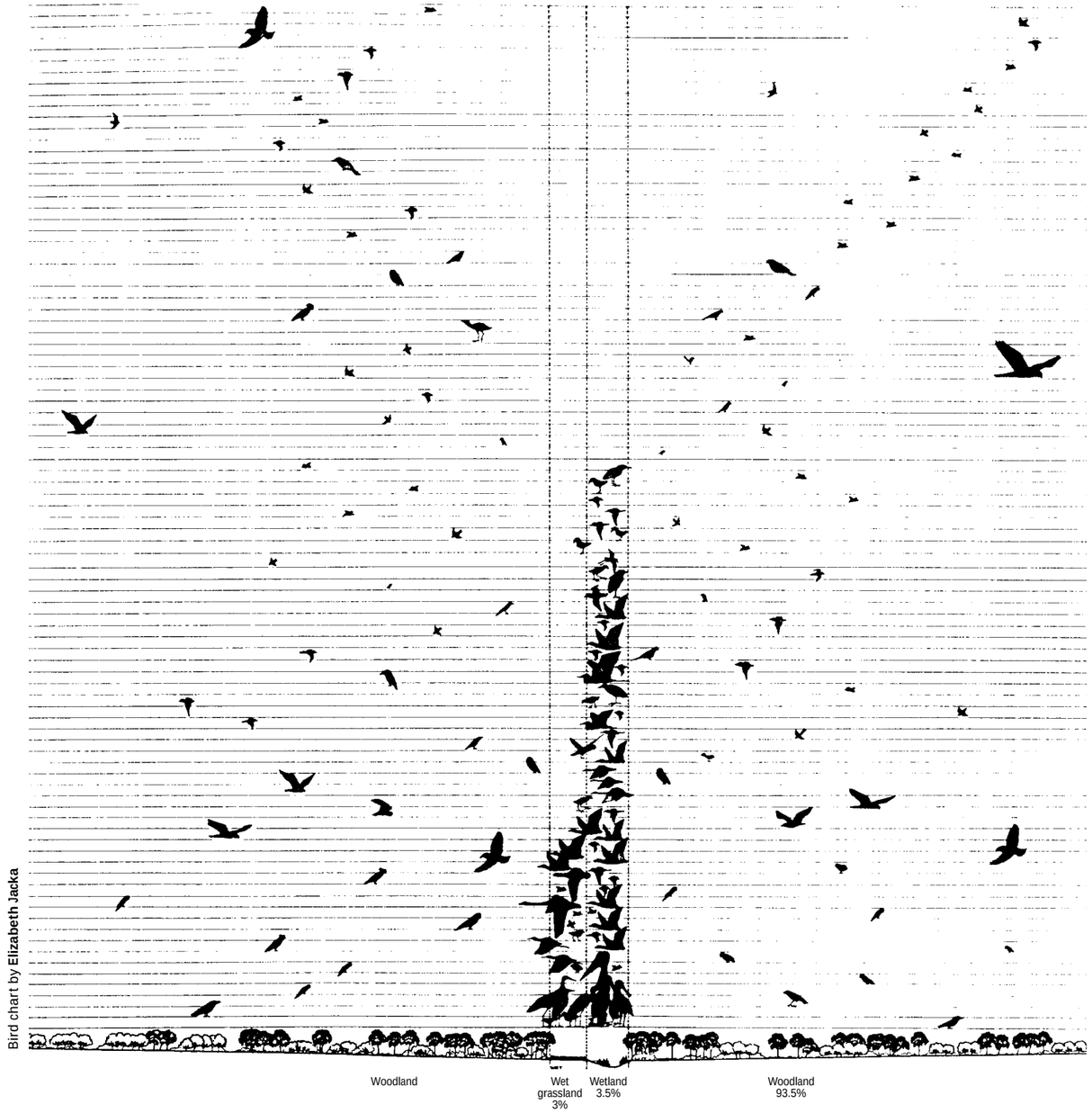
Research in Australia indicates that the minimum size for patches of native vegetation to remain healthy is around 5–10 hectares.

