



# ECOVINEYARDS BIRD GUIDE

UNDERSTANDING THE ECOLOGICAL ROLES  
OF BIRDS IN AUSTRALIAN VINEYARDS

by Ian Falkenberg,  
Dan Falkenberg and  
Dr Mary Retallack



Wine  
Australia

  
retallack  
viticulture

# ACKNOWLEDGEMENTS

The EcoVineyards series of best practice management guides (BPMGs) and support materials including this bird guide were developed by a team of subject specialists led by Dr Mary Retallack, Retallack Viticulture Pty Ltd, for the National EcoVineyards Program.

Published by Retallack Viticulture Pty Ltd  
ABN: 161 3501 6232  
© Retallack Viticulture Pty Ltd, 2024

All intellectual property rights in this EcoVineyards field guide is owned by Retallack Viticulture Pty Ltd. None of the contents of this guide may be used, reproduced, modified, or published without the written consent of Retallack Viticulture Pty Ltd.

## Cover photographs

(L-R) brown goshawk [Photo: Tim Pascoe], and male red-capped robin [Photo: Ian Falkenberg].

**Additional photos:** Mary Retallack

**Editor:** Sonya Logan

**Graphic design:** Debbie Wood, Debbie Wood Creative

## Citation

Falkenberg, I., Falkenberg, D., and Retallack M.J. (2024) [EcoVineyards bird guide: Understanding the ecological roles of birds in Australian vineyards](#). Retallack Viticulture Pty Ltd, Crafers West, South Australia.

## Funding

The National EcoVineyards Program is funded by Wine Australia with levies from Australia's grape growers and winemakers and matching funds from the Australian Government.

The program is delivered by Retallack Viticulture Pty Ltd with significant support from regional communities.

For more information about the National EcoVineyards Program please visit [www.ecovineyards.com.au](http://www.ecovineyards.com.au) @EcoVineyards

# CONTENTS

Introduction.....	1
Functional bird groups.....	4
Benefits of birds.....	6
Birds as an indicator of landscape health:.....	6
Birds indicate environmental hazards:.....	6
Birds depend on the bush to survive (and vegetation structure is important) ...	8
<b>Beneficial bird species found in and around vineyards</b>	
<b>Raptors (birds of prey).....</b>	<b>11</b>
<i>Accipiter cirrhocephalus</i> , collard sparrowhawk.....	12
<i>Accipiter fasciatus</i> , brown goshawk.....	14
<i>Aquila audax</i> , wedge-tailed eagle.....	16
<i>Elanus axillaris</i> , black-shouldered kite.....	18
<i>Falco berigora</i> , brown falcon.....	20
<i>Falco cenchroides</i> , Australian kestrel.....	22
<i>Falco longipennis</i> , Australian hobby.....	24
<i>Falco peregrinus</i> , peregrine falcon.....	26
<i>Hieraaetus morphnoides</i> , little eagle.....	28
<i>Ninox boobook</i> , Australian boobook.....	30
<i>Tyto alba</i> , barn owl.....	32
<i>Acanthiza chrysorrhoa</i> , yellow-rumped thornbill.....	34
<i>Aegotheles cristatus</i> , owlet nightjar.....	36
<i>Corcorax melanorhamphus</i> , white winged chough.....	38
<i>Corvus coronoides</i> , Australian raven.....	40
<i>Dacelo novaeguineae</i> , laughing kookaburra.....	42
<i>Epthianura albifrons</i> , white-fronted chat.....	44
<i>Gymnorhina tibicen</i> , Australian magpie.....	46
<i>Malurus cyaneus</i> , superb fairywren.....	48
<i>Rhipidura leucophrys</i> , willie wagtail.....	50
<i>Petroica goodenovii</i> , red-capped robin.....	52
<i>Rhipidura fuliginosa</i> , grey fantail.....	54

<b>Beneficial bird species found in and around vineyards</b>	
<b>Other (seed eaters)</b> .....	<b>57</b>
<i>Cacatua galerita</i> , sulphur-crested cockatoo .....	58
<i>Eolophus roseicapilla</i> , galah .....	60
<i>Ocyphaps lophotes</i> , crested pigeon (or topknot pigeon).....	62
<i>Psephotus haematonotus</i> , red-rumped parrot .....	64
<i>Stagonopleura guttata</i> , diamond firetail finch .....	66
<b>Beneficial bird species found in and around vineyards</b>	
<b>Other (honey eaters)</b> .....	<b>69</b>
<i>Anthochaera carunculata</i> , red wattlebird .....	70
<i>Lichenostomus penicillatus</i> , white-plumed honeyeater .....	72
<i>Manorina melanocephala</i> , noisy miner .....	74
<i>Phylidonyris novaehollandiae</i> , New Holland honeyeater.....	76
<b>Pest bird species found in and around vineyards</b>	
<b>frugivores (fruit eaters)</b> .....	<b>79</b>
<i>Barnardius zonarius</i> , Australian ringneck, twenty-eight parrot.....	80
<i>Cacatua sanguinea</i> , little corella .....	82
<i>Glossopsitta concinna</i> , musk lorikeet .....	84
<i>Parvipsitta porphyrocephala</i> , purple-crown lorikeet .....	86
<i>Passer domesticus</i> , house sparrow .....	88
<i>Platycercus elegans</i> , crimson rosella .....	90
<i>Platycercus elegans</i> ssp. <i>flaveolus</i> , yellow rosella .....	92
<i>Sturnus vulgaris</i> , common starling .....	94
<i>Trichoglossus haematodus</i> , rainbow lorikeet .....	96
<i>Turdus merula</i> , European blackbird .....	98
<i>Zosterops lateralis</i> , silveryeye .....	100
Management techniques .....	102
Vineyard pest bird species .....	103
Vigneron perceptions .....	104
Knowledge of bird ecology .....	106
Regenerative farming practices .....	107
Bird species causing damage in vineyards .....	108
Strategies for bird control .....	109
Falconry (use of trained birds of prey) .....	110
Birds of prey (raptors including hawks and falcons).....	111

Population reduction by shooting .....	113
Decoy crops .....	114
Scaring devices (sound, gas guns, decoys) .....	114
Exclusion netting .....	115
Light emitting devices (laser bird control scarers).....	117
Repellent chemicals .....	118
Supplementary habitat .....	119
<b>Nest boxes and roosting perches .....</b>	<b>120</b>
Australian owlet-nightjar .....	121
Barn owl .....	121
Brown treecreepers .....	122
Laughing kookaburra .....	122
Striated pardalote.....	122
Recommendations .....	123
Methods of bird control techniques in order of effectiveness .....	123
Research priorities.....	124
Conclusion .....	124

## LIST OF TABLES

<b>Table 1.</b> Examples of Australian functional bird groups (native species unless indicated otherwise).. .....	4
---	---

## LIST OF FIGURES

<b>Figure 1.</b> Large and extensive water hole on creek lined with <i>Phragmites</i> sp., reeds, an ideal habitat for Australian reed-warblers and little grassbirds. The dead tree in background provides an ideal raptor perch for still hunting, and red gum woodland adjacent to a creek provides valuable habitat. ....	8
---	---

<b>Figure 2.</b> Red gum open woodland with a series of permanent water holes provides ideal habitat for birds. The shrub and grassy understorey help stabilise creek banks, minimise soil erosion, and improve water quality. Some natural regeneration of red gum trees, and the creek are examples of good quality habitat for a range of bird species and linking wildlife corridors.....	9
---	---

<b>Figure 3.</b> The collard sparrowhawk eats mostly smaller birds including starlings, sparrows, and honeyeaters. ....	12
---	----

<b>Figure 4.</b> Brown goshawk eats mostly smaller birds (starlings, rosellas, feral pigeons, galahs, and honeyeaters.....	14
<b>Figure 5.</b> Wedge-tailed eagle, and resting on a pile of vineyard prunings at Taylors Wines	16
<b>Figure 6.</b> Black shouldered kites eat mostly insects, small rodents (mice), and reptiles.	18
<b>Figure 7.</b> Brown falcon eats mostly smaller birds (starlings and honeyeaters), mice, and occasionally kitten rabbits. ....	20
<b>Figure 8.</b> A pair of Australian kestrels perched on a dead tree on the edge of a vineyard .	22
<b>Figure 9.</b> Australian hobby eats mostly smaller birds including starlings, rosellas and honeyeaters.....	24
<b>Figure 10.</b> Peregrine falcon eats almost entirely birds including galahs (pictured), starlings, rosellas and feral pigeons .....	26
<b>Figure 11.</b> Little eagle, smallest Australian eagle and easily identified as it has legs feathered right down to the feet. ....	28
<b>Figure 12.</b> Australian boobook .....	30
<b>Figure 13.</b> A barn owl in captivity and in the wild .....	32
<b>Figure 14.</b> Yellow-rumped thornbill at nest eats mostly insects and spiders .....	34
<b>Figure 15.</b> Owlet nightjar roosts in tree hollows during the day.....	36
<b>Figure 16.</b> White winged chough are regularly seen foraging amongst leaf litter under the vineyard canopy and along grassy headlands for insects and other prey.....	38
<b>Figure 17.</b> Australian raven is largely responsible for cleaning up carrion. It also eats insects, including grasshoppers, locusts and army worms, and occasionally fruit .....	40
<b>Figure 18.</b> Laughing kookaburra eats mostly frogs, bugs, beetles, worms, small reptiles, and rodents .....	42
<b>Figure 19.</b> White fronted chat feeding on caterpillar .....	44
<b>Figure 20.</b> Australian magpies often forage amongst leaf litter under the vineyard canopy and along grassy headlands for insects.....	46
<b>Figure 21.</b> Superb fairywren feeds entirely on insects and the males are brightly coloured	48
<b>Figure 22.</b> The willie wagtail eats mostly insects and nest with young.....	50
<b>Figure 23.</b> Male red-capped and female eats mostly insects.....	52
<b>Figure 24.</b> Grey fantails eats mostly insects .....	54
<b>Figure 25.</b> Sulphur-crested cockatoo on a perch and in flight. ....	58
<b>Figure 26.</b> Galah and a flock of galahs .....	60

<b>Figure 27.</b> When flushed the crested pigeon rise with a loud wing clatter.....	62
<b>Figure 28.</b> Pair of red-rumped parrots. ....	64
<b>Figure 29.</b> Diamond firetail finch is a threatened species and listed as a declining woodland bird in South Australia. ....	66
<b>Figure 30.</b> Sedge regrowth along a creek and extensive and healthy sedges, reed beds, native grasses, and redgum trees along the creek provide ideal habitat for a range of bird species and other wildlife. ....	68
<b>Figure 31.</b> Remnant blue gums on ephemeral creek provide ideal refuge for bush birds particularly honeyeaters and pardalotes and mature redgum trees along a creek provide important habitat for a range of bird species. ....	68
<b>Figure 32.</b> Red wattlebird has distinctive pink, red wattles behind the eye . . . . .	70
<b>Figure 33.</b> White plumed honeyeater usually feeds among the leaves and blossoms of woodland trees, such as eucalypts, and eats mainly nectar and insects. ....	72
<b>Figure 34.</b> Noisy miner can be found in suburbs and gardens where colonies are particularly small and less obvious. However, they can form large colonies in open dry woodlands . . . . .	74
<b>Figure 35.</b> New Holland honeyeater feeding on nectar. ....	76
<b>Figure 36.</b> Mature redgum trees with hollows along a creek provide important nesting habitat for a range of bird species, and whilst relatively small, this remnant peppermint gum and sheoak woodland along an ephemeral creek line provides important refuge for many bush birds particularly red-capped robins, tawny frogmouths, wattle birds, and honeyeaters . . . . .	78
<b>Figure 37.</b> Australian ringneck or twenty-eight parrot eats mainly seeds of eucalypts, grass seeds, insects, tree blossom, nectar, and fruit and can cause damage to fruit in vineyards. ....	80
<b>Figure 38.</b> The little corella range appears to be expanding with several thousand birds flocking together at roosting time in some regional centres . . . . .	82
<b>Figure 39.</b> The musk lorikeet eats fruit, seeds, nectar, and insects, such as caterpillars and aphids and are unpopular in vineyards. . . . .	84
<b>Figure 40.</b> A distinctive diagnostic of the purple crowned lorikeet is the purple crown on top of its head which is absent from the musk lorikeet . . . . .	86
<b>Figure 41.</b> The house sparrow is an introduced species and although quite rare in heavily vegetated areas, its range is slowly spreading. ....	88
<b>Figure 42.</b> The crimson rosella eats mainly eucalyptus seeds, grass seeds, insects, tree blossom, nectar, and fruit. These birds can be a problem at times as they also feed on grapes . . . . .	90
<b>Figure 43.</b> In autumn, the yellow rosella has been observed feeding extensively on seeds of the water pepper plant and the introduced scotch thistle and paddy melons, the latter two being a serious pest weed . . . . .	92

<b>Figure 44.</b> The common starling feeds on grubs, insects, and grapes often doing considerable damage in vineyards .....	94
<b>Figure 45.</b> Rainbow lorikeets eat fruit, seeds, nectar, and insects such as grubs, caterpillars and aphids. They particularly like grapes, which makes them very unpopular in vineyards. ....	96
<b>Figure 46.</b> European blackbird feeding on worms and with young in nest - an unwelcome introduced species into Australia .....	98
<b>Figure 47.</b> Silveryeyes eat fruit, seeds, nectar, and insects such as grubs, caterpillars and aphids and particularly like grapes, which makes them very unpopular in vineyards. . .	100
<b>Figure 48.</b> Some bird control devices use a focused green laser beam to deter birds from specific areas .....	117
<b>Figure 49.</b> Nesting box being used by barn owls. ....	121
<b>Figure 50.</b> Striated pardalote. ....	122



# INTRODUCTION

This field guide focuses on the benefits of a range of bird species in viticulture and what can be achieved with a change in management to create habitat for predatory bird species. We also focus on strategies to minimise the impact of fruit eating birds and what drives their behaviour during the season.

Although birds can cause significant agricultural losses in Australia, there has been little research that has contributed to ameliorating the problem. This field guide on bird conservation and management draws largely on scientific papers, other relevant literature, and through personal experience and observations of a range of birds that are perceived as pests in viticulture (Jarman, 1990a).

Historically, much of the research on control techniques for pest bird species has been short term and inconclusive. It is difficult to accurately and consistently quantify and predict crop damage caused in vineyards by fruit-eating birds. However, there are now well documented ways to assess the incidence and severity of grape damage in vineyards, which can be used to quantify damage caused by a range of pests and diseases (Hill et. al., 2010) and a similar technique could be used to assess bird damage.

**Scholefield and Morrison (2010) estimated birds contribute \$9 million annually to the mean national economic impact in Australian vineyards.**

This review focused on damage inflicted by a small subset of bird species in vineyards. In addition to direct losses from birds eating or damaging crops, birds can negatively impact on commercial bee hives, compete with native species for food and nest sites, and are a social nuisance where they roost in urban areas. They also pose a risk of spreading exotic diseases, such as avian influenza, psittacosis, and Newcastle disease. While losses to industries are often relatively low, losses to individual growers may be high in some cases. Damage varies greatly from year to year, often in an unpredictable manner.

**Growers' perceptions of loss often greatly exceed estimates made by surveys of crop damage or estimates of bird food requirements (Noske 1980, Jarman 1990; Bomford and Sinclair, 2002).**

A difficulty with examining bird pest problems is that many of the assumptions about the level of damage and the effectiveness of control methods are based on unreliable information. This includes anecdotal information, unsubstantiated claims by manufacturers, and poorly designed field tests.

Some viticulturists may have the view that native vegetation attract birds and resulting in substantial bird damage to grape crops. It is true that some viticulturists suffer crop damage where their vineyards are situated close to remnant vegetation (woodlands). However, vineyards isolated or remote from remnant native vegetation are also subjected to damage by birds and, in some cases, the damage is more severe prior to and during harvest.



**Not all bird species seen in a vineyard are feeding on grapes; some feed on the ground between the rows of vines searching for insects or seeds, others forage for insects amongst mulch under the vine, and others forage for insects amongst the foliage and under the bark of grape stems.**

Historically, landholders have tried a range of deterrents, including imitation raptors hanging above the vines from elevated poles, gas guns, electronic devices, shooting, the use of trained falcons to keep birds away from vineyards, and elevated raptor perches. The proponents of these various techniques all claim various levels of success. In practice, it is very difficult to measure and quantify crop damage by birds and even more difficult to measure any subsequent benefit from the deterrent devices.



# FUNCTIONAL BIRD GROUPS

Birds can be categorised by their function, including predatory (insectivorous and raptors), other (seed eaters and honeyeaters), and pest species (frugivore, or fruit eating and or other drivers of pest status). Some common examples are presented below.

**Table 1.** Examples of Australian functional bird groups (native species unless indicated otherwise).

<b>Raptors (birds of prey)</b>	<b>Insectivorous (insect eaters)</b>	<b>Others (seed eaters)</b>	<b>Frugivores (fruit eaters)</b>
<i>Accipiter cirrhocephalus</i> collared sparrowhawk	<i>Acanthiza chrysorrhoa</i> yellow-rumped thornbill (D)	<i>Cacatua galerita</i> sulphur-crested cockatoo	<i>Barnardius zonarius</i> Australian ringneck parrot
<i>Accipiter fasciatus</i> brown goshawk	<i>Aegotheles cristatus</i> Australian owl-nightjar	<i>Eolophus roseicapilla</i> Galah (U)	<i>Cacatua sanguinea</i> little corella (U)
<i>Aquila audax</i> wedge-tailed eagle	<i>Corcorax melanorhamphus</i> white-winged chough	<i>Ocyphaps lophotes</i> crested pigeon	<i>Glossopsitta concinna</i> musk lorikeet
<i>Elanus axillaris</i> black-shouldered kite	<i>Corvus coronoides</i> Australian raven (U)	<i>Psephotus haematonotus</i> red-rumped parrot (D)	<i>Parvipsitta porphyrocephala</i> purple-crowned lorikeet
<i>Falco berigora</i> brown falcon	<i>Dacelo novaeguineae</i> laughing kookaburra	<i>Stagonopleura guttata</i> diamond firetail (R, D)	<i>Passer domesticus</i> house sparrow (I)
<i>Falco cenchroides</i> Australian kestrel	<i>Epthianura albifrons</i> white-fronted chat (D)	<b>Others (honeyeaters)</b>	<i>Platycercus elegans</i> crimson rosella
<i>Falco longipennis</i> Australian hobby	<i>Gymnorhina tibicen</i> Australian magpie	<i>Anthochaera carunculata</i> red wattlebird (U)	<i>Platycercus elegans</i> <i>ssp. flaveolus</i> yellow rosella
<i>Falco peregrinus</i> peregrine falcon (R)	<i>Malurus cyaneus</i> superb fairywren	<i>Lichenostomus penicillatus</i> white-plumed honeyeater	<i>Sturnus vulgaris</i> common starling (I)

<b>Raptors (birds of prey)</b>	<b>Insectivorous (insect eaters)</b>	<b>Others (seed eaters)</b>	<b>Frugivores (fruit eaters)</b>
<i>Hieraaetus morphnoides</i> little eagle (R)	<i>Petroica goodenovii</i> red-capped robin (D)	<i>Manorina melanocephala</i> noisy miner	<i>Trichoglossus haematodus</i> rainbow lorikeet
<i>Ninox boobook</i> Australian boobook	<i>Rhipidura fuliginosa</i> grey fantail (D)	<i>Phylidonyris novaehollandiae</i> New Holland honeyeater	<i>Turdus merula</i> European blackbird (I)
<i>Tyto alba</i> barn owl	<i>Rhipidura leucophrys</i> willie wagtail (D)		<i>Zosterops lateralis</i> silveryeye (U)

### Key:

- I** Introduced species (non-endemic to Australia)
- R** Rare species (listed under the National Parks and Wildlife Act, 1972)
- D** Declining woodland birds in the Mount Lofty Ranges
- U** Unprotected species (listed under the National Parks and Wildlife Act, 1972)

# BENEFITS OF BIRDS

## Birds as an indicator of landscape health:

- Birds play an important role in the environment and are good indicators that tell us about the health of the environment. Because of this, they are our early-warning system for pressing concerns, such as climate change.
- Raptors or birds of prey are good indicators of the health of the environment and respond quickly to any changes in the environment. They are often sensitive to chemical pollution, habitat alteration, and other human-related disturbances.
- Raptors face different patterns of food changes through the year, depending on their diets and available prey. Changes in raptor densities are often associated with the development of areas for agriculture, which almost always leads to a drop in the numbers of prey and, in turn, the numbers of raptors. There are many examples where natural areas show a significant difference compared with cultivated areas, (Newton 1979).
- Prey availability drives predator levels. Research has shown that bird of prey numbers are consistently higher at sites where biodiversity levels are also higher.

## Birds indicate environmental hazards:

- Many woodland bird species have been declining over the past two decades.
- Extreme weather (heat) events cause bird mortalities. Small birds are more at risk than larger birds via dehydration and hyperthermia (body temperature above normal).
- Nomadism in some birds is a way to get away from extreme heat. This does not work for many species that are unable to migrate or move over long distances.
- Good seasonal conditions (rainfall) and available food drives bird populations.
- Pesticides found in raptors act as ecological barometers. Raptors are at the top of the food chain and, therefore, are good indicators of the health of the environment.

**Birds pollinate plants:** When we think of pollinators, bees and butterflies come to mind. But, bird pollinators, such as honeyeaters, also make a big contribution. Their role as pollinators benefits us directly and around 5% of the plants that humans use for food or medicine are pollinated by birds (Law, 2019).

**Birds control pests:** Farm birds are nature's pest controllers and play a vital role controlling pests. A recent study reported that birds worldwide eat an estimated 400 to 500 million tonnes of insects a year. In vineyards, they include cut worms, flies, ants, beetles, borers, spiders, earwigs, mites, thrips, moths, aphids, crickets, grasshoppers, mealybugs, and scale insects - especially during the breeding season when adult birds feed their nestlings protein-rich prey (Nyffeler, 2018).

**Scavengers are nature's clean-up crew:** Crows and ravens scavenge around farm paddocks and in vineyards for insects, beetles, spiders and earwigs. Wedge-tailed eagles regularly scavenge for carrion (dead animals) and act as a deterrent to flocks of smaller birds that may fly in groups.

**Birds promote conservation:** Birds maintain the delicate balance between plants and grazing animals and predator and prey. For example, in healthy grassy woodlands that are lightly grazed, insectivorous birds feed and forage for insects in adjoining and nearby vineyards with grassy ground cover. Predators, such as goshawks, sparrowhawks, falcons, and owls, also benefit as they are usually only found in areas where there is an abundance of food.

**Bird-based tourism:** Bird-based tourism is growing rapidly worldwide. Bird watching is reported as being the fastest growing outdoor activity in America with \$41 billion spent annually on birding in the US (NOAA, 2022) and \$500 million spent annually on birding in the UK (Acorn Consulting Partnership, 2008). The movie 'The Big Year', starring Owen Wilson, Steve Martin, and Jack Black (based on a true story), illustrates the importance of this growing industry. It is reported that an increasing number of birdwatchers are traveling to long haul destinations to spot new birds that cannot be seen in their own country (Obmascik, 2004).



## Birds depend on the bush to survive (and vegetation structure is important)

- Quality habitat, including revegetation plantings, a range of habitats, different shrub layers, low trees, wetlands with permanent water, reed beds, and fringing shrubs, are all important examples. Grassy and remnant areas of grassy woodland (peppermint gums) commonly contain several woodland species. Grass species and understorey shrubs should be the priority to enhance biodiversity value and integrated pest management rather than solely focussing on tall trees.
- Declining populations of woodland birds is largely due to the loss of suitable habitats for species including diamond firetail finch, red-capped robin, grey fantail, superb fairywren, and brown treecreeper.
- Birds take advantage of available surface water in creeks, water holes, and wetland areas when conditions are dry and there is a lack of surface water elsewhere.



**FIGURE 1.** Large and extensive water hole on creek lined with *Phragmites* sp., reeds, an ideal habitat for Australian reed-warblers and little grassbirds. The dead tree in background provides an ideal raptor perch for still hunting (left), and red gum woodland adjacent to a creek provides valuable habitat (right) [Photos: Ian Falkenberg].

- Accipiter species (e.g. goshawks and sparrowhawks) hunt by stealth and surprise and often perch undetected, hidden by foliage in the tree canopy waiting to ambush prey, including fruit-eating birds. They can be difficult to observe due to their behaviour but can provide excellent seasonal benefits by helping to reduce bird damage to crops.



- When Eucalypts and shrubs are in flower, nectar-feeding birds, such as white-plumed honeyeater, New Holland honeyeater, red-wattlebird, purple crowned and musk lorikeet, and noisy miner, prefer to feed on nectar and blossom in these productive habitats.
- The remnant vegetation that exists near vineyards offers clues to the types of birds in an area. Where vegetation layers exist, including native grasses, sedges, *Dianella* sp., lilies, low shrubs (saltbush, *Acacia* sp., wattles, *Prostanthera* sp., mint bush, *Bursaria spinosa*, sweet bursaria), medium shrubs (*Acacia hakeoides*, hakea wattle, *A. pycnantha*, golden wattle), tall shrubs (*Melaleuca lanceolata*, dryland tea tree), trees (*Eucalyptus odorata*, peppermint box, *Callitris gracilis*, native pine and *Allocasuarina* spp., sheoak), insect-eating birds will be high.
- Each bird species has different habitat needs for nesting, foraging, hunting, and protection (Frith 1977). The careful placement of nest boxes and perches for birds and bats can enhance the value of remnant vegetation and can benefit nearby vineyards through insect control.



**FIGURE 2.** Red gum open woodland with a series of permanent water holes provides ideal habitat for birds. The shrub and grassy understorey help stabilise creek banks, minimise soil erosion, and improve water quality. Some natural regeneration of red gum trees (left), and the creek (right) are examples of good quality habitat for a range of bird species and linking wildlife corridors [Photos: Ian Falkenberg].



# **BENEFICIAL BIRD SPECIES FOUND IN AND AROUND VINEYARDS**

Raptors  
(birds of prey)



## *Accipiter cirrhocephalus* collard sparrowhawk



**FIGURE 3.** The collard sparrowhawk eats mostly smaller birds including starlings, sparrows, and honeyeaters (left) [Photo: Tim Pascoe] and (right) [Photo: Mary Retallack].

### **DESCRIPTION**

A small, lightly built, slate-grey (adult) or brown (juveniles) bird with broad wings. The collard sparrowhawk is a quick flying hawk that glides and soars on flat to slightly bowed wings. This species is easily confused with the brown goshawk. The female is larger than the male. A male brown goshawk and female sparrowhawk are of similar size. At close range the yellow eyes and long yellow legs are evident along with a rufous collar around the neck. Collard sparrowhawks are territorial during the breeding season.

### **BREEDING BEHAVIOUR**

They typically breed from July to December. The nest is usually a rough platform of sticks and twigs, lined with green leaves usually placed in a horizontal or vertical fork in a tall tree high above the ground that provides a good lookout. Sometimes they use the abandoned nest of ravens or another bird of prey.

## **HABITAT AND PREY**

Sparrowhawks habitat varies widely, including wet and dry forest areas, woodlands, grasslands, watercourses, dry scrub, and mallee. Sparrowhawks hunt along tree-lined creeks and water courses and vegetation corridors, including vineyards. Sparrowhawks attack their unwary victims at lightning speed and take most of their prey from the air by stealth and surprise.

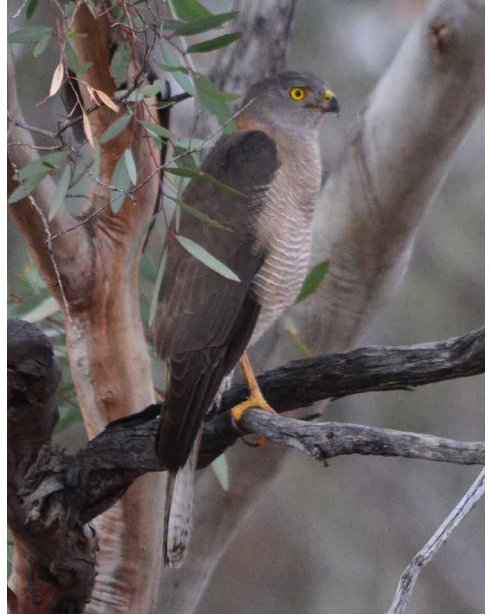
They often perch undetected in the outer limbs of trees and shrubs waiting to ambush unsuspecting prey. Whilst difficult to observe due to their behaviour, these species, if breeding and or foraging in the area, can provide excellent seasonal benefits by reducing frugivore bird damage to grape crops.

Their diet includes mainly small sized birds e.g. common starling, honeyeater, silvereye, small parrots, passerine birds, etc. They are birds of woodlands and regularly forage along the edges of native vegetation and along the rows of vineyard canopies in spring to autumn.

## **BENEFITS / PROBLEMS**

The presence of collard sparrowhawks in an area can provide excellent seasonal benefits by reducing bird damage to grape crops.

## *Accipiter fasciatus* brown goshawk



**FIGURE 4.** Brown goshawk eats mostly smaller birds (starlings, rosellas, feral pigeons, galahs, and honeyeaters) [Photos: Tim Pascoe].

### **DESCRIPTION**

A medium sized bird with slate-grey (adults) or brown (juveniles) broad wings. The goshawk is a quick flying hawk that glides and soars. This species is easily confused with the collared sparrowhawk.

The female is larger than the male. At close range the yellow eyes and long yellow legs are evident. Brown goshawks are territorial during the breeding season but are nomadic and partly migratory during the non-breeding season (February to July).

### **BREEDING BEHAVIOUR**

They usually breed from July to November. Brown goshawks build their own nest, usually placed in a horizontal or vertical fork in a tall tree high above the ground to provide a good all-round lookout. Nests are usually lined with green leaves.

## **HABITAT AND PREY**

Brown goshawks tend to hunt along tree-lined creeks and water courses and vegetation corridors, including vineyards. Accipiters (e.g. goshawks and sparrowhawks) hunt by stealth and surprise and often perch undetected in foliage and the canopy of trees and shrubs waiting to ambush unsuspecting prey.

Whilst difficult to observe due to their behaviour, these species, if breeding in the area, can provide excellent seasonal benefits by reducing frugivorous bird damage to grape crops.

Their diet includes mainly small to medium sized birds e.g. common starling, rosella, galah, feral pigeon, and rabbit kittens. They are birds of woodlands and regularly forage along the edges of native vegetation and along the rows of vineyard canopies during summer and autumn.

## **BENEFITS / PROBLEMS**

The presence of brown goshawks in an area can provide excellent seasonal benefits by reducing bird damage to grape crops.

# *Aquila audax* wedge-tailed eagle



**FIGURE 5.** Wedge-tailed eagle (left) [Photo: Tim Pascoe], and resting on a pile of vineyard prunings at Taylors Wines (right) [Photo: Dick Brysky].

## **DESCRIPTION**

Very large, blackish (adult) or brown eagle (juvenile) with distinctly wedge-shaped tail. Eagles soar and glide majestically on strong V-shaped wings to great heights.

It is the largest bird of prey in Australia with a wingspan of 1.9 metres (male) and up to 2.5 metres (females); the females are larger than males. The wedge-tailed eagle has legs feathered right down to the feet.

The mistaken belief that the eagle is a significant killer of lambs and sheep has led to the destruction of large numbers by farmers and pastoralists. Numerous studies have found that eagles have very little effect on the sheep industry.

It was found that most of the lambs eaten by eagles were in poor health or already dead. Only in exceptional circumstances do eagles attack and eat healthy lambs and when it does occur it's usually young eagles.

A 10-year study in Australia revealed that eagles kill less than 1% of healthy lambs (Brooker and Ridpath, 1980; Olsen, 1995; Olsen, 2005).



## **BREEDING BEHAVIOUR**

They breed from June to November with eggs laid from July to August in southern Australia. They usually build a very large platform of sticks lined with green leaves. Fresh leaves are added regularly when young are present.

Nests are usually placed in the fork of a large tree, although some nests are as low as 2 metres above the ground in pastoral areas. Pairs probably mate for life. Both sexes share in incubating the eggs and feeding the chicks.

In good seasons two chicks can be reared to fledging but, mostly, only one survives. In drought time and in pastoral zones they may not breed for several years.

## **HABITAT AND PREY**

Adult pairs are usually sedentary and will defend their territory against other eagles. Immature eagles are nomadic and can move many hundreds of kilometres from the nesting site.

It is primarily a bird of the open woodlands and is well adapted to agriculture areas. Carrion forms an important part of the wedge-tailed eagles extremely varied diet.

Live prey taken includes rabbits (main prey in some areas), reptiles (bearded dragon, goanna), birds (corella, raven and galah) and other small mammals (e.g. hare and smaller kangaroos). They can sometimes be seen looking for prey along the edges of woodlands that border vineyards and creek systems.

## **BENEFITS / PROBLEMS**

The presence of wedge-tailed eagles in an area can provide a seasonal benefit to vignerons by reducing rabbits, hares, and ravens and, potentially, moving flocks of pest birds (corellas) to other areas.

Particularly where vineyards border wooded areas, eagles often still hunt by perching on a dead tree and ambushing rabbits and hares that move across headlands to the safety for the trees.

## *Elanus axillaris* black-shouldered kite



**FIGURE 6.** Black shouldered kites eat mostly insects, small rodents (mice), and reptiles (left) [Photo: Ian Falkenberg] and (right) [Photo: Graham Lee].

### **DESCRIPTION**

A small, delicate and mostly white hawk that flies with winnowing beats and soars on raised V-shaped wings. They hover in a semi horizontal position with their legs lowered and drop feet first with wings raised high. At close range the red eyes and bright yellow legs are obvious. Black-shouldered kites are strongly territorial during the breeding season.

### **BREEDING BEHAVIOUR**

They breed from April to September and may breed twice in a season, laying eggs in late May or June and, again, in September. A stick nest is built in a tall tree and lined with green leaves. The nest is usually well concealed in dense foliage in a tree. They sometimes nest in isolated paddock trees with thick foliage.

## **HABITAT AND PREY**

Black-shouldered kites do not hunt by chasing their prey in flight but rather prey on animals that live on the ground. It hovers in search of its prey and, when it spots one, it drops or flutters onto it and grabs it with its talons.

Small mammals (mice) and insects, including grasshoppers, locusts, crickets, and beetles, make up the bulk of their diet. Occasionally, small birds (sparrows and chats) and small lizards also make up a small percentage of their diet.

It is primarily a bird of open grassy areas and is well adapted to agriculture areas. It is very common on cultivated land where house mice and insects are abundant.

The kite is often seen hovering over open country or perched quietly on low trees, fence posts and telegraph poles. They often glide for short distances with their wings held straight and in a wide V shape.

Often seen along the edges of vineyards and pasture/cropping land. Carefully placed perches in a vineyard setting can enhance the foraging behaviour of kites and provide seasonal benefits.

## **BENEFITS / PROBLEMS**

The presence of kites in an area can provide good seasonal benefits to vignerons by reducing mice and invertebrate damage to grape crops.

*Falco berigora*  
brown falcon



**FIGURE 7.** Brown falcon eats mostly smaller birds (starlings and honeyeaters), mice, and occasionally kitten rabbits [Photos: Tim Pascoe].

## **DESCRIPTION**

A medium sized, highly variable, and scruffy looking falcon that is often vocal and sometimes gregarious. Brown falcons fly with rather slow, heavy wingbeats, glide and soar on raised wings and sometimes hover high above the ground in strong head winds.

This species is easily confused with the black falcon. At close range the brown eyes and long grey legs are evident and a double cheek mark. Brown falcons are territorial during the breeding season.

## **BREEDING BEHAVIOUR**

The brown falcon breeds from July to November and usually takes over the nest of another species of raptor or raven. They breed in tall trees on the edge of remnant grassy woodlands or in isolated paddock trees. Brown falcons are largely sedentary but some of the population are migratory.

## **HABITAT AND PREY**

Brown falcons hunt by chasing their prey in flight. However, its main method of searching for its food is to perch quietly on a high branch of a dead tree or fence post and watch the ground. It drops down on its victim and grabs it with its talons. It also does some hunting and searching while gliding low or hovering.

Its main prey is small mammals, including mice, introduced rats, and occasional small kitten rabbits, small birds, lizards and snakes and a variety of invertebrates, such as caterpillars, grasshoppers, locusts, crickets, and beetles.

Insects make up the bulk of its diet during the warmer months. It can regularly be seen chasing grasshoppers on the ground and catching them with its bill as well as with its talons.

It is primarily a bird of the open grassy woodlands and is well adapted to agriculture areas, often seen along the edges of vineyards and pasture/cropping land.

Carefully placed perches in a vineyard setting can enhance the foraging behaviour of brown falcons and provide excellent seasonal benefits by reducing frugivore bird damage to grape crops.

## **BENEFITS / PROBLEMS**

The presence of brown falcon in an area can provide excellent seasonal benefits to vignerons by reducing mice, rats, and invertebrate damage to grape crops.

*Falco cenchroides*  
Australian kestrel



**FIGURE 8.** A pair of Australian kestrels perched on a dead tree on the edge of a vineyard [Photo: Ian Falkenberg].

**DESCRIPTION**

Kestrels are usually seen hovering or perched quietly on elevated vantage points like trees, fence posts, buildings and sheds. It is a small, delicate, rusty, and cream coloured falcon that flies with winnowing beats and glides and soars on flat, slightly drooping wings. It often hovers in a horizontal position and dives headfirst with wings partly closed.

This species is easily confused with the black shouldered kite. At close range the dark eyes and rusty streaking on its breast are evident as well as a cheek stripe and yellow legs. Kestrels are territorial during the breeding season. If not disturbed, they become quite tame and accepting of people.

## **BREEDING BEHAVIOUR**

Australian kestrels breed from August to November. No nest is built, and they usually take over the nest of a raven or other species in tall trees or, sometimes, in isolated paddock trees; they commonly use tree hollows, recesses and ledges in quarries, ledges on buildings or cliff ledges. Kestrels are largely sedentary and territorial during the breeding season.

## **HABITAT AND PREY**

Kestrels do not hunt by chasing their prey in flight but rather they prey on animals that live on the ground. They search for prey while hovering about 30 metres above the ground or perching quietly on a high vantage point, such as a branch of a dead tree or fence post, and watch the ground.

A hovering kestrel will hold its position for several minutes before flying with rapid wing beats to another place to hover again. When it sights its prey the bird hovers lower and lower until it drops the last few metres onto its prey and grabs it with its talons.

Insects make up the bulk of their diet, including grasshoppers, locusts, crickets, and beetles. Kestrels also consume small mammals, including house mice and, occasionally, small birds (sparrows, chats) and lizards. It is primarily a bird of open grassy areas and is well adapted to agriculture areas. It is also common on cultivated land where house mice and insects are abundant. It is often seen along the edges of vineyards and pasture/cropping land.

Carefully placed perches in a vineyard setting can enhance the foraging behaviour of kestrels and provide seasonal benefits by reducing pest species.

## **BENEFITS / PROBLEMS**

The presence of kestrels in an area can provide good seasonal benefits to viticulturists by reducing mice and invertebrate damage to grape crops.

## *Falco longipennis* Australian hobby



**FIGURE 9.** Australian hobby eats mostly smaller birds including starlings, rosellas and honeyeaters (left) [Photo: Graham Lee] and (right) [Photo: Tim Pascoe].

### **DESCRIPTION**

A small, fast, slate grey and rufous (reddish) falcon that flies with dashing or winnowing beats. It chases and stoops vertically with great agility and speed. At close range the dark eyes, black mask, pale forehead and collar, small bill and feet are evident. Hobbies are strongly territorial during the breeding season and will defend nests noisily and fiercely when disturbed.

### **BREEDING BEHAVIOUR**

They breed from October to December. Unlike other falcon species, the hobby sometimes builds its own nest lined with green leaves or bark but usually uses the nest of other birds, such as magpies and ravens.