Although most of the wildlife habitat on Lanark occurs in small patches (< 5 hectares), where possible, such areas have been enlarged by planting trees adjacent to the site. This then serves as a buffer against 'edge effects' caused by exposure to the elements, or the impact of grazing stock. Strong winds can strip loose bark from trees and disperse leaf litter, removing foraging habitat for native birds like the Grey Shrike-thrush and White-naped Honeyeater, and the Varied Sittella, all of which have now returned to Lanark (between 1956–76, and 1976–96 respectively) as the habitat areas have become more sheltered.

Where possible, the wildlife habitat on Lanark has been connected to other areas of tree and shrub cover by strips of planted trees and shrubs. These corridors act as flyways for birds moving about the farm, and also as shelterbelts for stock.

Livestock are reluctant to walk long distances for water or shelter. The same also seems to hold for birds and other wildlife – early on, the Fentons planted isolated

'Australia Felix': Lanark in 1840



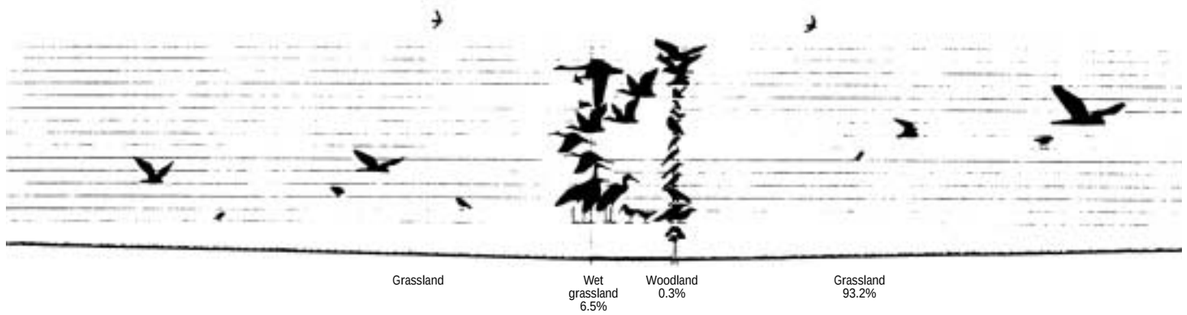
Elizabeth Jacka's first chart is a hypothetical representation of bird species that may have been found at Lanark in 1840, prior to European settlement. This chart was compiled by researching the different habitats that may have occurred on the property at the time, and by identifying the indigenous bird species that are likely to have occupied these different habitats.

While the land around Branxholme was occupied by squatters in the early 1840s, widespread clearing did not occur until much later. A survey plan of the Parish of Branxholme (including Lanark), dated 1857, provides a useful picture of the type of vegetation cover that existed on the property at that time: woodland of Swamp Gum *Eucalyptus ovata* and Manna Gum *E. viminalis*, with an understorey of wattles and other smaller species. Areas of swamp are also indicated on the plan.

A nearby remnant of indigenous vegetation also provided a good indication of the shrub species that would have occurred on the property.

Based on current lists of bird species indigenous to the area, and additional advice provided by naturalists Alan Reid and Murray Gunn, it is estimated that close to 200 bird species may have occurred on Lanark prior to European settlement, almost half of them being dependent on the wetland habitats. Species that require extensive wooded areas such as the Barking Owl and Spotted Quail-thrush, as well as open country birds such as the Bush Stone-curlew and Plains-wanderer, are likely to have been present.

Riding on the sheep's back: Lanark in 1956



By the time John Fenton inherited Lanark in 1956, the landscape had been transformed. The wetlands had been drained, and the woodlands cleared before the turn of the century, and were by now replaced by open pastures broken only by a couple of rows of exotic trees and small dams for livestock. Less than 0.3 per cent of the property's original tree cover remained. Three very small plantings of Sugar Gums and radiata pines had been established in the mid-1930s.

Of the 200 or so bird species estimated to have been present on Lanark prior to European settlement, fewer than 40 remained (see bird list, p. XVI): a handful of grassland species, such as the Black Falcon, Stubble Quail and Flame Robin; and a small group of robust woodland birds (14 species). Birds requiring standing water, such as the cormorants and grebes, had also disappeared, to be replaced by birds like the Straw-necked Ibis and Australian Shelduck that feed on wet grasslands.

patches of trees up to 700 metres apart, and well away from water; few birds colonised them. Now they aim for a maximum of 400 metres between tree plots.