## **HABITAT AND PREY**

A fierce and dashing hunter, the hobby is the terror of small birds. The hobby prey is almost exclusively birds taken on the wing. It hunts birds up to its own size but will often attack and kill birds considerably larger than itself, such as feral pigeon and galah (mostly the larger female takes the larger prey).

The hobby captures its prey in direct pursuit or in powerful vertical dives from above, surprising silvereyes, sparrows, and common starlings as they feed on the ground and catching stragglers before they reach cover.

Other prey includes lorikeets, smaller parrot sized birds, and honeyeaters. The hobby sometimes hunts into the evening and can be seen hunting early-flying bats. The hobby also eats larger flying insects, such as grasshoppers, dragon flies, and winged ants during the warmer months.

The hobby superficially looks and behaves like a small peregrine falcon. It is sometimes seen sitting quietly on a perch, such as a tall dead tree, but individuals and pairs are often seen flying fast with rapid wing beats at low to medium altitudes.

It is a wary bird and is commonly seen in open woodland areas, around parks and gardens, and in towns with plenty of trees.

It will attack and kill any small to medium sized bird that flies in the open. It is often seen flying fast (hunting) along the edges of vineyards and headlands and along creek systems with scattered trees and remnant woodland areas.

## **BENEFITS / PROBLEMS**

The presence of Australian hobby can provide excellent seasonal benefits to vignerons by disrupting the feeding behaviour of fruit-eating birds, such as smaller parrots, common starlings, silvereyes, and honeyeaters, and encouraging flocks of birds to move elsewhere.

## *Falco peregrinus* peregrine falcon



**FIGURE 10.** Peregrine falcon eats almost entirely birds including galahs (pictured), starlings, rosellas and feral pigeons [Photos: Nicholas Birks].

### **DESCRIPTION**

A medium sized to large powerful falcon that flies with strong winnowing beats, and glides on flat to slightly raised wings. It has the capacity to stoop vertically with a bullet shape at great speed.

At close range the dark eyes, large bill and feet, and bright yellow bare parts (cere, orbital patch and feet) are obvious. Peregrine falcons are strongly territorial and aggressive during the breeding season. They are a symbol of speed and courage in nature. It is a wary bird and flies with very rapid and quick wing beats.

### **BREEDING BEHAVIOUR**

They breed from August to December and do not build nests but rather lay eggs in recesses in cliffs, hollows in large trees, abandoned stick nests of other birds, or ledges on buildings.

### **HABITAT AND PREY**

One of the fastest of all birds of prey, it swoops on its panic-stricken prey at speeds of more than 300 km/hr. It will attack and kill any small to medium sized bird that flies in the open. Sometimes it even preys on birds larger than itself.

The peregrine swoops on its prey from above and catches it with its talons or strikes it with its feet so the bird is stunned and falls to the ground.

The peregrine's prey is almost exclusively birds taken on the wing, including galah, common starling, feral pigeon, rosella sized parrots, duck, and honeyeaters.

Sometimes the peregrine will hang onto its prey and drop to the ground with it. The peregrine then plucks its prey and carries it to a sheltered place to eat.

A pair of peregrines regularly hunt co-operatively and, given there is a 30% difference in size between males and females (females larger than males), the range and size of prey taken is quite broad.

The appearance of a peregrine usually causes panic among potential victims, causing them to rise and fly around rapidly in tight flocks. Smaller birds often fly quickly into dense cover and honeyeaters and other small birds utter continuous cries of alarm.

It is a wary bird and flies very rapidly with quick wing beats. It is often seen flying fast (hunting) along the edges of vineyards and along creek systems with scattered trees and remnant woodland areas and pasture/cropping land.

## **BENEFITS / PROBLEMS**

The presence of peregrine falcons can provide excellent benefits to vignerons by disrupting the feeding of fruit-eating birds, such as rosellas and starlings, and encouraging the flocks to move elsewhere.

## *Hieraaetus morphnoides* little eagle



**FIGURE 11.** Little eagle, smallest Australian eagle and easily identified as it has legs feathered right down to the feet (left) [Photo: Ian Falkenberg] and (right) [Photo: Nicholas Birks].

### **DESCRIPTION**

A medium-sized, brown and white eagle that soars and glides on flat to slightly drooping wings to great heights. In both the dark and light forms, the little eagle is found throughout Australia.

The light phase bird - brown above and paler below - is the most common. This species is easily confused with the whistling kite, black kite, and, potentially, the square-tailed kite. At close range the large, feathered legs and robust pale feet are evident. Little eagles are territorial during the breeding season.

In flight the little eagle is characterised by its stout build, broad wings, black-tipped primaries and short square-cut tail. The little eagle has a short erectile crest and is the only Australian eagle, other than the wedge-tailed eagle, that has legs feathered right down to the feet. Pairs probably mate for life.

## **BREEDING BEHAVIOUR**

They breed from August to November and usually build a large stick nest lined with green leaves placed high in a tree, or use the old nest of another species of hawk or raven and lines it with green leaves.

## **HABITAT AND PREY**

The little eagle is a tireless hunter that prefers live prey but will occasionally eat carrion, including dead rabbits. It searches for prey by flying and gliding over suitable country or by watching from a commanding position in a nearby tree.

Its main prey is small mammals (rabbit and hare), reptiles (bearded dragon, goanna), large insects, and, occasionally, other birds (galah, corella, and ravens). Rabbits are its main food source in areas infested with rabbits.

Little eagles usually catch and eat their prey on the ground or carry it up to a tree branch to escape the attention of scavenging birds, such as whistling kites, crows, or ravens. This eagle can sometimes be seen looking for prey along the edges of woodlands that border vineyards and creeks.

The little eagle is widespread but uncommon. However, in recent years, their numbers appear to have decreased and its status has been elevated to rare.

## **BENEFITS / PROBLEMS**

The presence of little eagles in an area can provide a seasonal benefit to vignerons by reducing rabbits, hares, and rats and, potentially, moving flocks of pest birds (corella and galah) to other areas.

*Ninox boobook*  
Australian boobook



**FIGURE 12.** Australian boobook [Photo: Graham Lee].

**DESCRIPTION**

The Australian boobook, sometimes called the ‘mopoke’ after its call, is the smallest and most abundant of the Australian owls. It is common in all types of landscapes from dense forest to woodlands to desert, and is also found in towns and suburbs with abundant and suitable trees.

The boobook is found throughout Australia wherever there are trees suitable for nesting or roosting.

However, it is not often seen, and the main indication of its presence is its characteristic call (e.g. boo-book). Boobook owls are usually sedentary and have daytime roosts generally in the dense foliage of trees but sometimes in a cave if trees are not plentiful. They live in pairs, but usually only single birds are seen roosting by day. Each bird or pair has several roosts.

The boobook owl does not usually fly off when people walk past. At the approach of danger, it sits upright with its feathers pressed tight against its body. Boobook owls are often mobbed incessantly by small birds that discover them at their roosts. The positions of the boobook are often given away by the persistent mobbing calls of birds such as the white-plumed honeyeater.

Its upper parts are dark to pale brown; the wings and back usually have white spots. The under parts are dull white mottled and streaked pale to dark brown. The facial disc is distinctive, and they have a large dark patch behind the eye, with a large eye that is pale green to yellow.

## **BREEDING BEHAVIOUR**

They breed from September to November and nest on a platform of wood dust or shredded bark in a hollow limb or trunk of a tree to 20 metres above the ground, with only a lining of leaves placed at the bottom of a tree hollow or sometimes a hole in a cliff face.

## **HABITAT AND PREY**

The boobook owl eats birds up to the size of a house sparrow and small mammals (e.g. mice and rats); it eats more invertebrates than any other Australian owl. Night-flying beetles and moths are important in its diet and has been seen catching large moths around streetlights.

## **BENEFITS / PROBLEMS**

Their presence in a vineyard setting would not cause any economic damage. The boobook owl is considered a beneficial bird to farmers and viticulturists given their diet of small birds, rodents, insects, and invertebrates. Boobook owls may benefit significantly from nest boxes strategically placed in paddock trees and where there is suitable habitat.

## *Tyto alba* barn owl



**FIGURE 13.** A barn owl in captivity (left) [Photo: Mary Retallack], and in the wild (right) [Photo: Graham Lee].

### **DESCRIPTION**

The barn owl is common in many places in Australia, particularly open woodland country as well cities, towns, and around farms where there are plenty of trees and outbuildings. The barn owl is not often seen except in the headlights of cars at night and it calls infrequently.

Barn owls live alone or in pairs. They roost quietly by day in places such as tree hollows, thickly foliated trees, caves and rock crevices, buildings and even wells.

Their reaction to the approach of an intruder is to stand upright with partly closed eyes and they try to look very slender. If a barn owl is disturbed, it flies off to another roost usually pursued and mobbed by small passerine birds.



Its upper parts are ash-grey with numerous fine, dark lines, pale-grey spots, dark to pale-brown wings and back usually with white spots. Under parts are white with dark flecks on the tips of some feathers. Tail feathers are pale-buff with brown-grey bars. The facial disc is distinctive white with a dark mark in front of its large black eyes.

## **BREEDING BEHAVIOUR**

It breeds from autumn to spring but can breed in any month depending on food supplies. It usually nests in a deep hollow but also in caves, disused buildings, under bridges, and nest boxes when available.

## **HABITAT AND PREY**

In southern Australia the barn owl eats mainly house mice, introduced rats, small birds, such as house sparrows, and beetles and moths. They hunt by flying close to the ground or still hunting and listening from a fence post or other low perch. Then it glides or drops onto its prey and usually swallows it whole. Its prey also includes other rodents, such as small marsupials and lizards.

Many regurgitated pellets of the indigestible parts of their prey can be found beneath their daytime roosts and in the nests of barn owls. A close examination of these pellets can reveal the diet of the barn owl.

## **BENEFITS / PROBLEMS**

Their presence in a vineyard setting would not cause any economic damage. The barn owl is considered a beneficial bird to farmers and viticulturists given its diet of house mice, introduced rats, and invertebrates.

Barn owls may benefit significantly from nest boxes strategically placed in paddock trees and disused buildings where there is suitable foraging habitat.

## *Acanthiza chrysorrhoa* yellow-rumped thornbill



**FIGURE 14.** Yellow-rumped thornbill at nest (left) [Photo: Graham Lee], eats mostly insects and spiders (right) [Photo: Andrew Silcock].

### **DESCRIPTION**

This is the easiest thornbill to identify with its brown / olive upperparts, black head, white markings, and its bright yellow rump, which are unique amongst thornbills. The yellow-rumped thornbill is locally nomadic and favours edge country where woodland and grasslands meet.

### **BREEDING BEHAVIOUR**

The nest of thornbills is also unique in that it comprises a cup-shaped false upper nest as well as a small, dome-shaped nest chamber with a concealed side entrance. The nest varies in shape and may be loosely and untidily constructed of grass and other plant materials, liberally bound with spider webs, egg sacks, and fibre placed in the outer foliage of a tree or shrub, usually 1 to 5 metres above the ground.

The size of the nest may also vary but is usually 200 mm deep by 100 mm across. The breeding season is somewhat variable and in the drier inland areas, the thornbill appears capable of breeding at most times of the year, particularly if triggered by rain. However, the breeding season is normally July to December.

### **HABITAT AND PREY**

In the non-breeding season, it feeds in mixed flocks with other small birds. They eat insects, spiders, and seeds that they find in trees, shrubs, and on the ground.

### **BENEFITS / PROBLEMS**

These small birds can be regularly seen foraging along the edges of vineyards that have incorporated native perennial grasses into the management.

The yellow-rumped thornbill is considered a benefit to farmers and viticulturists given their diet of insects and spiders. They are not known to cause damage to fruit in vineyards.

*Aegotheles cristatus*  
owlet nightjar



**FIGURE 15.** Owlet nightjar roosts in tree hollows during the day [Photo: Graham Lee].

## **DESCRIPTION**

The owlet nightjar is one of the most widespread of all Australian nocturnal birds and one of the least seen. During the day it roosts inside hollow trees. It is most often heard calling during the first few hours after sunset, but it also calls from the entrance of its roost where on fine winter days it spends much of the time sunning itself. During daylight hours it sometimes flushes from its hollow if disturbed.

The owlet nightjar is common throughout Australia but is more abundant in the arid interior. The largest numbers occur in areas of mature woodland with plenty of hollows and dead trees. It is the smallest of the nocturnal birds in Australia and most of its bulk is made up of soft, grey plumage.

The bird's beautiful, big, brown eyes and black, striped crown give it an engaging mammal-like appearance reminiscent of a sugar glider or small possum. The owlet nightjar flies silently and erratically, rather like a butterfly. Its movements are not known but adult birds are probably sedentary.

## **BREEDING BEHAVIOUR**

The owlet nightjar feeds on the wing like a true nightjar and also on the ground like a frogmouth. They breed from September to December. The nest comprises only a lining of leaves placed at the bottom of a tree hollow or sometimes a hole in a cliff face.

## **HABITAT AND PREY**

An owlet nightjar disturbed from its roost during the day will fly straight to another tree hole. Individual birds do not use the same roost all the time and they are probably familiar with all the suitable holes in their territories.

The life history of nightjars is not known, however, when young birds leave the nest, they closely resemble the adults except for a possible tinge of buff colour around the head and neck.

## **BENEFITS / PROBLEMS**

Their presence in a vineyard setting would not cause any economic damage. The owlet nightjar is considered a beneficial bird to farmers and viticulturists given their diet of mostly insects and other invertebrates.

## *Corcorax melanorhamphus* white winged chough



**FIGURE 16.** White winged chough are regularly seen foraging amongst leaf litter under the vineyard canopy and along grassy headlands for insects and other prey [Photo: Graham Lee].

### **DESCRIPTION**

The white-winged chough is a large, black bird with a long, curved beak. It has distinctive red eyes and a large white wing patch, visible when the bird is in flight. The bill and legs are black. Both male and female share the same plumage pattern.

Young white-winged choughs start off duskier than the adults, and the eye is brown. Choughs are characterised by a mournful, descending whistle call and, if disturbed, they display a ratchet like call. Their favoured habitat is open woodland and scrub, which has significantly declined in many agricultural areas.

Groups of choughs usually consist of 5 to 10 birds and, occasionally, as few as two are found together. Each group contains one or more breeding adult of each sex. They do not mature sexually until they are four years old, and most of the group are the immature progeny of the breeding birds.

White-winged choughs build bowl-shaped mud nests on a horizontal branch about ten metres above the ground. All members of the group join in building the nests, which is built in several stages because each stage must harden before more mud can be added.

Each bird gathers a grass stem or piece of bark and dabbles it in mud and, when it's thoroughly covered, the bird flies to the nest and carefully places it in position. Each contribution is trowelled into position with the bird's bill and then settled by a rapid scissoring of the bill held sideways to the exterior of the nest.

The finished nest appears to be solid mud at first glance but about 8% of its weight is fibre. Nests can last for years and used several times.

## **BREEDING BEHAVIOUR**

White winged choughs breed from August to December and, occasionally, they may raise up to two broods of young in a season, but the average group raises fewer than two offspring a year. For a species to survive with such low annual reproduction, the survivors must live a long time (> 10 years).

## **HABITAT AND PREY**

Arthropods are the main food of choughs, including insects, centipedes, millipedes, beetles, cockroaches, termites, ants, crickets, bees, wasps, caterpillars, moths, and snails, but when these are scarce in winter, they eat seeds. Cereal growing has probably provided a welcome source of food for the birds, and they are often seen feeding amongst stubble and recently sown crops.

## **BENEFITS / PROBLEMS**

White winged choughs in a vineyard setting would rarely cause any economic damage. They are flexible and opportunistic feeders and forage for arthropods on the ground and in litter and soil.

*Corvus coronoides*  
Australian raven



**FIGURE 17.** Australian raven is largely responsible for cleaning up carrion. It also eats insects, including grasshoppers, locusts and army worms, and occasionally fruit [Photo: Andrew Silcocks].



## **DESCRIPTION**

This large black bird is the largest member of the crow family. Once ravens reach breeding age (3 years) they pair for life. The Australian raven is basically sedentary, which means they occupy their territory all year round. Each morning, soon after sunrise, the pairs reaffirm the boundaries of their territories by patrolling and calling.

## **BREEDING BEHAVIOUR**

Egg laying is usually in July to September. Their nest is a large stick basket structure lined with leaves, bark and wool felted together into a dense mat.

The nest is usually situated in a tall tree more than 10 metres above the ground in a site that provides a good all-round lookout.

## **HABITAT AND PREY**

The Australian raven is largely responsible for clearing up carrion (dead animals). During the warmer months of the year ravens eat mostly insects, and their diet includes several agricultural pests, such as grasshoppers, locusts, and army worms.

They are birds that frequent open pasture and regularly forage along headlands and the edges of vineyards with a grassy midrow.

## **BENEFITS / PROBLEMS**

These birds are mainly predators and rarely eat fruit. It is important to note their presence in a vineyard setting would rarely cause any economic damage.

## *Dacelo novaeguineae* laughing kookaburra



**FIGURE 18.** Laughing kookaburra eats mostly frogs, bugs, beetles, worms, small reptiles, and rodents (left) [Photo: Mary Retallack], and (right) [Photo: Ian Falkenberg].

### **DESCRIPTION**

The laughing kookaburra is the largest member of the kingfisher family but, unlike most of its relatives, it is sedentary and occupies the same territory year-round. Before the spring breeding season, when family groups adjust their boundaries, an observer can locate the territory by listening to the noisy chorus at dusk as each group calls in turn and awaits the replies of the neighbouring group.

Laughing kookaburra live in woodlands and open forest. They occur in almost any part of Australia with an equable climate, trees big enough to contain their nests and open patches sufficient to provide hunting grounds. In favourable conditions, they may live to 20 years or more; their birth rate is low to keep pace with the low death rate and the population turnover is very slow.

## **BREEDING BEHAVIOUR**

Kookaburras form permanent pairs and typically produce one clutch in a season. After a short courtship in early spring, the female lays two eggs; incubation lasts for about 24 days and the young take about 36 days to fledge and are then fed by the parents for a further eight to 13 weeks. They breed from September to January and usually nest in a large tree hollow in a tree trunk or branch. The cavity or chamber is flat floored about 500 mm across. The nest chamber opens directly to the entrance through which the young excrete. No nesting material is used.

## **HABITAT AND PREY**

Laughing kookaburra are not particularly selective feeders with a diet of snakes, lizards, rodents, and the odd small bird being typical. However, they also live on a variety of insects and other invertebrates. In times of insect plagues, they feed entirely on the pest, which may often help to curb the plague.

## **BENEFITS / PROBLEMS**

Because the kookaburra's rate of reproduction is so slow, they would not be able to recover quickly should a catastrophe through destruction of habitat or misuse of chemical pesticides occur.

These birds are mainly predators and rarely eat fruit. Their presence in a vineyard setting would rarely cause any economic damage. Kookaburras are considered beneficial birds to farmers and viticulturists given their diet of mostly snakes, lizards, rodents, small bird, insects, and other invertebrates.

*Epthianura albifrons*  
white-fronted chat



**FIGURE 19.** White fronted chat feeding on caterpillar [Photo: Graham Lee].

## **DESCRIPTION**

White-fronted chat is identified by its white forehead, face, throat, and breast encircled by black crown and broad black band across the breast. It has a white belly, and its back and rump are grey with black wings.

The eye colour is white, brown-cream or orange. The white-fronted chat has the most southerly range of all Australian chats. The Tasmanian chat is apparently sedentary. The chat is fairly common in southern Australia.

In the non-breeding season, it congregates in flocks that are usually fairly small, although up to 400 or 500 birds have been recorded together. This gregariousness extends into the breeding season where the birds often nest in loose colonies.

## **BREEDING BEHAVIOUR**

In the mainland population, breeding occurs mainly in the southern parts of its range. The nest comprises a cup of fine twigs, rootlets, and plant stalks lined with fine grass, hair, and sometimes flower heads. The nest is often placed near the ground in salt bush, samphire, reed clumps, or similar cover. If an intruder approaches a nest, the chat will feign injury to draw attention to itself and away from the nest. It breeds mainly in July to January.

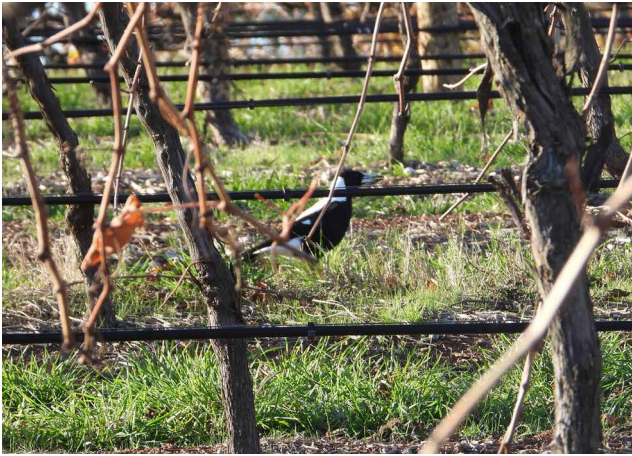
## **HABITAT AND PREY**

White-fronted chats frequent low, dense cover, such as samphire, moist dense grasslands, edges of swamps and marshes, and low heath, and will venture into vineyards at certain times of the year. Some populations are sedentary, others appear nomadic. These birds procure their food mainly on the ground. Its diet is mainly spiders, small insects, such as ants, caterpillars, beetles, grasshoppers and, if available, nectar.

## **BENEFITS / PROBLEMS**

The white-fronted chat is considered a benefit to farmers and viticulturists given their diet of insects. While chats sometimes nest in a vineyard setting, they are not known to cause damage to fruit in vineyards.

## *Gymnorhina tibicen* Australian magpie



**FIGURE 20.** Australian magpies often forage amongst leaf litter under the vineyard canopy and along grassy headlands for insects (left and centre) [Photos: Ian Falkenberg], and (right) [Photo: Graham Lee].

### **DESCRIPTION**

The Australian magpie lives in groups of up to ten individuals that help to defend their territory against trespass by other magpies. The territory can be up to 18 hectares in size depending on the numbers of birds in the group and the quality of the habitats. There may be several adult females in the group and several nests may be built at the same time.

But, usually, only one male bird fathers the broods, although other males may try to steal matings even by force. Despite this polygamy, it is rare for more than one nest to result in hatching young because the females find it hard to incubate eggs and feed themselves unless their mate helps.

## **BREEDING BEHAVIOUR**

Magpies breed from August to October and their nest is a basket of sticks lined with wool, hair and grass and placed in the canopy of trees at least six to 16 metres high. The nest is built solely by the female.

## **HABITAT AND PREY**

Suitable breeding areas for magpies are in short supply, and this is primarily due to natural habitat being cleared for agriculture. This has most likely benefited magpies in terms of food and survival but has reduced the woodlands they need to breed and roost in. Once a territory has been acquired it has to be constantly defended to prevent it being seized.

It seems the only way magpies can do this is to live in groups that are strong enough to defend their territory. This allows at least one female free to get on with breeding. During the warmer months of the year magpies eat mostly insects with their diet including several agricultural pests, such as grasshoppers, locusts, and army worms. They are birds that frequent open pasture and regularly forage along headlands and the edges of vineyards with a grassy midrow.

## **BENEFITS / PROBLEMS**

The presence of magpies in a vineyard setting would rarely cause any economic damage. They are flexible and opportunistic feeders and forage on the ground and in litter and soil for worms, caterpillars, beetles, lizards (skinks), frogs, slaters, millipedes, crickets, grasshoppers, seeds and, sometimes, they will also eat fruit. Magpies have adapted very well to human habitat.

They are excellent mimics and imitate calls of other birds and sounds they hear. They have very good hearing and often turn their heads to one side listening for movement in the grass or grubs under the ground. Magpies are typical in the Australian environment with their beautiful melodious call.

## *Malurus cyaneus* superb fairywren



**FIGURE 21.** Superb fairywren feeds entirely on insects and the males are brightly coloured (left) [Photo: Graham Lee] and (right) [Photo: Andrew Silcock].

### **DESCRIPTION**

This spectacular wren is not only a favourite for the beautiful colouring of the males, but because it has adapted well to human intrusion and readily lives in gardens and parks where it is easily seen.

Male superb fairywrens in breeding plumage have a blue crown while the upper back, the back of its neck and lower back are black; the wings are grey brown and tail deep blue.

The throat and breast are black, the rest of the underparts are cream, and the eye is dark brown. Females have similar plumage to a non-breeding male – upper parts brown, lores and area around the eye pale, with cream underparts.



The superb fairywren usually lives in small family groups that may contain several adult males. One of the advantages of living in family groups is that when seasonal conditions are suitable, it enables them to breed several times in rapid succession.

Male wrens take over the care of nestlings when they fledge, enabling the females to nest again. Later in the season, the members of early broods help to feed their younger siblings. Family groups of wrens are more productive per nesting attempt and per adult involved than breeding pairs only.

## **BREEDING BEHAVIOUR**

The nest is a small dome-shaped grass ball 120 mm tall and 70 mm wide, consisting of grass stems and blades woven into a framework of spiderwebs and lined with finer grasses and feathers. It is usually placed in dense bush or tussock up to 1 metre above ground and, occasionally, much higher. It breeds from September to March.

## **HABITAT AND PREY**

Superb fairywrens defend their territory, which usually consists of half to one hectare of shrubby habitat interspersed with clearings. They eat a variety of small insects and forage for them by hopping over a clearing and searching foliage a metre or two above the ground.

If you are lucky enough to have these spectacular wrens on your property it is possible to make friends with them by offering food (e.g. insects and meal worms).

## **BENEFITS / PROBLEMS**

The superb fairywren is considered a beneficial bird to farmers and viticulturists given their diet of insects. They are not known to cause damage to fruit in vineyards.

## *Rhipidura leucophrys* willie wagtail



**FIGURE 22.** The willie wagtail eats mostly insects (left) and nest with young (right) [Photo: Graham Lee].

### **DESCRIPTION**

A willie wagtail's upper parts and throat are black with conspicuous white eyebrows while the rest of underparts are white. The white conspicuous eyebrows play a useful part in the interaction between adult birds in the breeding season.

In territorial disputes, for example, the rivals can show aggression simply by expanding their eyebrows. The dispute is generally resolved without physical injury to either party as soon as one contestant gives the signal of defeat by hiding its eyebrow completely and looking like a young submissive bird.

Willie wagtails are among the best know Australian birds, common in inhabited areas, parklands and most towns and cities. Their numbers have probably increased significantly as more and more forest and woodland areas are cleared for agriculture. This busy bird with its attractive whistling song flits around restlessly or perches on vantage points to dart after its prey.

Willie wagtails can be easily confused with the restless flycatcher that inhabits similar open country. However, the latter has no white eyebrow but has a white throat.

## **BREEDING BEHAVIOUR**

Willie wagtails are particularly aggressive when breeding. They have been seen to attack and drive away even large birds, such as wedge-tailed eagles, brown falcons, laughing kookaburras and magpies.

Both males and females build the nest, which is often found near water, sometimes in the same tree as the nest of the magpie lark. Several clutches of eggs may be laid in one season and the nests are often reused. Sometimes nests are placed in sheds and on verandas.

The nest is a small, neat structure about 70 mm across and 40 mm deep of fine grasses placed on a horizontal branch usually close to the ground in open country. They breed mainly from June to February.

## **HABITAT AND PREY**

The willie wagtail is a bird of the open woodlands and open country with few trees. These birds take insects, spiders and, occasionally, worms on the ground and pick spiders off the outside surfaces of buildings.

They usually appear singly or in pairs and are often seen accompanying or riding on livestock. At rest it sways its body and tail constantly from side to side.

## **BENEFITS / PROBLEMS**

The willie wagtail is considered a benefit to farmers and viticulturists given their diet of insects and spiders. Whilst willie wagtails sometimes forage on the edges of vineyards, they are not known to cause damage to fruit in vineyards.

## *Petroica goodenovii* red-capped robin



**FIGURE 23.** Male red-capped (left) and female (right) eats mostly insects [Photos: Ian Falkenberg].

### **DESCRIPTION**

This colourful bird of the dry interior is characteristically restless and when perched it continually gives a slight and quick flick of its wings and tail. Flight is short, low, and undulating and the bird often flits just in front of an intruder, usually along a fence, settles, moves on and settles again.

Males are dull black on their back, with a conspicuous bright red forehead and front of crown, irregular white stripe along the wing, with a dull black throat and bright red breast. Females are dull brown on their back, with dark wings and tail and a light brown breast. Red-capped robins were once moderately common, but are now considered a declining woodland bird species in many regions.

Their primary habitat is grassy woodlands and lightly timbered country, mallee, mulga, and grassland areas.

### **BREEDING BEHAVIOUR**

The nest is a compact cup shape that varies according to the site. The nest consists of fine strips of bark and dry grass neatly bound with spiderwebs, often with soft green moss worked in. The nest is lined with soft grass, hair, rootlets, or fur and, occasionally, a few small feathers.

The bird also collects white, silver, and green lichen and pieces of bark from the nest tree and uses cobwebs to attach them onto the outside of the nest and bind the structure to the site. This serves as a very effective camouflage. Nests are positioned 0.5 to 10 m above the ground according to the type of vegetation available.

They normally breed from July or August to December or January, or in the dryer interior at any time in response to rain.

## **HABITAT AND PREY**

While feeding, the bird perches on a low bough, head sideways or looking over its shoulder apparently watching a particular area. Suddenly, it flits to the ground and picks up an insect and rises again. Red-capped robins also forage in trees and orchards, sometimes taking insects on the wing.

Birds have also been seen spending much time on the ground among twigs, leaves, and fallen timber, flipping their wings as if to start insects moving then taking them in a swift forward movement.

Their insect food comprises grasshoppers, bugs, beetles, small flies, moths, wasps, bees, ants, and small mantids. Eggs of several species of cuckoo are often found in the nest of red-capped robins.

## **BENEFITS / PROBLEMS**

Red-capped robins can be regularly seen foraging along the edges of vineyards that have incorporated native perennial grasses into the management.

They are considered a benefit to farmers and viticulturists given their diet of insects and spiders. They are not known to cause damage to fruit in vineyards.

## *Rhipidura fuliginosa* grey fantail



**FIGURE 24.** Grey fantails eats mostly insects (left) [Photo: Graham Lee] (right) [Photo: Andrew Silcock].

### **DESCRIPTION**

Grey fantails are easy to identify. They have a permanently fanned tail and can always be distinguished by the colour of their plumage.

Grey fantails are fearless and inquisitive and readily respond to an imitation of its call. They never fly in a straight line but rather in a wildly irregular path, hence the reason they have been given the nickname of 'mad fan'.

Grey fantails show considerable variation in plumage, however, they are generally grey, brown with small white bars on their wings and a conspicuous white line over their eyes and another over ear-coverts. The tail is long with white outer feathers. The throat is white and the rest of underparts buff.

It is widely distributed over much of Australia except the interior. Grey fantails are found in virtually all types of habitats within its range. It is frequently seen in low scrub but just as often in high forest areas.

## **BREEDING BEHAVIOUR**

Grey fantails breed in wet forest and dry scrub/woodland. Nests look like a wine glass without the base and are constructed of a tiny cup of plant fibres, liberally bound with cobwebs with a tail up to 150 mm long hanging beneath. Usually, nests are placed in a thin horizontal fork of a tree, one to two metres above the ground but can be as high as five or six metres. They breed mainly from August to January.

## **HABITAT AND PREY**

The grey fantail is considered one of Australia's most active and restless birds and has a conspicuous habit of darting out from a perch in search of flying insects, which seem to be its primary food. When it perches it often moves its body and tail sideways.

## **BENEFITS / PROBLEMS**

The grey fantail is considered a beneficial bird to farmers and viticulturists given their diet of mostly insects. Where there is suitable habitat grey fantails sometimes forage on the edges of vineyards and headlands. They are not known to cause damage to fruit in vineyards.







## **BENEFICIAL BIRD SPECIES FOUND IN AND AROUND VINEYARDS**

Other  
(seed eaters)

## *Cacatua galerita* sulphur-crested cockatoo



**FIGURE 25.** Sulphur-crested cockatoo on a perch (left) and in flight (right) [Photos: Graham Lee].

### **DESCRIPTION**

In Australia the discordant call of the sulphur-crested cockatoo is a familiar sound in woodlands and open farmland. It is also very popular as a pet. In other countries it can be found in most zoos and well stocked aviaries.

It is widely distributed and common in most types of timbered country throughout the northern, eastern, and south-eastern mainland, Tasmania and some offshore islands, including Kangaroo Island. In the south and outside of the breeding season the birds congregate in large flocks and, occasionally, they are associated with other cockatoos, especially galahs and little corellas.

In southern regions wherever the birds inhabit open country, they have well established 'sentinel' warning systems. While the main flock is feeding on the ground, a few birds perch in trees and screech loudly at the approach of intruders. The entire flock then immediately rises into the air.

Each flock has its own roosting site that is rarely deserted even if the cockatoos must fly long distances to feeding grounds.

As evening falls the noise in the roosting areas is deafening as birds jostle for positions and squabble with one another; it is long after sunset before the screeching stops. Soon after sunrise the screeching and noise starts again when the birds fly off to feed.

Its general plumage is white with a narrow forward-curving yellow crest, together with yellow ear coverts and the bases of cheeks and throat. The undersides of wings and tail feathers are strongly washed with yellow.

## **BREEDING BEHAVIOUR**

They breed from August to January in the south with nests found in a hollow limb or hole in a tree, usually high up in a river red gum tree near water. They may also nest in holes and cavities in limestone cliffs.

## **HABITAT AND PREY**

Until mid-morning, cockatoos usually feed on seeds on the ground then during the hottest part of the day they sit in trees near the feeding area, idly stripping the leaves and bark. In the afternoon, they feed again and then fly back to the roosting areas for the night.

Each day they return to feed in the same area until the food supply is exhausted. Sulphur-crested cockatoos eat the seeds of grasses and herbaceous plants, grains, bulbous roots, berries, nuts, and leaf buds, often causing considerable damage to crops, particularly oats and maize. To some extent they compensate for these destructive behaviours by eating the seeds of noxious weeds. They also eat insects and their larvae.

## **BENEFITS / PROBLEMS**

In farming areas, they can be a pest in crops and eat a wide variety of seed, usually on the ground, but they also feed on native fruits and berries in shrubs and trees.

However, in late spring, cockatoos bite off the emerging leaf buds on vines. The presence of these birds in a vineyard setting is not welcome.

# *Eolophus roseicapilla* galah



**FIGURE 26.** Galah (left) [Photo: Graham Lee] and a flock of galahs (right) [Photo: Lukina Lunkin].

## DESCRIPTION

Galaha are among one of the most beautiful birds in the world. However, because they are so common in the Australian landscape, they are often unnoticed. They are often seen in flocks of 30 to 1,000 birds foraging together or flying over the landscape. Its head, nape and underparts are pink while its back, wings, and tail are light grey.

Many young galaha die in the early summer while they are learning to live on their own. Only about 10 out of 100 fledglings survive to breed, but once they reach adulthood they generally live for many years.

Young galaha do not breed until they are 3 or 4 years of age and spend their first 2 or 3 years in flocks of immature birds that may travel as far as 50 km from their birthplace. Adults seldom move this far. Galaha are fast, strong flyers and have been timed at more than 50 km/hr, and often travel as far as 15 km to look for food, returning to the nest area to roost at night.

## **BREEDING BEHAVIOUR**

In the breeding season galahs separate into pairs that may mate for life. Each pair defends a nesting tree that contains a nesting hollow and returns to the same site year after year. Often several nests occur quite close together in a clump of trees; neighbours are tolerant of each other and of visitors provided they do not come within 3 metres of the nest.

They breed from August to November and the nest is a hollow limb or hole in a tree. The nest is normally 4 to 14 metres above the ground and more than 1 metre deep and lined with green leafy branchlets.

When young galahs leave the nest, the new fledglings gather in special patches of woodland and form creches of up to 100 birds. The parents forage in the surrounding areas and return to the creche to feed the young. The young recognise the parents call and gather in the same tree to be fed. This continues for 6 to 8 weeks after which time the young must fend for themselves.

Most nesting trees have a conspicuous area where the birds, mainly the males, have removed the bark. This may be a form of advertising ownership of the site.

## **HABITAT AND PREY**

Galahs, like most parrots, are seed eaters. They gather nearly all their food on the ground after ripened seeds have fallen. Galahs are generally found in large flocks at abundant food sources.

There are many advantages of flock feeding, for example, the search for food becomes more efficient and all the individuals in the flock benefit from any food source that is found. There is also greater safety with many birds feeding together; one nearly always is on the lookout, making it difficult for a predator to approach unnoticed.

## **BENEFITS / PROBLEMS**

The presence of these birds in a vineyard setting rarely causes economic damage to crops. However, in late spring, some galahs have been known to bite off the emerging shoots on vines. The reason for this is unclear.

## *Ocyphaps lophotes* crested pigeon (or topknot pigeon)



**FIGURE 27.** When flushed the crested pigeon rise with a loud wing clatter [Photo Rod Bradtke].

### **DESCRIPTION**

Commonly referred to as topknot pigeon, the crested pigeon has adapted to living on farms and around homesteads in many parts of Australia, but when found in isolated and remote areas it is quite a shy bird. The pigeon is widely distributed and common across mainland Australia.

This pigeon has benefited from human settlement as large areas that were formally thick scrub and closed woodlands have been cleared and converted into wheat, sheep, and grazing country with scattered trees and remnant woodlands that are ideal for roosting and nesting.

Inland crested pigeons live happily around homesteads, nesting in windbreaks and small remnant areas of vegetation and feeding in paddocks. Although normally seen in small groups of five or six, they often gather in large numbers near water holes in the arid zones. When flushed they rise with a loud wing clatter but seldom go far before alighting on a bare branch to look back at the intruder.

The flights are swift and direct with rapid wing beats interspersed with periods of gliding on extended wings. On alighting they swing their tails high above their body for a moment.

They can regularly be seen feeding along the headlands and amongst rows of vines where there is suitable habitat nearby and grass cover; they are typically sedentary.

## **BREEDING BEHAVIOUR**

They breed in spring and early summer but at any time after good rainfall. The nest is a frail platform of fine sticks about 170 mm in diameter placed seldom more than 3 metres above the ground on a horizontal fork, usually in a low, thickly foliated bush.

## **HABITAT AND PREY**

Food of the crested pigeon is derived almost entirely from crops and exotic weeds. In some areas in the arid zone their food is 85% seeds, 14% leaves and 1% insects.

The most important single food items are the introduced *Echium lycopsis*, Paterson's curse or salvation Jane, which provides a third of their annual food. Other plants include heliotrope, barley grass, black oats, saffron thistle, star thistle, and various *Medicago species*, clover, and legumes.

No doubt the bird's ability to eat exotic seeds has contributed greatly to the bird's expanding distribution.

## **BENEFITS / PROBLEMS**

The crested pigeon is relatively common, and the species has benefited from the clearing of native vegetation for the cultivation of cereal crops.

Crested pigeons are considered a beneficial bird to farmers and viticulturists given their diet of seeds and pest plant matter. They are not known to cause damage to fruit in vineyards.

*Psephotus haematonotus*  
red-rumped parrot



**FIGURE 28.** Pair of red-rumped parrots [Photo: Graham Lee].

**DESCRIPTION**

This species is widely distributed across south-eastern Australia although is less common in Victoria. They are common in sparsely timbered grassy woodlands, open plains, mallee, and cultivated farmlands. They can also be regularly seen feeding along the headlands of vineyards where there is suitable habitat nearby and grass cover rather than cultivation.

Its forehead and cheeks are blue-green, with the rest of the head and neck bright green. The back is a dull blue-green and the rump a dull red. The breast is a bright green, the belly and shoulder yellow. Females are a dull green-olive overall. Although red-rumped parrots form flocks, they remain in pairs. The flight of the red-rump is strong and rather swift with an undulating flight. They are mostly sedentary.