Habitat diversity

The Fentons' systematic approach to increasing habitat diversity in Lanark's farm vegetation has been a significant factor in the return of birdlife to the property.

Because of their small, broad wings, most understorey-dependent birds are unable to fly long distances without dense shrub cover. As well as planting shrubs in the wildlife refuge areas, the Fentons have planted understorey shrubs adjacent to their commercial plantations. This attracts birds into the woodlots, where they remove insects from the trees.

Many native birds will forage in exotic tree plantations such as pines, as long as there are local native trees and shrubs nearby.

The appearance of the Brown Thornbill, Superb Fairy-wren, Yellow-faced Honeyeater, Grey Fantail and Red-browed Finch (between 1956–76), and Rufous Fantail and White-browed Scrubwren (between 1976–96), mark the establishment of dense understorey vegetation and a gradual 'connecting up' of the wildlife refuges on Lanark.

Mixed-species vegetation, that will provide both habitat and a diverse source of food year-round, is also important to farm ecosystem health. As a general guide, when planting shrubs, only one in five should be a nectar-producer. Too many nectar-producing shrubs creates a 'honey pot', which will be taken over by aggressive honeyeaters such as the Noisy Miner. Miners have not been recorded on Lanark but are becoming a problem elsewhere in Australia, as they exclude other birds from small woodlots, resulting in the trees becoming vulnerable to insect attack.

Old trees

About one-fifth of Australia's native birds require tree-hollows for nesting. Retaining old, senescent trees and stags – even fallen logs – is essential for attracting these species. Nesting boxes are a poor substitute.

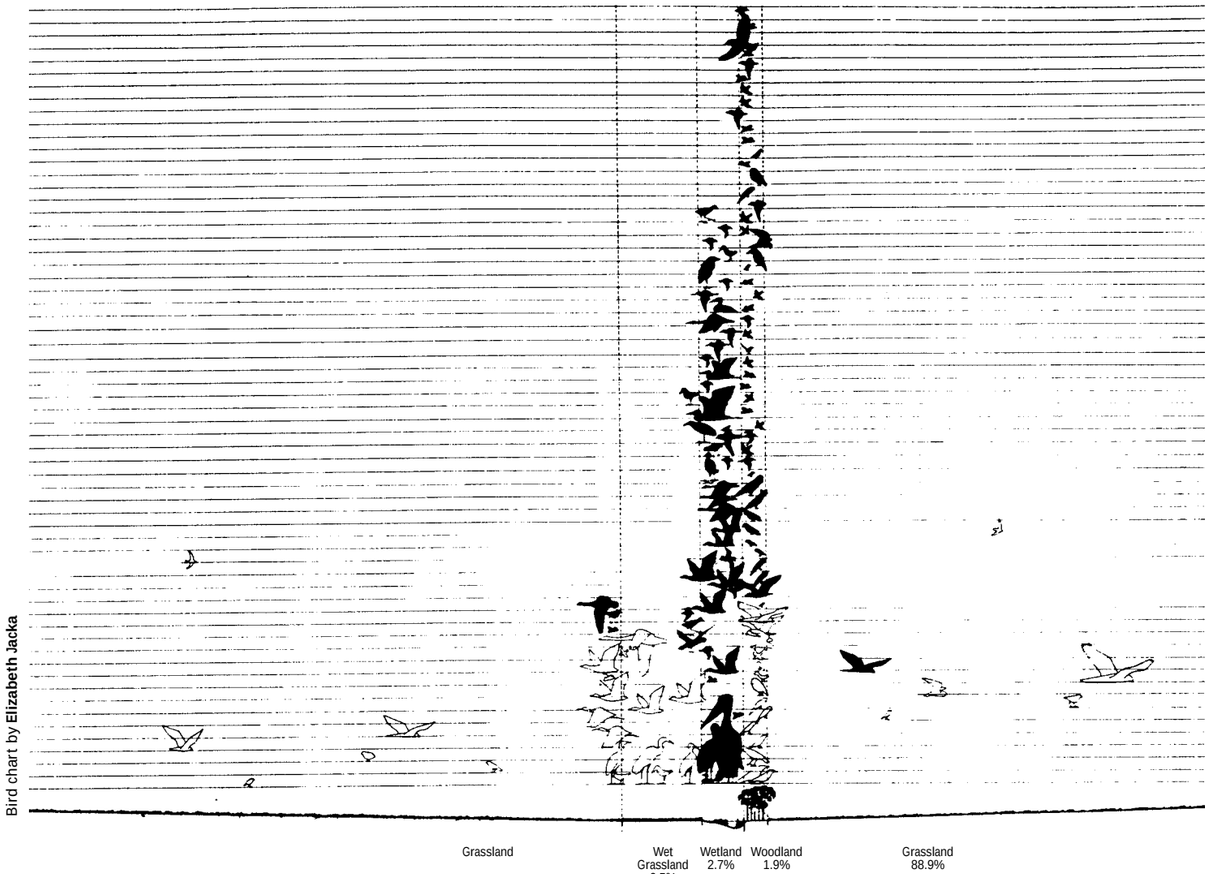
Most farmers would be astonished at the number and diversity of bats that also roost in hollow trees on their properties. Research suggests that the decline of bats may be a key factor in the rise of insect pest problems on farms.