## **BREEDING BEHAVIOUR**

Like many parrots, the red-rump nests in a hollow limb or hole in a living or dead tree or even a hollow fence post, preferably near water. The bottom of the hollow is lined with a wood dust material. The female incubates the eggs, sitting on them very tightly. The male feeds her at almost hourly intervals throughout the day.

After leaving the nest, the young remain with their parents for some months, often joining a flock with them. They typically breed from August to December or January.

## **HABITAT AND PREY**

Much of the red-rumped parrot's time is spent on the ground foraging and searching for grass seeds. The birds scurry here and there or flutter from the shade of one tree to another, often congregating around haystacks or in stubble paddocks to feed on fallen grain.

They also feed on unripe seeds, especially the developing seeds of *Erodium botrys*, longbeak stork's bill. In addition, they also eat the leaves and flowers of certain thistles.

## **BENEFITS / PROBLEMS**

Although the red-rumped parrot is relatively common inland, their numbers have declined in recent decades. The species has benefited from the clearing of native vegetation for the cultivation of cereal crops.

Red-rumped parrots are considered a beneficial bird to farmers and viticulturists given their diet of seeds and plant matter. They are not known to cause damage to fruit in vineyards.

## *Stagonopleura guttata* diamond firetail finch



**FIGURE 29.** Diamond firetail finch is a threatened species and listed as a declining woodland bird in South Australia (left) [Photo: Graham Lee] and (right) [photo: Phil Barron].

### **DESCRIPTION**

The black and white diamond firetail finch is usually seen in scattered groups, hopping energetically over the ground as they search for seeds. They are most often found in open country in south-east Australia. These grass finches like to keep near trees as they feed. When disturbed they rise with a whirring sound and fly strongly and silently to the nearest tree, displaying their crimson rumps as they go.

Diamond firetails are highly social birds even during the breeding season. They flock loosely when feeding but when alarmed they tighten into small groups as they make their way to cover. Diamond firetails inhabit open grasslands and grassy woodlands in south-eastern Australia.

### **BREEDING BEHAVIOUR**

The male diamond firetail engages in an elaborate courtship ritual by picking up the longest green grass stem he can find and flying to the highest dead branches of a tree. The female soon follows him and there he begins his song and dance

routine and a courtship ceremony involving nest building and food begging displays until copulation.

The nest is flask shaped with a bulky spherical chamber and an entrance tunnel of variable length and is made of long grass blades and stems lined with fine grass stems and white feathers. The nest is usually placed in thick foliage. They breed from August to January.

## **HABITAT AND PREY**

Diamond firetails drink frequently throughout the day and are generally found near water. Members of a breeding colony feed in open areas next to their nests, mostly eating ripe and half ripe grass seeds and occasional insects. *Allocasuarina verticillata*, drooping sheoak, and *A. muelleriana*, slaty sheoak, are commonly planted to provide habitat for the diamond firetail finch.

## **BENEFITS / PROBLEMS**

The diamond firetail is considered a beneficial bird to farmers and viticulturists given their diet of seeds and insects. Where there is suitable habitat, diamond firetails sometimes forage on the edges of vineyards and headlands. They are not known to cause damage to fruit in vineyards.



**FIGURE 30.** Sedge regrowth along a creek (left) and extensive and healthy sedges, reed beds, native grasses, and redgum trees along the creek provide ideal habitat for a range of bird species and other wildlife (right) [Photos: Ian Falkenberg].

These areas require minimal management and maintenance work. It is recommended not to slash these sedge communities as they provide important habitat and ground cover for birds and other native wildlife. The sedges will have no impact on vineyard production. Note the good quality habitat for birds along the creek with reeds, sedges, and mature red gum trees.



**FIGURE 31.** Remnant blue gums on ephemeral creek provide ideal refuge for bush birds particularly honeyeaters and pardalotes (left) and mature redgum trees along a creek provide important habitat for a range of bird species (right) [Photos: Ian Falkenberg].

These creek lines would significantly benefit from plantings of shrub species and native perennial grasses underneath to enhance habitat and ground cover for birds and other native wildlife and help stabilise creek banks and minimise soil erosion. These plantings would have minimal impact on vineyard production.



## **BENEFICIAL BIRD SPECIES FOUND IN AND AROUND VINEYARDS**

Other  
(honey eaters)

## *Anthochaera carunculata* red wattlebird



**FIGURE 32.** Red wattlebird (left) [Photo: Graham Lee] has distinctive pink, red wattles behind the eye and (right) [Photo: Andrew Silcock].

### **DESCRIPTION**

The red wattle bird is one of the most common honeyeaters and is abundant in suburbs and towns over south-eastern Australia. The red wattlebird inhabits forest and woodlands.

The upper parts of the bird are dark brown, boldly streaked with white, its forehead dark and cheeks white, with small pink, red wattles behind the eye. Its under parts are dusky brown while its lower breast and belly are yellow; eyes are red and legs pink, brown.

## **BREEDING BEHAVIOUR**

The nest ranges from flat to saucer shaped to a deep cup roughly constructed of grass and twigs lined with feathers, hair, or soft plant material. They are usually in large bushes or trees 4 to 20 metres above the ground. They breed from July to December.

## **HABITAT AND PREY**

In autumn, red wattlebirds leave their breeding areas and migrate via well-established routes in search of winter flowers; they can form large flocks at this time. Red wattlebirds can regularly be seen searching for spiders and insects under eaves and gutters to feed their young.

They also snatch large orb-weaving spiders from their webs and insects from the air. Food comprises mainly nectar from many species of plants, especially eucalypts. Less often they feed on insects, especially lerps and honeydew. In gardens red wattlebirds take nectar from a wide range of flowers, including exotics such as fuchsias.

## **BENEFITS / PROBLEMS**

Red wattlebirds have been adversely affected by the removal of banksia undergrowth. Its population has declined in areas that have been extensively cleared.

Occasionally, red wattlebirds become a pest in stone fruit orchards and vineyards, however, they seldom cause serious damage.

The red wattlebird is considered a beneficial bird to farmers and viticulturists given their diet of mostly nectar and insects.

*Lichenostomus penicillatus*  
white-plumed honeyeater



**FIGURE 33.** White plumed honeyeater usually feeds among the leaves and blossoms of woodland trees, such as eucalypts, and eats mainly nectar and insects [Photo: Tim Pascoe].

### **DESCRIPTION**

The white-plumed honeyeater is one of the best-known honeyeaters, particularly in south-eastern Australia, and is one of the most widely distributed. It is common in pairs or small groups in open forest and woodlands as well as parks and gardens.

It darts rapidly and noisily about leaves and blossoms of eucalypts and other flowering trees. The white-plumed honeyeaters flight is short, fast, and undulating and the bird has a habit of often rising into the air from the top of a tree to utter the well-known whistling call that has given rise to one of its popular names, 'chickowie'.



When in numbers, the white-plumed honeyeater is very aggressive and will attack birds much larger than itself. It is always alert and very quick to sound an alarm at the approach of an intruder or predator.

The white-plumed honeyeater occurs through all levels of trees and shrubs, particularly treetops in open forest. Inland, it is usually found near water, and it is very much a bird found in association with *Eucalyptus camaldulensis*, river red gum. Creek side wattles and casuarinas are also favourite nesting sites.

Its upper parts are light grey-brown and washed olive with a white tuft behind the ear. The head, wing-coverts and rump are washed olive-yellow. The wings and tail are olive brown with feathers edged with olive-yellow. The underparts are buff, its throat and upper breast washed yellow, and its eyes dark brown.

### **BREEDING BEHAVIOUR**

The nest is a neatly woven cup of grass, fine bark strips, rootlets, hair or plant down, spider webs and eggs sacks. The nest is lined with plant down, fine rootlets, hair, fur and, occasionally, a few feathers.

The nest is suspended by the rim in the drooping outer leaves of a tree frequently over hanging water and is usually 1 to 19 metres above the ground. They breed from June or July to January or February and also in autumn.

### **HABITAT AND PREY**

Feeding is usually among the leaves and blossoms of forest and woodland trees, such as eucalypts. The white-plumed honeyeater eats mainly nectar and insects, such as beetles, lacewings, bees, ants, weevils, aphids, bugs, moths and their larvae, wasps, flies, blowflies, and lerp scales and their larvae. They also eat spiders and pseudo-scorpions.

### **BENEFITS / PROBLEMS**

The white-plumed honeyeater is considered a beneficial bird to farmers and viticulturists given their diet of mostly nectar and insects. There are no records of these birds causing damage to fruit in vineyards.

*Manorina melanocephala*  
noisy miner



**FIGURE 34.** Noisy miner can be found in suburbs and gardens where colonies are particularly small and less obvious. However, they can form large colonies in open dry woodlands [Photo: Rod Bradtke].

### **DESCRIPTION**

The noisy miner is perhaps the best-known honeyeater in eastern Australia. It occupies gardens where colonies are small and less obvious, particularly if they are near large trees, but this miner reaches its greatest density in extensive open dry woodlands and is generally sedentary throughout its range.

It has a black crown with black extending in an arc behind the ears and to the throat. The nape is black with and the rump grey. The wings are brown while the outer flight feathers have olive yellow edges. The tail is brown with a white band, there is a patch of bright yellow behind its brown eyes, and it has a bright yellow bill.

## **BREEDING BEHAVIOUR**

The noisy miner nest is a cup shape, often so flimsy that one can see through the bottom of twigs, grasses, and leaves and, sometimes, it is lined with hair. Usually, there is a felt-like pad of silk from moth cocoons or wool in the bottom.

The nest is usually placed in the outer branches of a tree up to 20 metres and sometimes as low as 0.5 metres. They breed from June to December. As many as ten or more males may visit a single nest while it contains eggs and most of these participate in feeding the nestlings. In a single nesting season, one female may be helped by as many as 24 males.

## **HABITAT AND PREY**

Like many honeyeaters, the noisy miner eats mainly insects and small invertebrates. These birds take nectar from flowering plants. Studies have found that the noisy miner is most common in small, heavily grazed forest patches in farmland and absent from extensive intact forest areas.

Noisy miners feed mainly on invertebrates, nectar, flowers, and fruit and, occasionally, small frogs and reptiles. They forage in foliage, on trunks and branches of trees, trunks of vines, and on the ground. Miners unite to mob predators and are particularly noisy when ganging up on raptors, snakes, and goannas. They also attack other species of birds that enter their territory and are successful in driving out most species and, occasionally, killing some.

Attacks are less successful in shrubby woodlands because small birds can take refuge. Noisy miners have social displays where many birds come together and greet each other by opening their beaks and lifting their tongues while slowly waiving their wings.

## **BENEFITS / PROBLEMS**

They have been recorded as a pest in orchards and vineyards in New South Wales, particularly in times of drought due to their preference to consume fruit when other food options are scarce, but they are not considered to cause significant economic damage to vineyards.

The noisy miner is considered a beneficial bird to farmers and viticulturists given their diet of mostly nectar and insects; their benefit to insect control far outweighs any damage to fruit.

## *Phylidonyris novaehollandiae* New Holland honeyeater



**FIGURE 35.** New Holland honeyeater feeding on nectar [Photo: Graham Lee (left) and (right) Mary Retallack].

### **DESCRIPTION**

The New Holland honeyeater is a bird of coastal heath and open woodlands where there is dense growth of flowering shrubs. This honeyeater is also common in gardens and appears to have increased in some parts of its range.

The New Holland honeyeater's upper parts are black and heavily streaked with white. It has conspicuous yellow edges on its wing and tail. Its head is black with white eyebrows and a small ear patch. The underparts are black with white streaks, and it has a white eye.

### **BREEDING BEHAVIOUR**

They nest throughout the year and position their nests to suit the seasons. In winter, in some places its nest is high in the outer branches on the northern side of a shrub where it receives as much sunshine as possible.

In summer, it builds its nest deep inside a shrub, usually on the southern or eastern side, avoiding the heat of the sun. The nest is cup shaped and constructed of plant fibre, bark and grass tightly woven together and lined with soft materials, usually banksia flowers and sometimes spider webs, fur, or soft plant material.

The nest is placed in a shrub or low tree 1 to 3 metres above ground. They are found in loose colonies and do not defend large territories. They breed from March to May and August to October.

## **HABITAT AND PREY**

New Holland honeyeaters feed on nectar and insects (e.g. arthropods, lerps, honeydew, insect larvae, etc.) and particularly favour the blossoms of banksia, grevillea, and eucalypt, often congregating at blossoming gum trees where they feed on nectar and catch insects. They take insects from the foliage, but most insects are taken on the wing. They rarely forage on the ground.

The New Holland honeyeater is one of few birds that can catch several insects and hold them in line in its bill before flying off to feed its young. In calm conditions it will hover in a swarm of small insects taking several with quick snaps of its bill, but normally it flies out from its perch taking one at a time.

## **BENEFITS / PROBLEMS**

Instances of large flocks have been observed feeding amongst fallen fruit, however, further monitoring revealed they were searching for insects and not feeding on the fruit.

The New Holland honeyeater is considered a beneficial bird to farmers and viticulturists given their diet of mostly nectar and insects. There are no records of these birds causing significant damage to fruit in vineyards.



**FIGURE 36.** Mature redgum trees with hollows along a creek provide important nesting habitat for a range of bird species (left), and whilst relatively small, this remnant peppermint gum and sheoak woodland along an ephemeral creek line provides important refuge for many bush birds particularly red-capped robins, tawny frogmouths, wattle birds, and honeyeaters [Photos: Ian Falkenberg].

The ephemeral creek line pictured in **Figure 36** would significantly benefit from additional plantings of shrub species and native perennial grasses to form a habitat corridor linking other remnant trees. This would enhance existing habitats and the movement of birds and other native wildlife. These plantings would have minimal impact on future vineyard production.

# PEST BIRD SPECIES FOUND IN AND AROUND VINEYARDS

frugivores  
(fruit eaters)



## *Barnardius zonarius*

### Australian ringneck, twenty-eight parrot



**FIGURE 37.** Australian ringneck or twenty-eight parrot eats mainly seeds of eucalypts, grass seeds, insects, tree blossom, nectar, and fruit and can cause damage to fruit in vineyards [Photo: Tim Pascoe].

#### **DESCRIPTION**

Australian ringneck blend extremely well with their surroundings when feeding among the outer branches of eucalypt trees and on the ground. Their general plumage is green, they have a frontal band that is red and blue cheeks.

They are often called 28 parrots because their call sounds like they are saying 'twenty-eight'.

They frequent open forest trees surrounding cereal crops or bordering water courses. Callitris woodlands and Acacia shrubland are also important habitats. In the Margaret River area, they are commonly found in close proximity to suitable bushland habitat and adjacent vineyards.



## **BREEDING BEHAVIOUR**

The breeding season is typically August and January but may be triggered by good seasonal rainfall in an area. After choosing a hollow limb for a nest site, a pair spends considerable time preparing it, lining the bottom of the hole with decayed wood dust, and making a shallow excavation for the eggs.

The female incubates the eggs, which take about 20 days. While the female feeds in the early morning and late afternoon, the male sits in a nearby tree and warns of approaching danger. The young leave the nest about 30 days after hatching.

## **HABITAT AND PREY**

The Australian ringneck is common in mallee scrub, open woodland, and among trees bordering water courses. They are usually seen in pairs or family groups.

Soon after sunrise they leave their roosting perches and move to feeding areas where they remain until mid-morning. During the hottest part of the day, they shelter in the trees or forage in the shade for seeds and fallen fruit. Towards dusk they again become active and feed and drink before settling to roost for the night

Ringnecks eat the seeds of grasses and herbs, fruit blossoms, leaf buds, and insects and their larvae. Frequently, they are seen feeding on the blossoms and seeds of *Eucalyptus gracilis*, mallee gums, *E. Dumosa*, white mallee, and *E. cladocalyx*, sugar gum.

## **BENEFITS / PROBLEMS**

Twenty-eight parrots are very fond of fruits and can cause significant damage to grape crops.

## *Cacatua sanguinea* little corella



**FIGURE 38.** The little corella range appears to be expanding with several thousand birds flocking together at roosting time in some regional centres (left) [Photo: Andrew Silcock] and (right) [Photo: Mary Retallack].

### **DESCRIPTION**

The little corella is common throughout arid mainland areas and its range appears to be expanding. Several thousand little corellas may flock together at roosting time, usually midday and night, and gather in trees along water courses and town parks and gardens.

Little corellas are generally thought of as loud and gregarious birds without any developed social organisation, but in fact they group themselves in two well-developed ways: well-known flocking of thousands of birds and the formation of groups of a few hundred birds during the breeding season.

Their general plumage is white with diffuse yellow bands under their wings and tail. They don't have a distinct crest but feathers on top of their head can be raised in alarm or aggression. They have small red feathers between the eye and bill.

## **BREEDING BEHAVIOUR**

While the birds breed, they are silent and secretive in their nesting areas with well-established pair bonding and nest maintenance rituals. The birds seem to use the same nest in successive years.

Little corellas breed from June to October and the nest is a hollow limb or hole in a tree, mainly in a river red gum tree. Breeding pairs chew the inside of the hollow to produce deep wood dust litter.

The birds prepare fresh litter every year by chewing the inside of the hollow, which at times may end in the destruction of the hollow and the trees after many successive years of use. The nest is normally 4 to 14 metres above the ground and more than one metre deep and lined with green leafy branchlets.

## **HABITAT AND PREY**

Little corellas eat the seeds of grasses and legumes, preferring native grasses, seed, and grain crops.

## **BENEFITS / PROBLEMS**

These birds rarely cause severe economic damage to vineyard crops. However, in late spring, little corellas have been known to bite off the emerging shoots on vines.

*Glossopsitta concinna*  
musk lorikeet



**FIGURE 39.** The musk lorikeet eats fruit, seeds, nectar, and insects, such as caterpillars and aphids and are unpopular in vineyards [Photo: Graham Lee].

## **DESCRIPTION**

The musk lorikeet ranges across eastern and south-eastern Australia. They are very common and live in a wide range of habitats, including trees bordering watercourses or surrounding farmland. They can be found in most types of woodland wherever there is flowering or fruit-bearing trees and shrubs.

Flocks are usually seen flying high overhead or climbing amongst branches of flowering eucalypts feeding on nectar. They are often observed in the company of other lorikeets. They are extremely noisy and although their plumage blends with the foliage, their continuous screeching always indicates their presence.

Their direct flight is very swift, and the whirring of wing beats can be heard as the birds pass overhead. In flight the yellowish-green underwings distinguish this species from other lorikeets.

The plumage is generally bright green, tending lighter and more yellow on underparts; the forehead, lores and band from the sides of the head to the neck are red, the crown is blue, and there are yellow patches on the sides of breast.

## **BREEDING BEHAVIOUR**

They nest in hollow limbs or holes in trees, usually in a living eucalypt near water. The eggs are laid on a decayed wood dust lining at the bottom of the hollow. The breeding season lasts from August to January.

## **HABITAT AND PREY**

The musk lorikeet usually moves in small groups that often congregate in trees where there is a profusion of flowering eucalypts. They feed on nectar, pollen, blossoms, particularly those of eucalypts, fruits, including berries, seeds, and insects and their larvae.

## **BENEFITS / PROBLEMS**

Sometimes musk lorikeets become a pest in orchards and vineyards. They seem oblivious to approaching danger and seem reluctant to leave the feeding tree. The stomach contents of birds collected in South Australia comprised seeds, vegetable matter, and small caterpillars.

The presence of these birds in a vineyard setting is rarely welcome. However, their numbers are usually small and there are few reports of these birds causing significant economic damage to grape crops.

*Parvipsitta porphyrocephala*  
purple-crown lorikeet



**FIGURE 40.** A distinctive diagnostic of the purple crowned lorikeet is the purple crown on top of its head which is absent from the musk lorikeet [Photo: Ian Wilson].

## DESCRIPTION

The purple-crown lorikeet ranges across southern Australia and can live in a wide range of habitats. It is the only lorikeet to colonise south-western Australia.