Unfortunately, all of Lanark's old trees were removed during the initial clearing of the land. Although a number of hollow-dependent species such as the Yellow-tailed Black-Cockatoo, Southern Boobook and Tree Martin returned to Lanark between 1956–76, they must nest elsewhere. As it is, Neville Bonney from Greening Australia, has indicated that the initial plantings at Lanark will not begin to senesce for at least another 140 years.

Mistletoes

Mistletoes, viewed by many farmers as pest plants, are also vital to a healthy woodland ecosystem, providing protection for birds seeking refuge in their dense foliage, and also fruit, nectar and possible nesting sites. Honeyeaters, such as the Yellow-faced and the White-naped Honeyeater, will move throughout a rural landscape in response to the flowering of mistletoes; while visiting they will also pollinate trees and remove leaf-feeding insects.

Wetlands and woodlands: Lanark in 1976



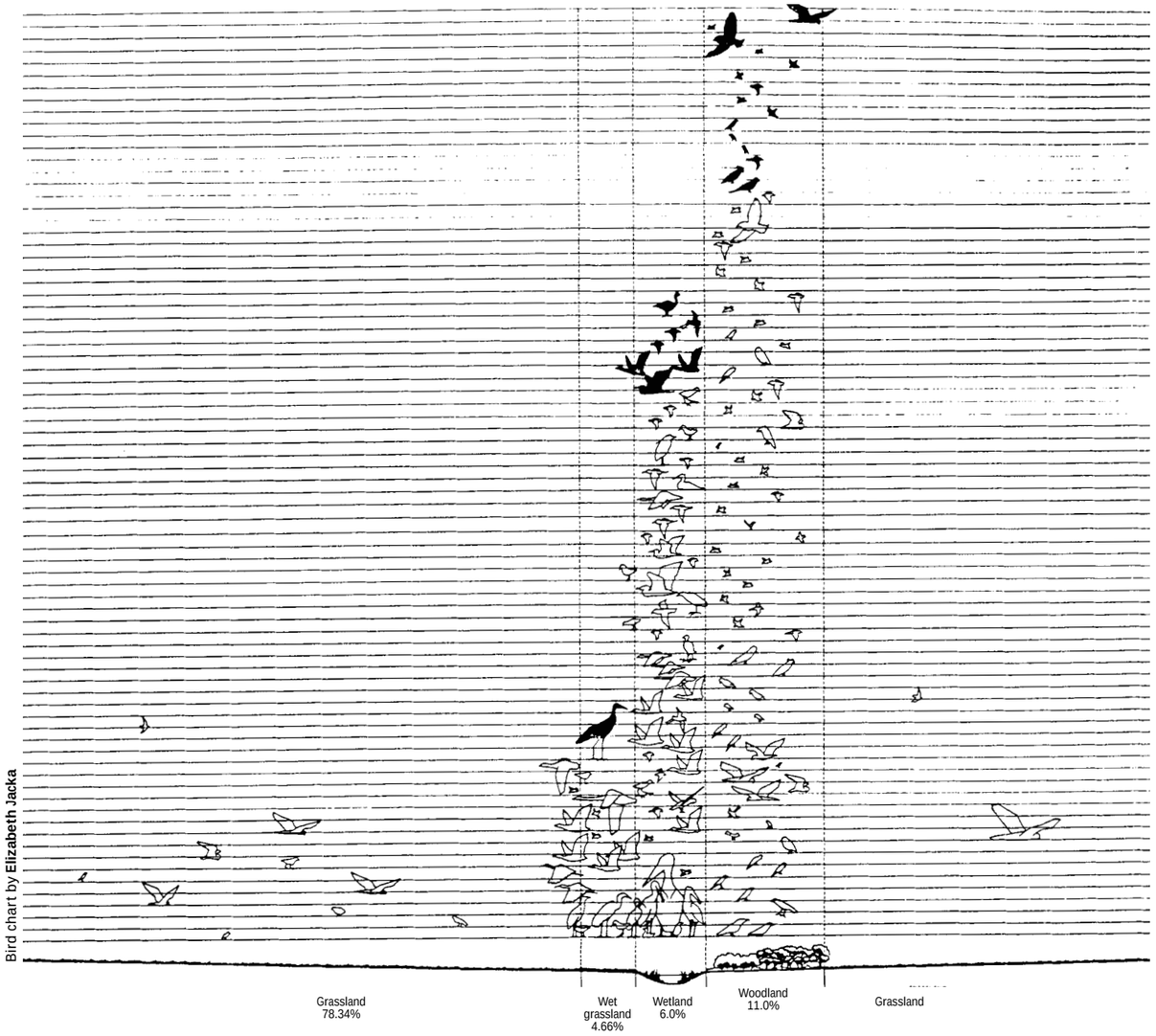
Twenty years later, by 1976, tree cover on Lanark – mainly for shelter and wildlife habitat – has increased from less than 1 per cent in 1956 to 2 per cent of the property. This small increase has neverthless resulted in the return of 46 woodland species. Of particular interest is the return of understorey-dependent birds such as the Brown Thornbill and Yellow-faced Honeyeater; and the Brown Goshawk, which requires dense vegetation and a regular supply of smaller birds on which to feed.

Cuckoos such as the Fan-tailed and Horsfield's Bronze-Cuckoos are classic successional species; their arrival marks not only the establishment of understorey vegetation but also the presence of breeding populations of small song birds which can act as hosts for their young.

Restoration of the wetland areas has seen the return of 45 wetland species. These include diving birds that require deep, open water such as the grebes, coots and cormorants; and waders that feed in the shallows, such as spoonbills, pelicans, the Black-winged Stilt and Black-fronted Dotterel. Reed-loving species, such as the Australasian Bittern, Lewin's Rail and Dusky Moorhen, have also been attracted to the dense vegetation on the water's edge.

Wet grassland birds such as the Cape Barren Goose, as well as the Spotted Harrier which utilises grassland habitats, have also returned.

Farm forestry: Lanark in 1996



Bird chart by **Elizabeth Jacka**

Existing bird

New bird

Extensive farm forestry plantings began on Lanark in 1984, and trees now cover almost 11 per cent of the property. A further 15 woodland birds have returned, bringing the total of woodland species to 75. These include the Common Bronzewing which, along with the White-winged Chough, Eastern Yellow Robin and White-browed Scrubwren, indicate that the ground ecosystem is improving as a result of better management of grazing stock.

Wetland habitat now accounts for almost 8 per cent of the property, and wetland species now include the Plumed Whistling-Duck and the rare Freckled Duck. Wood Sandpipers, Magpie Geese and Banded Stilts have also returned.

The Brolga is another welcome return to Lanark. In 1956, Brolgas were nesting on the property, but soon after disappeared for 40 years. They had returned for the 1996 count, but are yet to resume breeding on Lanark.