The lorikeet is common in mallee, open woodland, and dry sclerophyll forest, but also common near the coast. The purple-crowned lorikeet is nomadic, following flowering eucalypts; their numbers fluctuate unpredictably.

Despite the array of colours on the purple-crowned lorikeet it blends remarkably well with the foliage in which it feeds and roosts.

Purple-crowned lorikeet has a direct and swift flight with rapid wing beats. It has a crimson patch under its wing, which distinguishes it from other lorikeets in flight. If the birds pass close by, the whirring of their wings can be heard.

Its forehead is yellow-orange becoming red on the lores, and in front of eye. Its crown is deep purple, the ear coverts pale orange with washed yellow and the rest of head green; its nape and upper parts are green, its under wing coverts crimson, and the bend of its wings are blue and the rest green.

## **BREEDING BEHAVIOUR**

Purple-crowned lorikeet nest in hollow limbs or holes in trees, preferably in a dead or living eucalypt near water. The eggs are laid on a decayed wood dust lining at the bottom of the hollow. Colonial nesting has also been recorded for this species and during these events the nesting area is full of activity as the birds flit to and from the feeding areas. It breeds from August to December.

## **HABITAT AND PREY**

The attractive, purple-crowned lorikeet usually move in small groups but large flocks, sometimes of hundreds of birds, congregate where there is a profusion of flowering eucalypts.

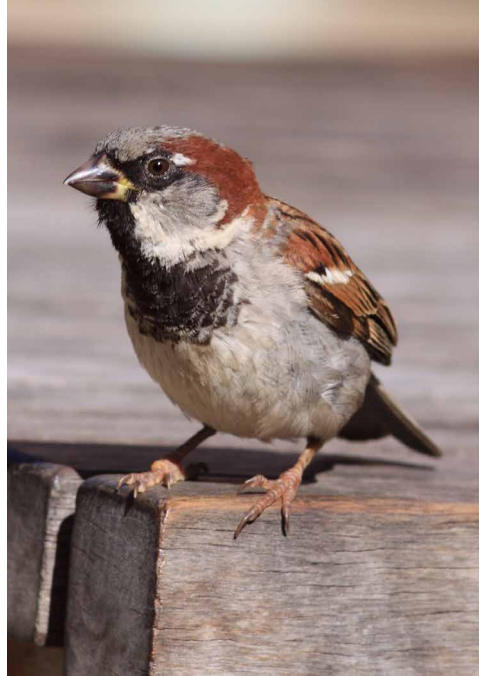
They feed on pollen, nectar, blossoms, fruits, including berries, and insects and their larvae. Although they prefer the pollen and nectar from eucalypts, they are also fond of cultivated fruits, particularly apples and pears, and can cause considerable damage in orchards and vineyards. While feeding they do allow people to approach quite close.

## **BENEFITS / PROBLEMS**

Sometimes purple-crowned lorikeets are killed or injured after striking telegraph wires or fences.

The presence of these birds in a vineyard setting is rarely welcome as they do cause some localised economic damage to crops.

*Passer domesticus*  
house sparrow



**FIGURE 41.** The house sparrow is an introduced species and although quite rare in heavily vegetated areas, its range is slowly spreading [Photo: Rod Bradtke].

### **DESCRIPTION**

The house sparrow is an introduced species, common throughout southern and eastern Australia and including Tasmania. Its upper parts are dark chestnut brown with black streaks, the crown and rump are dark grey, and the wings are brown with a dull white bar on the shoulder. Their eyes are brown and their bill is very thick and dark brown. The female is duller than the male.

The house sparrow was first introduced into Australia in the late 1850s to early 1860s. Millions of birds have descended from these few imported birds and in the south-east of Australia, house sparrows live where humans live.



## **BREEDING BEHAVIOUR**

Several successive broods are raised in a season. The nest is an untidy dome-shaped structure with a side entrance and is lined with feathers and plant down.

The nest is placed in a crevice in buildings, under bridges, in fairy martin nests, under eaves, in thick bushes and trees or in hollow limbs. It breeds in spring and summer and at other times if conditions are suitable.

## **HABITAT AND PREY**

House sparrows are quite rare in heavily vegetated areas, however, their range is slowly spreading.

These birds live in flocks in trees and on the ground, feeding on seeds and odd bits of food dropped by humans. They also eat insects, particularly when feeding their young.

## **BENEFITS / PROBLEMS**

The house sparrow is considered a minor nuisance to farmers and viticulturists and is not considered a significant cause of fruit damage in vineyards.

*Platycercus elegans*  
crimson rosella



**FIGURE 42.** The crimson rosella eats mainly eucalyptus seeds, grass seeds, insects, tree blossom, nectar, and fruit. These birds can be a problem at times as they also feed on grapes [Photo: Ian Falkenberg].

## **DESCRIPTION**

The crimson, yellow and Adelaide rosellas are regarded as forms of the same species and range in colour from a rich red to scarlet orange or lemon yellow. Regardless of the body colour, the brow remains red in all of them.

The crimson rosella is abundant in suitable habitats throughout its range. Pure red forms occur in the sclerophyll forest areas in south-eastern Australia while a paler form lives in the sclerophyll forest and grassy woodlands of the Mount Lofty ranges. This parrot has adapted successfully to man-made cleared habitats.

The roaming flocks of immatures that form after the young are independent can comprise 50 or more individuals. These rosellas are closely related to the green rosella of Tasmania, which they resemble in all aspects of their behaviour.

## **BREEDING BEHAVIOUR**

They breed from September to January and the nest is in a hollow, usually in a tall eucalypt about 8 to 30 metres above the ground. Young fledge about five weeks after hatching but remain with the parents for another month or so before becoming independent.

## **HABITAT AND PREY**

The seeds of wattle and eucalypts are prominent in the diet of the crimson rosella. But the birds also visit orchards in small groups or flocks to feed on cultivated fruit, such as grapes, stone fruits, etc.

## **BENEFITS / PROBLEMS**

The presence of these birds in a vineyard setting is rarely welcome and they do cause some economic damage to crops.

## *Platycercus elegans ssp. flaveolus* yellow rosella



**FIGURE 43.** In autumn, the yellow rosella has been observed feeding extensively on seeds of the water pepper plant and the introduced scotch thistle and paddy melons, the latter two being a serious pest weed [Photo: Andrew Silcock].

### **DESCRIPTION**

The crimson, yellow and Adelaide rosellas are regarded as forms of the same species and range in colour from a rich red to scarlet orange or lemon yellow. The yellow form is named subspecies *flaveolus*.

Regardless of the body colour the brow remains red in all of them. The yellow rosella has a riparian distribution centred around the Murray and Murrumbidgee River systems and is abundant in suitable habitats throughout its range. This parrot has adapted successfully to man-made cleared habitats.

## **BREEDING BEHAVIOUR**

It breeds from August to December and the nest is in a hollow some considerable height from the ground, usually in a tall eucalypt in or near water.

## **HABITAT AND PREY**

Its diet comprises seeds of grasses, shrubs, and trees, especially eucalypts, as well as fruits, berries, nuts, buds, blossoms, nectar, and insects and their larvae, including the cut moth larvae, which they extract from under loose bark.

An important food is the seeds of redgum trees and when a group of rosellas are feeding in these trees, there is always a steady fall of discarded fragments.

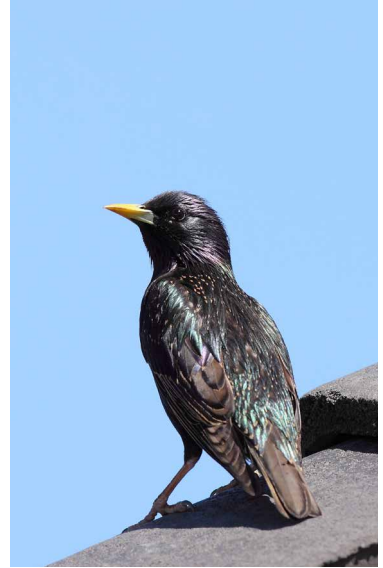
In autumn, the parrot has been reported feeding extensively on seeds of the water pepper plant and the introduced scotch thistle and paddy melons, the latter two being a serious weed pest.

## **BENEFITS / PROBLEMS**

Although fond of cultivated fruits, these parrots do not congregate in large flocks or move far from riverine trees and, therefore, are seldom responsible for widespread damage.

The presence of these birds in a vineyard setting is rarely welcome, however, they do not cause serious economic damage to grape crops.

*Sturnus vulgaris*  
common starling



**FIGURE 44.** The common starling feeds on grubs, insects, and grapes often doing considerable damage in vineyards [Photo: Rod Bradtke].

**DESCRIPTION**

The common starling is black all over with green or purple iridescence except for its brown wings and tail. It is an introduced bird, first released in Victoria in the 1850s. It has now spread throughout towns and cities in eastern Australia and into many agricultural areas and, in some places, into natural bushland.

The starling is probably sedentary although its range appears to be increasing slowly. In Western Australia the department of agriculture is working to prevent it becoming firmly established there.

## **BREEDING BEHAVIOUR**

Starlings are pugnacious and will successfully compete with native birds for nest sites, even building on top of other birds' nests and evicting the rightful occupants. Nests are untidy and built of grass, twigs, leaves, and feathers as well as man-made materials and is generally placed in tree hollows, cliff holes, crevices in buildings, or in bridges. One pair can raise several broods in a season with the whole nesting cycle being completed in as little as six or seven weeks. They breed from August to December.

## **HABITAT AND PREY**

In winter, starlings feed in flocks that gather in spectacular fashion at communal roosts in the evenings. These roosts, which may accommodate many thousands of birds, form attractive targets for raptors, such as brown goshawk, little falcon and peregrine falcon.

Starlings are omnivorous. They feed mainly on the ground, probing with their long bill for insects, seeds, and small fruits. They also feed on grapes, often doing considerable damage in vineyards. However, there is no doubt that they play a beneficial role; because their numbers are so great, they devour countless insect pests.

## **BENEFITS / PROBLEMS**

A common problem is preventing starlings from building nests in the roof space of houses and is probably one of the most important arguments against them.

Not only are their nests a fire hazard but when the young have flown, small red blood sucking mites are left. These parasites then descend on the occupants of the house and get into bedding, cause irritations to the skin and they may transmit disease.

Starlings can be quite common in monoculture vineyards prior to and during harvest. The starling is considered a significant cause of fruit damage in vineyards in some areas. However, starlings also provide a useful service to viticulturists by consuming countless insect pests.

## *Trichoglossus haematodus* rainbow lorikeet



**FIGURE 45.** Rainbow lorikeets eat fruit, seeds, nectar, and insects such as grubs, caterpillars and aphids. They particularly like grapes, which makes them very unpopular in vineyards [Photo: Graham Lee].

### **DESCRIPTION**

The rainbow lorikeet is widespread in most timbered areas of eastern and southern Australia and prefer areas where there are flowering trees. The rainbow lorikeet is one of the most brilliantly plumaged of Australian parrots and a flock of these birds feeding in a blossom-laden tree is a most impressive sight.

Its head is violet blue with a yellow green collar. Its breast and its sides are bright yellow barred with bright blue, and there is a large patch of deep violet blue on the centre of its belly.



## **BREEDING BEHAVIOUR**

The rainbow lorikeet nests in hollow limbs or holes in trees, preferably near water. The eggs are laid on a decayed wood dust lining at the bottom of the hollow. It breeds from August to January but varies in the north where nesting has been recorded in most months.

## **HABITAT AND PREY**

Rainbow lorikeets are usually seen in pairs or flocks flying overhead or feeding amongst the outer most branches of flowering trees. They frequent most timbered areas, including off-shore islands, and are often seen in gardens and parklands.

Rainbow lorikeet are extremely noisy birds and attract attention by their screeching and chattering. They feed greedily and become so engrossed in the search for pollen and nectar that they sometimes remain oblivious to observers. They also eat blossoms, berries, other fruit, seeds, and insects and their larvae. They are also seen in the company of other species of lorikeets.

At sunrise, flocks of lorikeets leave their roosting trees and fly to feeding areas where they remain during the day, sheltering from the heat and the sun in the dense foliage. Towards sunset they return to their roosting trees. Rainbow lorikeets fly very swiftly in a direct path and the sound of their rapid wing beats can clearly be heard as they pass over head.

## **BENEFITS / PROBLEMS**

The presence of these birds in a vineyard setting is rarely welcome and they do cause some localised economic damage to grape crops.

## *Turdus merula* European blackbird



**FIGURE 46.** European blackbird feeding on worms (left) [Photo: Andrew Silcock], and with young in nest - an unwelcome introduced species into Australia [Photo: Graham Lee].

### **DESCRIPTION**

The European blackbird is entirely dull black. Its eyes are brown with a yellow eye ring, the bill is yellow, and the legs brown, black. The female blackbird is more rufous (reddish) brown. The blackbird was first introduced into Australia in 1863.

For a considerable time, the blackbird was confined mostly to Melbourne and Adelaide and spread only very slowly outside of those areas. Over the last 30 or 40 years, however, its range has noticeably increased and now covers most of the south-east of mainland Australia and Tasmania.

Today, the blackbird is common in towns and cities in NSW, Victoria and south-eastern South Australia. Where favourable conditions exist, its numbers have increased significantly.

## **BREEDING BEHAVIOUR**

The nests comprise a cup of dried grass and other plant matter, bound together with mud and lined with fine grasses. They are usually placed in a bush or any suitable thick clump of vegetation or low tree. They breed from September to January.

## **HABITAT AND PREY**

The blackbird eats mainly insects, earth worms, molluscs, spiders, and a variety of seeds and fruit. It has become a pest in orchards and vineyards. Its fine song, heard mostly in spring and summer, is delightful.

Its flight is fast and direct with a curious flickering of the wings. On alighting, it moves its tail up and down. At times it perches high, mainly to sing and nest.

When blackbirds congregate on lawns and among fallen leaves below densely foliated trees, they feed mainly on the ground, probing with their long bill for insects, seeds, and small fruits. They also feed on grapes in vineyards, often doing considerable damage.

## **BENEFITS / PROBLEMS**

There is no doubt the blackbird provides a beneficial role to viticulturists because they devour countless insect pests.

It is considered a significant cause of fruit damage in vineyards at certain times.

## *Zosterops lateralis* silvereeye



**FIGURE 47.** Silvereeyes eat fruit, seeds, nectar, and insects such as grubs, caterpillars and aphids and particularly like grapes, which makes them very unpopular in vineyards [Photo: Graham Lee].

### **DESCRIPTION**

There is wide plumage variation in the subspecies of silvereeyes, which mainly occur in the tropical north of Australia. The silvereeye upper plumage is usually yellow green with underparts grey or white, and a distinctive white eye ring.

Each year thousands of silvereeyes migrate from Tasmania as far as southern Queensland. The birds migrate towards the end of summer after breeding when they congregate in large flocks. Some wander widely while others migrate northwards along defined routes.

Birds from Tasmania and southern Victoria move mainly along the coastal plains where vast numbers feed in coastal heathland.

## **BREEDING BEHAVIOUR**

They breed from August to January and frequently raise two and sometimes three broods in a season. The nests are a small cup, 65 mm in diameter, of fine grasses and rootlets, cobwebs, hair, and animal fur.

They are usually suspended from a small almost horizontal branch in outer foliage of native and exotic plants, shrubs, and trees and are usually about 1 to 4 metres above the ground.

## **HABITAT AND PREY**

Silvereyes feed low down in trees and shrubs on fruits, seeds, nectar, and insects, such as grubs, caterpillars, and aphids. They particularly like soft fruits which makes them very unpopular in vineyards and orchards.

The movement of silvereyes takes place mainly at night although they tend to drift as they feed during the day.

## **BENEFITS / PROBLEMS**

Silvereyes can be quite common in vineyards and due to their inconspicuous habit of feeding low down in foliage they are often not detected, particularly when in lower numbers.

The silvereye is considered a significant cause of fruit damage in vineyards and orchards in some areas. However, silvereyes also provide a useful service to horticulturalists by consuming grubs, caterpillars, and aphids.

# MANAGEMENT TECHNIQUES

There is a perception that bird problems are increasing, however, large flocks were commonplace in the 1800s.

**Now birds are more conspicuous in the environment because we have cleared and removed much of their natural habitat.**

In addition, we are seeing longer periods of drought and or dryer conditions and birds have few options but to move to more reliable areas for food and other resources.

When food resources become scarce during periods of lower rainfall and dryer conditions, birds become desperate and keeping them away from crops can be very difficult. Birds are simply trying to survive in an environment where food resources and suitable habitats are diminishing at a rapid rate. This trend appears to be increasing and current research shows many of our woodland birds are in decline.

Research on bird problems in Australia has mainly focussed on damage caused to fruit, cereal, and grain crops. There has also been some research on damage to plantation trees and aquaculture, risks posed to aircraft and the role of exotic birds as environmental pests. This guide and summary are primarily focussed on the affects and damage birds cause in vineyards and to grape crops.

# VINEYARD PEST BIRD SPECIES

The main species of birds that cause damage to grape crops include common starling, silvereve, crimson rosella, lorikeets (rainbow, purple crowned and musk), corvids (crow and raven), red wattlebird, European blackbird, and house sparrow.

- Little corella is also included as they cause damage to viticulture and other natural and built facilities around towns. The size of the problem was assessed as very serious in the early 2000s by Bomford and Sinclair (2002). However, given a general decline in the abundance of many species of birds over the past two decades, the problem is likely to be very different today.
- Silvereve can be quite common in vineyards and, due to their inconspicuous habit of feeding low down in foliage, are often hard to detect. The silvereve is considered a significant cause of fruit damage in vineyards in some areas. However, silvereves also provide a useful service to grape growers by consuming grubs, caterpillars, and aphids.
- The common starling has been found to cause significant damage prior to and during harvest and is considered one of the primary causes of fruit damage in vineyards in most grape growing regions in Australia (except Western Australia).
- The European blackbird rarely occurs in large numbers but causes fruit damage in vineyards more at a localised level. However, both common starling and European blackbird can also be beneficial to viticulturists as they devour countless insect pests when available. Both the common starling and European blackbird are introduced into Australia and considered a pest species.



The authors have found that where there is minimal biodiversity (monocultures) in an area (e.g. lack of remnant vegetation, perennial grasses, water courses, paddock trees, etc.), it will be difficult for a diverse number of native bird species to thrive, and these vineyards are more likely to encounter populations of pest bird species, such as common starlings (Lindenmayer, 2011).

Pests, insects, and diseases can **spread through crop systems extremely fast** if there are no other natural barriers (Barber, 1993). Pesticides can have **negative effects on the environment** (Olsen, 1995; Falkenberg et. al. 1991), harming native insects and bird populations and even contributing to air and water pollution. Significant damage caused by a few bird species may be an indication that viticultural management is out of balance with the environment.

**In large areas of intense agriculture there are fewer arthropods and pollinators, less food for insectivorous birds to eat, and less space for other plants to grow. Areas comprising minimal biodiversity (monocultures) have significantly fewer arthropod and bird species (Paton, et. al. 2004). In contrast, pest bird species, such as common starlings, often visit these vineyards in large flocks and cause significant damage very quickly before moving on.**

Vineyards need specific nutrients from the soil and if one plant species (monoculture) is continually grown in the same area without adequate inputs, the soil can eventually become deficient in specific nutrients (Viers, et. al. 2013; Ochoa-Hueso, et. al. 2023), harming its composition and reducing the quality of plants and production. Monocultures can show significant soil health problems and soil tests have found that soil composition was worse when compared to perennial grasses nearby (Reseigh, 2009; Ochoa-Hueso, 2023). They were lower in bacterial matter, fungi, nutrients, and other microbes, which are all critical for sustainable soil health (Reseigh, 2009; Ochoa-Hueso, 2023).

## Vignerons perceptions

A dislike of birds is inherent in some sections of the farming community and there is a general misconception amongst viticulturists that most birds eat grapes and, therefore, birds in and near vineyards are considered a threat and not welcome. Birds are an important part of the ecosystem and are here to stay, some in large numbers (e.g. little corellas and rosellas).