If there is enough tree cover on a property, mistletoes will co-exist harmlessly with their host trees.

Even after 40 years of diverse planting, there is only one mistletoe on Lanark, in a she-oak.

Stock management

Lanark's wildlife habitat areas have been fenced off to allow better management of grazing stock. The resulting improvement of the ground ecosystem is marked by the arrival of birds such as the Rufous Songlark and Grey Currawong (between 1956–76), and the Common Bronzewing and White-winged Chough (between 1976–96).

Research suggests that low levels of grazing may be necessary for maintaining bird species richness in small farm woodlots.

Lanark was the first working family farm selected as a release site in a captive breeding program for Victoria's most endangered mammal, the Eastern Barred Bandicoot. Beginning with an initial release of ten animals on the property in 1994, a population of at least 50 has now successfully established itself in the woodlands around the homestead and Lake Cicely. The dense shrub cover and grassy understorey in the wildlife refuge areas create ideal bandicoot habitat, while a systematic predator control program against foxes and cats ensures the best chance of survival for these most vulnerable of creatures.
Photo by **Kay Aldridge**

Native pasture

Another important indicator of farm ecosystem health is the percentage of native pasture on a farm: as this percentage rises, bird diversity also increases.

Today, pastures cover just over 80 per cent of Lanark, 15 per cent of this area being native pasture. The combination of this native pasture with the planting of trees has seen the arrival of ground-foraging birds such as the Jacky Winter, Rufous Songlark and Red-browed Finch (between 1956–76), and the Common Bronzewing, Eastern Yellow Robin and White-winged Chough (between 1976–96).

The ideal balance of native to improved pastures is not yet known, but is probably around 50:50. Beyond this threshold, the dominance of improved pasture begins to impact on the health of farm ecosystems, and farm profitability. The most obvious manifestation is eucalypt dieback, which has been conclusively linked to fertilised pastures: huge numbers of chrysomelid beetle larvae feed on the pastures' roots, competing with livestock and reducing productivity, and then emerge as adults to defoliate nearby eucalypts, pushing even resilient, mature trees beyond the point of no return.

Birds and pest control

The value of Australia's native birds as natural control agents for insect pests is poorly studied, but experiments in which individual tree branches have been enclosed in bird-excluding mesh have resulted in rapid, near-complete defoliation. Researchers estimate that a healthy, diverse bird community consumes 50 to 70 per cent of the insects that attack trees.

Defoliation and the eventual death of individual trees intensifies insect attack on those that remain; because trees act as natural groundwater pumps, their loss accelerates rising water tables. The result is soil salinisation, which accelerates the destruction of plant cover, exposing the soil to water and wind erosion.

By protecting trees, woodland birds play an unseen and undervalued role in stabilising farm health and securing productivity.

Open-country, pasture-foraging birds also play a role in keeping a farm healthy. A breeding colony of Australian White Ibis has been established on Lanark since 1984, attracted to the dense reedbeds in the original 15-hectare swamp, which was reinstated and fenced in 1960. An adult ibis will eat 200 grams of pasture insects a day, including chrysomelid beetle larvae; a flock of 2000 birds is estimated to remove half a million pasture grubs each day.

(continued from page IX)

algal blooms, lethal temperature extremes, insect pests and disease. And, by attempting to stabilise one key variable in the economic equation – the environment – they hope eventually to achieve a measure of protection against the market's erratic cycles.

Their debt was incurred improving the environment, not in running down its resources and services. In effect, the Fentons have repaid a debt to nature, and are now accruing interest in the restored environmental resources and services. By any objective measure, their property and their business are in better shape to survive in the long term.

Money is a necessity, but for the Fentons, as for many farmers, wealth is almost incidental to the business of farming. Life on the land is also about family, continuity, order and aesthetics – values that emerge in a simple love of the land. Like environmental amenity, such values resist mathematical description, and have no place in the conventional economist's austere vision of efficiency. How do you quantify the pleasure given by the call of a bird as you walk from the farm to the wool shed? Or the security of knowing that this soil, these trees, this water, will sustain your children's children? On the eve of a new millennium, this is the direction in which Lanark beckons us.

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