Many vignerons understand that birds can have an impact on their crops, but few know just how much damage they can cause. The 2003 study, titled 'Bird damage to the wine grape industry', found that some unprotected crops commonly lost up to 45% through bird damage with an average total loss per producer of about 9.4% (Tracey and Saunders, 2003).

**Bomford and Sinclair (2002) outlined several studies that have attempted to quantify damage to grapes. A method to quantify grape damage was based on a visual assessment of the frequency of bunches damaged. Damage was highest for red grapes than for white grapes and was highest near the edges of a vineyard and near roost trees or bushes. Most of the damage was found to be caused by the common starling.**

Analysis of the influence of environmental variables indicated that foliage cover, number of perch sites close to vineyards, size of the vineyard block, and the location of the control effort within the block were important factors influencing the extent of damage caused by the common starling. In Victoria, *Strepera versicolor* (grey currawong), common starling, and silvereye were observed to be causing serious damage to grapes in the Bendigo area (Bomford and Sinclair, 2002).

Not only can birds wreak havoc through berry loss, they can also be responsible for secondary spoilage through moulds, yeast, bacteria, and subsequent insect damage where the skins of berries have been compromised. Bird damage has also been known to result in unnecessary harvest and subsequent downgrading of premium fruit (Tracey and Saunders, 2003; Bomford and Sinclair, 2002).



## Knowledge of bird ecology

When implementing bird control strategies, it helps to know a little about the bird's ecology and what makes a particular crop vulnerable.

**Comparing situations where damage occurs to those where it does not may provide an insight into the bird's behaviour so that a landowner can alter circumstances to avoid or reduce damage.**

There have been several studies on parrot ecology that may form the basis for future research on damage control programs (Jarman and McKenzie, 1983; Jones, 1983).

Parrots occupy a wide range of habitats and display a wide range of social behaviours in relation to habitat preference, flocking and nomadic behaviour, and crop food preferences. Flock sizes are usually highly variable, with the largest flocks forming when concentrated transitory food is available, such as ripening fruit crops.

**Bird damage is likely to be greater when local and natural food sources are either not available or in low supplies (e.g. flowering trees and shrubs) during periods of drought and lower rainfall.**

An important consideration when controlling birds in vineyards is to put as much pressure on them as possible. It's important for birds to experience deterring consequences for visiting a particular vineyard so that the experience outweighs the desire of birds feeding on grapes. One single strategy or control method is unlikely to work on its own.

A combination of control methods to attack multiple senses of birds will deliver the best longer-term results (Bomford and Sinclair, 2002; Falkenberg pers. comm. 2024).

## Regenerative farming practices

Amongst some vignerons, a regenerative agricultural approach appears to be growing in popularity and is based on the idea that soil, the environment, and elements that rely on soil health can be improved. Regenerative practices are aimed at restoring soil health, increasing organic matter over time, while they sequester carbon below and above ground. Each element protects against erosion, helps with water and nutrient retention, stores carbon in soil and plant material, and contributes to biodiversity in our soil.

The authors have adopted a regenerative approach to viticulture with considerable success. Overall, grape production (tonnes) is slightly lower and fruit quality is higher, however, operational costs are much lower, but the bottom line is higher in terms of profitability. Soil health, water retention, the environment, and integrated pest management are also improved. Birds are an important part of an integrated pest management approach in viticulture as many bird species found on properties feed on insects and invertebrates (Table 1).

For conventional winegrowers, transitioning to regenerative farming can be a challenge, even if they're motivated to increase the fertility of their soil. However, there will be significant benefits for them over the longer term.

**Ecologically diverse ecosystems tend to be better buffered due to the complexity and diversity of species present, and it is less likely pest species (including birds) will dominate and result in significant crop damage.**



## Bird species causing damage in vineyards

The functional group of bird species that are most likely to cause damage to the viticultural industry are the frugivores (fruit-eating birds), including common starling, European blackbird, silvereye, crimson rosella, purple crowned lorikeet, rainbow lorikeet, musk lorikeet, little corella, yellow rosella, and house sparrow. Three of these species are introduced and one is an unprotected species (see **Table 1**).

- The red wattlebird is a honeyeater and although it is considered a pest of orchards and vineyards, it seldom causes serious damage. Conversely, the red wattlebird should be considered a beneficial bird to viticulturists given its diet of mostly nectar and insects. The crimson rosella has several subspecies, including the yellow rosella, and are a close relative of the Australian ringneck parrot.
- On occasions, vignerons have mistaken the regent parrot (threatened species and not included in this guide) with the yellow rosella, particularly along river systems in the Murray Darling Basin. The rosella group of birds, including the crimson, yellow and ringneck parrots, are seldom welcome in vineyards and do cause some damage to fruit. However, these parrots rarely congregate in large flocks and damage is mostly localised and not considered to cause serious economic damage to crops. Whilst frugivores' diet consists of fruit, at certain times of the year they also consume large quantities of insects and invertebrates (Forshaw and Cooper, 1988).
- Rainbow lorikeets feed greedily and become so engrossed in the search for pollen and nectar that they sometimes remain oblivious to observers. They also eat grapes and other fruit, seeds, and insects and their larva. They are also observed in the company of purple-crowned lorikeets and musk lorikeets in vineyards. All species of lorikeets are rarely welcome, and they do have the potential to cause some localised economic damage to grape crops.
- Other species of birds causing significant damage in vineyards include the little corella and sulphur-crested cockatoo, which can defoliate trees and vines. In late spring, cockatoos and corellas bite off emerging leaf buds on vines (Forshaw and Cooper, 1988) see sections on frugivore birds and seed eaters.
- The house sparrow would be considered a minor nuisance to viticulturists and not considered a significant cause of fruit damage in vineyards.

# STRATEGIES FOR BIRD CONTROL

Much research on damage control has focussed on habitat manipulation to reduce the attractiveness of crops to birds or to make alternative food sources more attractive. However, there has been little adoption of these approaches by growers to date. Habitat manipulation to mitigate the risk of bird strike has been more successful at airports. Exclusion netting has been found to be highly effective and the best approach for orchards and vineyards where it is economically beneficial.

**In general, most evaluations of scaring and population reduction approaches for bird control have concluded that they are usually not effective (Bomford and Sinclair, 2002).**

In vineyards and fruit orchards there have been several devices used by vignerons to deter birds from feeding in vineyards, including decoy birds, plastic hawks that float like kites, imitation owls, gas-guns that explode every few minutes, electronic devices that emit a sonic sound, reflective streamers, light emitting devices (lasers), and people on motorbikes moving the birds along, sometimes using bird fright cartridges shot above their head. All can assist to some degree, however, over time birds can become accustomed and or habituated to these techniques and their effectiveness is rapidly diminished.

Some nuisance bird dispersal companies are now using drones made to look like raptors with some success. These remote-control robotic birds of prey resemble the appearance and weight to a living raptor.

They work on the basis of an ornithopter, which means it flies by flapping its wings as a means of lift and propulsion and the suppliers claim a flight performance like a real bird of prey. Their main deficiency at present is that they do not actually seek out the targeted nuisance birds like a trained live raptor might do, but that may be solvable in the not-too-distant future using algorithms for 'prey' recognition.

**These types of remote-control robotic birds of prey may achieve the best results on larger flocks of birds, such as starlings, rosellas, lorikeets, and corellas. Minimal influence would be expected on silvereyes, for example, due to their inconspicuous habits, difficulty in flushing from vines, and of feeding low down in the foliage and under the canopy.**

## Falconry (use of trained birds of prey)

A trained, captive, New Zealand falcon has been reported to have been successfully used to keep small birds away from vineyards. Whilst falconers advocate the benefits of trained birds for bird control, there are few suitable raptors in captivity in Australia to make this a viable and sustainable option.

There is overwhelming evidence both from Australian and overseas trials that show the use of trained birds of prey and, in particular, falcons to deter and control pest birds has limited value and only delivers short-term benefits (Bomford and Sinclair, 2002; Olsen, 1995).

Whilst the presence of a hunting falcon in the vicinity of a large flock of birds will cause some short-term disruption and cause some birds (e.g. little corellas) to take to the air and flock, the disruption rarely lasts more than a few minutes.

There are numerous examples where this technique has been trialled in Australia with poor results (Olsen, 1995; Falkenberg, unpublished data).

The impact on wild populations of raptor species from removing birds from the wild that could be considered suitable for bird control would be unsustainable. In addition, there are several animal welfare issues associated with falconry and legal constraints on taking raptors from the wild. Falconry activities have the potential to quickly get out of hand and may be quite difficult for government agencies to manage in future. Therefore, the use of trained raptors (falconry) for bird control is not recommended.

The use of falconry methods has its short comings and, more recently, falconers have been replaced by pyrotechnical means and noise generators. The firing of pyrotechnic charges on flocks of birds has also proved ineffective on its own, but mixed with several techniques may deliver improved results.



## Birds of prey (raptors including hawks and falcons)

Much has been written about the food habits of predatory birds and the impact on prey species as a food source and how these behaviours may benefit bird control. However, little information is available on the significance of predation on prey populations.

Regardless of the large numbers of individual birds that may be killed by raptors, predation itself appears ineffective as a limiting factor for populations of pest birds.

**However, raptors can have a significant influence on local populations of some birds by disrupting feeding behaviours and moving birds to other sites.**

Food (prey) is the driver for raptor populations to remain viable and healthy. For example, in Western Australia the average clutch size (number of eggs laid) of the little eagle, wedge-tailed eagle, and the brown goshawk increased following the introduction and spread of the rabbit into their range (Ridpath and Brooker 1985). All three showed a decrease in clutch size following successful control of rabbits and a high percentage of rabbit in their diet. In the same study, non-rabbit eating raptors showed no change in the clutch size over the same period.

Experimental studies have shown similar adaptive changes in clutch sizes in response to increased food availability for some raptors. Sparrowhawks, for example, laid larger clutch sizes of eggs in areas where extra food was provided, and prey (birds) were more abundant than in habitats where prey was scarce (Newton and Marquis 1981).

These findings support a strong relationship between food availability (birds) and the number of eggs laid and, therefore, the number of raptors in an area of suitable habitats.

Many birds must deal with predators in one form or another on a daily basis; this process is a natural part of life for birds. In view of the issues associated with falconry for bird control, it is far more effective to have resident (wild) birds of prey in the vicinity of a vineyard that will hunt and forage naturally on a regular basis. Monocultures are unlikely to support enough resident birds of prey for them to provide significant benefits for bird control.

The greater the variety of habitats (biodiversity) in an area, the greater the diversity of bird species and, therefore, the greater the number of raptors.

**In a viticultural context, the variety of habitats may include patches of remnant vegetation (grassy woodlands), tree-lined creek systems with reeds and sedges, water holes, paddock trees, grassy headlands, native perennial grasses on headlands and in mid row of vineyard, etc.**

**Vineyards situated within these diverse habitats / landscapes, even if they are relatively small in area, are likely to have greater insectivorous, seed-eating birds and honeyeaters than a monocultured landscape (Falkenberg pers. comm. 2024).**

The variety of raptors (e.g. hawks, falcons, and kites) will also be greater in these habitats due to the abundance and variety of prey. Whilst frugivore birds will also be present in these landscapes, generally the species of birds that cause and contribute to the greatest damage to crops and vines, in most cases, will be in lower numbers e.g. (common starling).

Other frugivore species of birds, such as *Rosella* spp., silvereye, blackbird, house sparrow, and lorikeets, will also be present but will be subjected to increasing risk of predation, disturbance and disruption to feeding from brown goshawks, sparrowhawks, falcons, and other raptors that hunt by ambush and stealth in and near vineyards.





## Population reduction by shooting

The usual aim of shooting is to reduce the population to reduce the damage flocks of birds cause to crops. The potential for cost-effective damage control by reductions in numbers is very limited because birds learn very quickly to avoid shooters, and it is expensive and time-consuming. (Fleming et al. 1990).

**Shooting is probably the most universally practised and most ineffective bird control technique used in Australia (Fleming, 1990).**

Killing is clearly not providing a solution for most vignerons. Emison (1990) found that large-scale shooting and poisoning of corellas was found to be ineffective in terms of mitigating damage to crops but potentially damaging to both the target and non-target species. Removal of birds from a population is unlikely to have any sustained effects on density and probably enhances the survival of the remaining birds (Emison, 1990).

Bird fright cartridges that are fired from a 12-gauge shotgun are quite effective when used with other methods. The projectile explodes within the flock or above the birds while in the air. The birds must be airborne for bird flight cartridges to be effective (availability of these cartridges may be problematic).

Shooting is not a magic bullet when it comes to controlling corellas and other pest bird species. Given the serious damage little corella is causing around some towns, parks and gardens in some regions, culling is recommended for their control. Failing to control corella numbers means they can damage the environment and nesting trees for other bird species. For example, large trees are rare and usually contain hollows for other nesting birds. Little corella distribution is increasing and are more commonly seen in large numbers on school ovals and football grounds, etc.

Not allowing scouting flocks – often a few hundred birds – to become settled in an area where they then encourage the main flock to join them through sophisticated call signs is important for effective control. This is one of the reasons the birds are so noisy, constantly chatting and gossiping. It's important to move them on if they have the resources they need elsewhere, but experts agree whatever strategy of management is adopted to lessen their impact, getting rid of little corellas will be the hardest and least successful option.

Corella management is a complex and difficult problem and almost impossible to permanently resolve (Alexander, 1990; Bomford and Sinclair, 2002). Some of the learnings from corella control and management can be applied to other species causing economic damage in vineyards.

## Decoy crops

Decoy crops maybe a more effective way to protect vineyards than shooting or scaring (Ford, 1990). Growing crops specifically to be eaten by birds is hard for landholders to accept and requires coordination on a local basis for maximum effect (Ford, 1990), but De la Motte (1977) estimated the cost compared favourably with shooting. Decoy crops have had only mixed success in some grain growing areas (Allen, 1990). The main problem is rendering the main crop less attractive than the decoy crop (Allan, 1990).

Decoy crops in South Australia have been used for little corella control to protect grain crops and rosella control to protect cherry orchards. However, there are few examples where decoy crops have been used to reduce damage to grape crops.

In areas where severe bird damage is common, damage avoidance by crop substitution maybe a viable option. For example, a small area of a vineyard can be planted to other varieties (e.g. sultana or other preferred varieties) and sacrificed to the birds (but landowners must weigh up the cost benefits).

## Scaring devices (sound, gas guns, decoys)

Several sound-producing devices have been tested for their ability to repel birds from crops, but none have proved effective for damage control (Bomford and O'Brien, 1990; Jaremovic, 1990). Shooting and use of scare devices may be counterproductive.

**For example, when birds are scared off and then return repeatedly, they may damage more fruit in orchards than if they were left undisturbed (Fleming, 1990; Sinclair, 2002). Fleming (1990) also found similar results in vineyards with silvereve, red wattlebird and rosella, whereby scaring the birds was found to spread the damage and decrease productivity (Fleming et. al. 1990). Each time a scare device was activated, it was found to disturb birds so that they moved to another area of the vineyard and commenced feeding.**

Unless birds are successfully scared to a different feeding site, they will inevitably return to the crop where scaring is undertaken and. if continually and regularly disturbed, the birds will increase their energy use flying back and forth and, consequently, need to eat more of the crop to satisfy their energy needs.

Bomford and O'Brien (1990) reviewed the scientific literature on the use of sound-producing devices for controlling bird damage and concluded that they were of little practical use. They determined that the main problem was that, after time, most birds adjust and ignore a new sound and become habituated.

Even if devices successfully scared birds when they were initially placed in vineyards, habituation is usually rapid. Several electronic bird-scaring devices on the market incorporate digitised sound mimicking alarm and distress calls of pest species and the predator hunting calls. There is no scientific evidence to show the effectiveness of these artificial sounds, and it is questionable whether they would be meaningful to birds given the complexity of natural bird communication.

Trials of the effectiveness of scaring devices have usually investigated the impact of each device on its own rather than in combination with other damage-mitigating strategies, techniques, or devices. Field trials on several scaring devices, including commercial electronic scare devices, gas cannons, imitation hawks, and balloons with eye patterns, found that none of them had any significant effect on parrots and that their use was not cost effective (Bomford and Sinclair, 2002; Sinclair, 2002).

Decoy birds, such as plastic hawks that float like kites and carved owls, and gas-guns that explode every few minutes may assist in deterring birds from moving into a vineyard, however, over time birds become accustomed or habituated to such techniques and their effectiveness is quickly diminished.

## **Exclusion netting**

Several studies have investigated the use of exclusion netting to exclude birds from grape crops and have found this method the most successful for crop protection. The term 'netting' refers to 'throw over' netting (single or multiple row) or side netting (clipped over bunch zone) and applied annually. In some situations, it may be the only way of controlling birds given increasing concerns about animal welfare issues.

**With the introduction of long life ultraviolet stabilised plastics, exclusion nets are now frequently used over large areas of horticultural and viticultural crops. The economic evaluation of the effectiveness, costs, and benefits of using exclusion netting to reduce bird damage in vineyards has been favourable. Exclusion netting can be highly effective against most species, is ecological and socially acceptable, is humane, and the expertise for its installation and maintenance is readily available (Sinclair, 2002).**

The disadvantage is its cost. Its economic benefit depends on the balance between the level of damage to the crop, the annual returns from the crop, and the cost of the application. Netting applied annually over low value grape crops will rarely be economic unless high levels of damage are experienced. New multi-row drape netting, with more efficient application and removal techniques, has markedly reduced costs, thereby improving the economic viability of this approach. This is especially important when netting is applied over high value wine grape varieties.

Numerous studies in Australia's grape growing regions have concluded that exclusion netting is the best option for bird control (Bomford and Sinclair, 2002). In 2010 the Australian Grape and Wine Research and Development Corporation provided costings for the initial purchase of netting at \$3,000 per hectare but over its life span (assumed 5 years) was \$600 per hectare per year. An average cost of \$1,500 per hectare per year was used (Scholefield and Morris, 2010).

**In 2023 a vigneron applied exclusion netting to his grape crop in the Barossa Valley at an initial establishment cost of about \$12,000 per hectare and annual operating costs per hectare of \$2,800. Given this significant increase in costs over 13 years, returns from crops will need to increase substantially for grape growers to be able to repay those expenses over 10 years and be in front, as outlined by Sinclair (2002).**

Throw-over nets that can be mounted on light weight structures give short term protection during the ripening season, but picking a crop through a net is slow and can increase costs significantly.

Extruded nets also catch and entangle birds and reptiles moving through vineyards. Few grape varieties have market values to make throw-over nets consistently cost-effective; they also have a high maintenance component and usually need to be replaced every two to three years.

A permanent structure with full exclusion is the most frequently adopted netting system for excluding birds from stone fruit. A pole, wire and cable structure supports roof and side netting. The structures are designed in panels, and loads that develop due to rain are transferred to anchors guying back the perimeter poles. Black nets have a life expectancy of >10 years, white nets of 5 to 8 years. There is no limit to the size of the area covered but there are economies of scale. Growers often consider netting is too expensive. Netting does not require much special expertise or sophisticated equipment and appears to be increasingly accepted by some growers.

## Light emitting devices (laser bird control scarers)

Some bird control devices use a focused green laser beam to deter birds from specific areas. The manufacturers claim they are designed to mimic the presence of predators that naturally frighten other bird species. The laser emits a bright green light that moves swiftly and unpredictably across surfaces, creating an illusion of an approaching predator.

Suppliers also claim these lasers operate on the concept of triggering birds' instinctive fear response as birds perceive the approaching laser beam as a potential threat, prompting them to flee the area. The dynamic movement and random patterns of the laser beam simulate the hunting behaviour of raptors, which effectively discourages birds from landing or roosting in the targeted spaces. The authors question these claims and suggest there may be a misinterpretation of prey response to these devices. A laser can sweep up to 1,000 metres in a straight line. This distance is dependent on the light conditions as the laser beam is strongest and longest on a cloudy day or from dusk to dawn.

Other claims include that once programmed, the bird control laser can be left to do its job against pest birds, the sweeping motion of the laser acting as a silent scare device repelling pest birds. The manufacturers claim the cost-effective solution will help achieve a return on investment each year. Field use shows that the best results are achieved by pointing the laser to the foliage when used in vineyards.

Suppliers of gas canons, acoustic alarms, and distress call devices as well as visual bird scarers claim these methods to be an effective means of bird control. To use these techniques effectively, vignerons would need to be in the vicinity of the birds, requiring them to drive around constantly to approach the birds.

It is also important to consider the negative impact these types of lasers may have on nocturnal animals and other non-target species if they are used outside of daylight hours, as has been observed in some wine regions (Mary Retallack pers. comm. 2024).

NB: approval/permit from a relevant authority may be required to use handheld lasers.



**FIGURE 48.** Some bird control devices use a focused green laser beam to deter birds from specific areas [Photo: Phil Barron].

## Combined control techniques (lasers, scarers, and shooting)

There has been some success with the use of light emitting devices (lasers) for corella control around townships in some regional centres.

**The use of laser lights moves birds on, however, in most cases, the birds soon return. Lasers are ineffective during the day and whilst unlikely to be effective for most pest bird control in vineyards on their own, lasers appear to be effective when combined with other techniques.**

The most effective approach for corella control and other pest bird species has been the use of a combination of techniques, including gas guns, and lasers. The key is to deter the birds with a combination of techniques and be consistent. Corellas are very social birds and, to achieve effective control, techniques must change the birds' habits and move them onto other areas.

Corellas and other bird species quickly become habituated to gas guns on their own and very soon lose their effectiveness. When a corella is shot and/or injured (using low velocity bullets) the other birds in the flock think the tree is a dangerous place to be and move to other sites.

The manufacturers of laser bird deterrent systems claim that using high-powered green laser beams are designed not to hurt birds, but to stimulate a flight response.

The best results for corella control can be achieved by repeatedly treating roosting sites at dawn and dusk. The effectiveness of laser devices on their own is questionable for other bird species where control is primarily focussed during daylight hours. No one method alone will fix the problem of bird damage in vineyards. LED lights work to varying degrees on little corellas but do not appear to work on long billed corellas and some other bird species.

A combination of techniques may be effective for control of other bird species, however, there appears to be little direct evidence of any field trials. Note: there are legal requirements regarding the use and strength of lasers in certain areas.

## Repellent chemicals

There have been several trials conducted using repellent chemicals on table grapes in the Riverland, in SA, and on grain crops to reduce damage caused by corellas. Most have been either inconclusive in their results or discontinued due to their toxicity. Few chemicals are currently registered in Australia for bird control.

# SUPPLEMENTARY HABITAT

Nest boxes and roosting  
perches



# NEST BOXES AND ROOSTING PERCHES

Given the focus and nature of this report, the placement of nest boxes that attract the species that may be causing damage to vineyards is unlikely to be supported and adopted by vignerons.

However, we have attempted to focus on the type of nest boxes and perches that beneficial birds will use. For example, laughing kookaburras, pardalotes, barn owls, Australian owlet nightjar, and tree creepers. We have tended to avoid recommending nest boxes for parrots and cockatoos as these species have been clearly identified as causing varying levels of damage to grape production.

**Nest boxes for pest bird species are quite different in their design to those intended for desirable species of birds. Some nest box designs may also be taken up by pest bird species, such as common starlings. Regular maintenance and checking to remove these species when they have taken over a particular nest box will be important.**

The placement of nest boxes will require careful consideration and not all vineyards will be suitable. The vineyards that have remnant vegetation, revegetation plantings, and paddock trees nearby would be ideal.

**Strategically placed perches around a property for raptors would also be beneficial. Paddock trees also play an important role for several raptor species to perch and still hunt. Dead trees are also very important for raptors to perch as they provide good visibility of the immediate and surrounding ground for them to look for insects, skinks, and small reptiles.**

**Many raptors employ a still hunting technique where they survey the surrounding area for prey while sitting on an elevated perch or a dead tree or branch, thus conserving energy.**

The species listed below are those birds that are most likely to use nest boxes and are considered beneficial to farmers and viticulturists given their diet of mostly invertebrates and other small animals. Nest Box information taken from '[The nest book](#)'.



## Australian owlet-nightjar

- Nest box height above ground: about 5 metres
- Special considerations: Drill a suitable number of drainage holes 5 mm into the base of the nest box.
- Maintenance: Watch for bees. Trees should be made predator proof with a sheet of tin around the trunk of the tree to stop cat and possum predation.

## Barn owl

- Nest box height above ground: 5 to 10 metres
- Special considerations: If the nest box is installed outside, it should be horizontal. If the nest box is installed in an old building, shed or barn, place the platform in the darkest part of the rafters. No nesting material is needed. The nest can become smelly and messy due to food remains and regurgitated pellet remains. Drill a suitable number of drainage holes into the base of the nest box.
- Maintenance: The nest can become quite smelly with faeces and remains of food items. This is normal and do not disturb.



**FIGURE 49.** Nesting box being used by barn owls [Photo: Kelly Meaney].

## Brown treecreepers

- Treecreepers nest box height above ground: 3 to 5 meters
- Special considerations: Install about 5 metres high. Birds will nest lower but will be more vulnerable to cats. Drill a suitable number of drainage holes (5 mm) into the base of the nest box.
- Maintenance: Watch for bees and feral birds, such as starlings.

## Laughing kookaburra

- Nestbox height above ground: 5 to 10 metres
- Special considerations: Young kookaburras defecate over the edge of the nest opening so the edge along the bottom of the opening must be less than 2 cm or non-existent. Opening should be facing away from the sun and prevailing winds.
- Maintenance: if birds do not show interest in the box, shift to another location

## Striated pardalote

- Nest box height above ground: 5 metres
- Special considerations: Pardalotes like a narrow and long entrance so a piece of pipe about 10 cm long can be used as an opening. Drill a suitable number of drainage holes into the base of the nest box.
- Maintenance: Watch for bees



**FIGURE 50.** Striated pardalote [Photo: Phil Barron].

# RECOMMENDATIONS

Improved and targeted extension programs are required to improve growers' awareness of the results of research on bird pests with a particular focus on:

- the effectiveness of habitat manipulation practices to improve soil health, water retention, the environment and integrated pest management to achieve significant benefits over the longer term (regenerative farming and a holistic approach to viticulture management\*)
- the economics of exclusion netting and other bird control devices that are commercially available
- the ineffectiveness of many scaring devices as they are currently used, and ways to improve their effectiveness (e.g. combining multiple techniques)
- the value of integrated bird pest management, coordinated on a regional scale.

\* Whilst bird damage is a significant issue in viticulture, a regenerative farming and a holistic approach to grape production may help to address many other serious issues such as soil health and water management / conservation and including mitigating damage caused by birds.

Investigations are required to explain why the use of decoy crops and other habitat manipulation approaches to bird damage recommended by researchers are so poorly accepted by growers and why ineffective techniques, such as expensive electronic scaring devices and shooting to kill, are so popular.

## Methods of bird control techniques in order of effectiveness

1. Exclusion netting
2. Decoy crops
3. Combining control techniques and the application of multiple devices
4. The use of individual scaring devices (sound, gas guns, decoys, or drones)
5. Bird population reduction (shooting)
6. Light emitting devices (lasers)
7. Repellent chemicals



## RESEARCH PRIORITIES

The cost of bird damage to the viticultural industry needs to be evaluated with simple, cheap techniques growers can use to reliably estimate damage. There is also a need for more studies on the biology of pest birds in relation to the potential mitigation of crop damage by habitat modification or changes in crop growing practices. An evaluation of the potential application of overseas bird pest control techniques to Australian bird pest problems may also be beneficial.

## CONCLUSION

Bird pest control companies often claim they can achieve effective bird control, saving the landowner thousands of dollars in lost produce and property damage caused by pest birds. Landowners need to be very wary of technological, so-called cutting-edge bird lasers and electronic, physical, and visual bird deterrents. Whilst they are humane and eco-friendly, their effectiveness is questionable.

**Living sustainably with wildlife and the environment is the philosophy everyone should adopt. There are many positive aspects to wildlife on farms that should encourage us to live together.**

The connections between man and bird cannot be sustained on the extremes of a love and hate relationship. We need to use our logic, skills, and knowledge to find practical solutions for humans and birds to coexist.

## FURTHER INFORMATION

- Aussie Bird Count app for [Apple](#) and [Android](#)
- Australia Birds Sounds Pro app for [Android](#)
- Birda app for [Apple](#) and [Android](#)
- Birdly - Birdlife Australia app for [Apple](#) and [Android](#)
- **BirdWeather PUC** (Portable Universe Codec), an AI powered bioacoustics platform for capturing and identifying bird species including native Australian species.
- Gould Group (2008) **The Nestbox Book** 2<sup>nd</sup> Edition, Wilkinson Publishing Pty Ltd, Melbourne.
- Morcombe, M. (2000) **Field guide to Australian birds**. Steve Parish Publishing Pty Ltd or Field guide to Australian birds app for [Apple](#) and [Android](#)
- Reid, A. (2005) **Birds of South-eastern Australia - farmlands**. Gould League Series. Overthefence Press.
- Slater, P., Slater, P, and Slater, R. (2023) **The Slater Field Guide to Australian Birds**, 3rd edition. Reed New Holland.
- Smart Bird ID (Australia And NZ) for [Apple](#) and [Android](#)
- Stewart Australian Bird Calls app for [Apple](#) and [Android](#)
- Pizzey, G., and Knight, F. (2012) **The field guide to the birds of Australia** 9th Edition. HarperCollins Publishers and app for [Apple](#) and [Android](#)
- For an introduction to the best birdwatching apps in Australia please click [here](#).

# REFERENCES

- Acorn Consulting Partnership (2008) Bird watching. p 10.
- Alexander, P.A. (1990) Progress report on investigations in long-billed corellas and other ground feeding cockatoos in the south-east of Australia. 1988-89. National Bird Pest Workshop, Armidale 8-9 February. NSW Agriculture and Fisheries, pp. 25-33.
- Allen, L.R. (1990) Habitat manipulation and the control of cockatoos and galahs. National Bird Pest Workshop, Armidale 8-9 February. NSW Agriculture and Fisheries, pp. 125-132.
- Baker, G.B. (1995) Report on the Australian bird and bat banding scheme 1984-1995. Australian Nature Conservation Agency.
- Barber, T.X. (1993) The human nature of birds: a scientific discovery with startling implications. Bookman Press, Melbourne, Australia.
- Bomford, M., Sinclair, R. (2002) Australian research on bird pests: impact, management and future directions. *Emu*. 102: 29-45.
- Bomford, M. (1990) A role for fertility control in wildlife management. Bureau of Rural Resources Bulletin No. 7. Australian Government Publishing Service. 50pp.
- Bomford, M., O'Brien, P. (1990) Sonic deterrents in bird damage control: a review. Proceedings National Bird Pest Workshop, Armidale 8-9 February. NSW Agriculture and Fisheries, pp. 83-92.
- Brooker, M.G., Ridpath, M.G. (1980) The diet of the wedge-tailed eagle *Aquila audax* in Western Australia. *Aust. Wild. Res.* 7, 433-52.
- Broome, L.S., Schlager, F.E., Jarman, P.J. (1979) The use of decoy crops to combat the bird pest problem on sunflower crops. Report to Oilseeds Marketing Board of NSW. University of New England. Unpublished.
- De La Motte, K.A. (1977) The assessment and mitigation of parrot depredations on sunflower crops. Bachelor in Natural Resources (Hons.) Thesis. University of New England, Armidale, Australia. Unpublished.
- Easdown, W.J. (1978) Some aspects of the ecology and management of avian pests in agro-ecosystems. Bachelor of Rural Science (Hons) Thesis, University New England Armidale. 55pp. Unpublished.
- Emison, W.B. (1990) Review of bird pest research in Victoria. Proceedings National Bird Pest Workshop, Armidale 8-9 February. NSW Agriculture and Fisheries, pp. 23-33.
- Falkenberg I.D., Dennis, T.D., Williams, B.D. (1991) Organochlorine pesticide contamination in three species of raptors and their prey in South Australia. *Wildlife Research*. 21: 163-173.
- Flemming, P. (1990) Some other bird control techniques. National Bird Pest Workshop, Armidale 8-9 February. NSW Agriculture and Fisheries, pp. 143-145.
- Flemming, P., Temby, I., Thompson, J. (1990) National bird Pest workshop proceedings. Armidale, 8-9 February. NSW Agriculture and Fisheries. 231 pp.
- Ford, H. (1990) Research on birds of crops in northern NSW. Proceedings National Bird Pest Workshop, Armidale 8-9 February. NSW Agriculture and Fisheries, pp. 17-22.
- Forshaw, J.M., Cooper, W.T. (1988) Australian Parrots second edition. Lansdowne-Rigby Publishers Willoughby, NSW.

- Frith, H.J. (1977) Readers digest complete book of Australian birds. Readers Digest Services Pty Ltd, Sydney.
- Graham, A., Paton, D., Berry, O. (1999) Survey of the incidence of bird damage to apples, pears and cherries and grapes and methods of control in the Mount Lofty Ranges, Southern Australia. Department of Environment and Biology, University of Adelaide.
- Halse, S.A. (1990) Review of bird pest research in Western Australia. Proceedings National Bird Pest Workshop, Armidale 8-9 February. NSW Agriculture and Fisheries, pp. 34-37.
- Hill, G., Beresford, R., Evans, K. (2010) **Tools for accurate assessment of botrytis bunch rot (*Botrytis cinerea*) on wine grapes**. New Zealand Plant Protection 63:174-181.
- Jaremovic, R. (1990) Bioacoustical scaring trials. Proceedings National Bird Pest Workshop, Armidale 8-9 February. NSW Agriculture and Fisheries, pp. 98-110.
- Jarman, P.J. (1990) Bird pest research: the gap between research and application. Proceedings National Bird Pest Workshop. Armidale, 8-9 February, NSW Agriculture and Fisheries, pp. 7-12.
- Jarman, P.J., McKenzie, D.C. (1983). Behavioural mitigation of damage by galahs to a wheat trial. Aust. Wildlife. Research. 10:201-202.
- Law, J. (2019) **Why we need birds (far more than they need us)**. Birdlife International.
- Lea, A.M., Gray, J.T. (1935) The food of Australian birds, an analysis of stomach contents. Emu, 34: 275-92; 35: 63-98.
- Lindenmayer, D.B. (2011) What makes a good farm for wildlife. CSIRO Publishing.
- Marchant, S., Higgins, P.J. (eds) (1993) Handbook of Australian and New Zealand and Antarctic birds, Vol 2 and 5. Oxford University Press, Melbourne.
- Newton, I., Marquis, M. (1981) Seasonal trends in the breeding performance of sparrowhawks. Journal of Animal Ecology, 53; 809-30.
- Newton, I. Olsen, P. (1990) Birds of prey. Golden Press Pty Ltd, Silverwater NSW.
- NOAA (2022) **National bird day**. National Oceanic and Atmospheric Administration, USA.
- Noske, S. (1980) Aspects of the behaviour and ecology of the white cockatoo (*Cacatua galerita*) and galah (*C. roseicapilla*) in croplands in north-east New South Wales. M. Sc. Thesis, University of New England, Armidale.
- Nyffeler, M., Sekercioqu, C., Whelan, C. (2018) Insectivorous birds consume an estimated 400-500 million tons of prey annually. Science of Nature, 10: 1007.
- Ochoa-Hueso, R., Cantos-Villar, E., Puertas, B., Aguiar del Rio, J.F., Belda, I., Delgado-Baquerizo, M., Fernández, V., Gallardo, A., García-Morales, J.L., Garde-Cerdán, T., Gonzaga-Santesteban, L., Lázcano, C., Liberal, I.M., Serrano-Grijalva, L., Tortosa, G., Casimiro-Soriguer, R. (2024) **Nature-based strategies to regenerate the functioning and biodiversity of vineyards**. Journal of Sustainable Agriculture and Environment 3:e12088.
- Olsen, P. (2005) Wedge-tailed eagle. CSIRO Publishing. Collingwood, Victoria, Australia.
- Olsen, P. (1995) Australian birds of prey: the biology and conservation of raptors. University of New South Wales Press, Sydney NSW.
- Obmascik, M. (2004) The big year - The extraordinary story of the greatest bird-watching competition of all time. Transworld publishers, Random House Group, London.

- Ochoa-Hueso, R., Cantos-Villar, E., Belen Puerta, P., Aquiar del Rio, J.F., Belda, I., Delgado-Baquerizo, M., Fernandez, V., Gallardo, A., Garcia-Morales, J.L., Garde-Cerdan, T., Gonzag-Santesteban, L., Loberal, I.M., German, T, Serrano-Grijalva, L., Casimiro-Soriguer, R. (2023). [Nature-based strategies to regenerate the functioning and biodiversity of vineyards](#). *J. Sustain. Agric. Environ.* 2024; 3:e12088.
- Reseigh, J., Foster, P., Myers, R.J. (2009) Native grass strategy for South Australia 2: management of native grasses and grassy ecosystems for Sustainable Production and Biodiversity Conservation, Rural Solutions SA, Adelaide.
- Scholefield P.B., Morison J. (2010) Assessment of economic cost of endemic pest and diseases on the Australian grape and wine industry. GWR 08/04, Grape and Wine Research and Development Corporation, Adelaide.
- Sergio, F., Newton, I., Marchesi, L., Pedrini, P. (2006). Ecological justified charisma: preservation of top predators delivers biodiversity conservation. *Journal of Applied Ecology* 43: 1049-1055
- Sinclair, R. (2002) Guidelines for best practice bird management. Animal and Plant Control Commission, Department of Water, Land and Biodiversity Conservation.
- Sinclair, R. (1990) The economics of netting for bird control. Proceedings National Bird Pest Workshop, Armidale 8-9 February. NSW Agriculture and Fisheries, pp. 134-141.
- Temby, I. (1990) Chemical control of birds. National Bird Pest Workshop, Armidale 8-9 February. NSW Agriculture and Fisheries, pp. 120-124.
- Tracey, J., Saunders, G. (2003) Bird damage to the wine grape industry. A report to the Bureau of Rural Sciences, Department of Agriculture, Fisheries and Forestry. Vertebrate Pest Research Unit, NSW Agriculture, Orange.
- Tracey, J., Bomford, M., Hart, Q., Saunders, G., Sinclair, R. (2007) Managing bird damage to fruit and other horticultural crops. Bureau of Rural Sciences, Canberra, A.C.T.
- Viers, H.J., Williams, J.N., Nicholas, K.A., Barbosa, O., Kotze, I., Spence, L., Webb, L.B., Merenlender, A. and Reynolds, M. (2013) Vinecology: pairing wine with nature. *Nature Conservancy, Conservation letters*. 6: 5 September/October 287-299.







### **Acknowledgement of country**

EcoVineyards proudly acknowledges the Aboriginal and Torres Strait Islander Peoples, and their ongoing cultural and spiritual connection to this ancient land on which we work and live. As the Traditional Custodians we recognise their wealth of ecological knowledge and the importance of caring for Country. We pay our respects to Elders past and present and extend this respect to all Aboriginal and Torres Strait Islander Peoples.

### **Disclaimer**

The information contained in this EcoVineyards bird guide is provided for information purposes only. Wine Australia and Retallack Viticulture Pty Ltd give no representations or warranties in relation to the content of the bird guide including without limitation that it is without error or is appropriate for any particular purpose. No person should act in reliance on the content of this bird guide without first obtaining specific, independent professional advice having regard to their site(s). Wine Australia and Retallack Viticulture Pty Ltd accept no liability for any direct or indirect loss or damage of any nature suffered or incurred in reliance on the content of the field guide.

For more information about the National EcoVineyards Program please visit [www.ecovineyards.com.au](http://www.ecovineyards.com.au) @EcoVineyards

© Retallack Viticulture Pty Ltd

## PROGRAM PARTNERS



## REGIONAL PARTNERS



MARGARET RIVER WINE



The National EcoVineyards Program is funded by Wine Australia with levies from Australia's grape growers and winemakers and matching funds from the Australian Government.

