

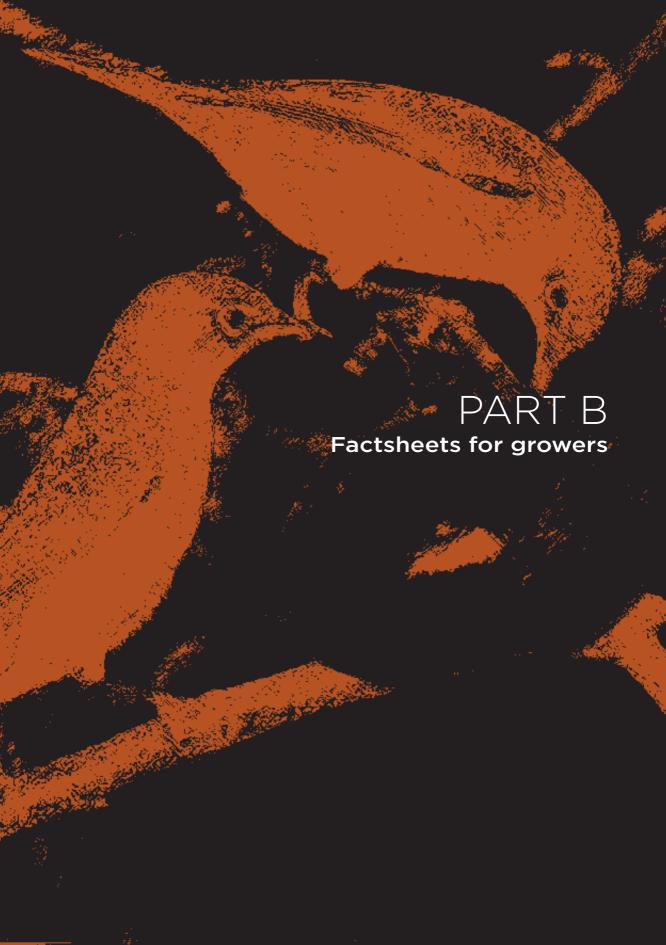
# Managing bird damage to fruit and other horticultural crops

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## This part presents information on 20 species that can be significant

horticultural pests. For each species information is given on names, identification, distribution, habitat, movement, foods and feeding behaviour, breeding, damage to horticulture, protection status and sources of further information.

Apart from these 20 species, there are many other bird species in Australia that can be pests (Table 2.1, Table 2.3). Information on these species' identification, distribution, habitat, diet and breeding can be obtained from many reliable sources including:

- Barrett, G. Silcocks, A., Barry, S. Cunningham, R. and Poulter, R. (2003) New Atlas of Australian Birds. Royal Australasian Ornithologists Union, Hawthorn East, Victoria.
- Blakers, M., Davies, S.J.J.F. and Reilly, P.N. (1984) *The Atlas of Australian Birds*. Melbourne University

  Press, Melbourne.
- Forshaw, J.M. (1969) *Australian Parrots*. Lansdowne Press. Melbourne.
- Frith, H.J. (1982) Waterfowl in Australia. Angus and Robertson, Sydney.
- Higgins, P.J. (1999) Handbook of Australian New Zealand and Antarctic Birds Volume 4: Parrots to Dollarbirds. Oxford University Press, Melbourne.
- Higgins, P.J. and Davies, S.J.J.F. (1996) Handbook of Australian New Zealand and Antarctic Birds Volume 3: Snipe to Pigeons. Oxford University Press, Melbourne.
- Higgins, P.J. and Peter, J.M. (2003) Handbook of
  Australian New Zealand and Antarctic Birds
  Volume 6: Pardalotes to Spangled Drongo.
  Oxford University Press, Melbourne.
- Higgins, P.J., Peter, J.M. and Cowling, S.J. (2006)

  Handbook of Australian New Zealand and

  Antarctic Birds Volume 7: Part A and B Boatbill

  to Starlings. Oxford University Press, Melbourne.
- Higgins, P.J., Peter, J.M. and Steele, W.K. (2001)

  Handbook of Australian New Zealand and

  Antarctic Birds Volume 5: Tyrant-flycatcher to

  Chat. Oxford University Press, Melbourne.
- Marchant, S. and Higgins, P.J. (1990) Handbook of Australian New Zealand and Antarctic Birds Volume 1 (Part A and B): Ratites to Ducks. Oxford University Press, Australia.

- Marchant, S. and Higgins, P.J. (1993) Handbook of Australian New Zealand and Antarctic Birds Volume 2: Raptors to Lapwings. Oxford University Press, Australia.
- Morcombe, M. (2003) A Field Guide to Australian Birds. Steve Parish Publishing, Archerfield Qld.
- Pizzey, G. and Knight, F. (2001) A Field Guide to the Birds of Australia. Harper Collins, Sydney.
- Reader's Digest Services Pty Ltd (1988) Reader's Digest

  Complete Book of Australian Birds. Reader's

  Digest, Sydney.
- Simpson, K. and Day, N. (2004) Field Guide to the Birds of Australia. 7th Edition. Viking, Ringwood.
- Slater, P., Slater, P. and Slater, R. (1989) The Slater Field Guide to Australian Birds. Revised Edition. Weldon, Sydney.
- Taylor, M. and Canberra Ornithologists Group (1992) Birds of the Australian Capital Territory: An Atlas. Canberra Ornithological Group Inc and the National Capital Planning Authority, Canberra ACT.



# Black-faced cuckoo-shrike

# (Coracina novaehollandiae)

#### Other names

Blue jay; messenger bird; shufflewing.



Photo: Canberra Ornithologists Group.



Birds Australia Atlas (1998-2002)

## Field identification

This is a medium-sized (33 centimetres head to tail) bird, soft grey in colour with a white belly and tail tip. It has a black face extending from behind the eye, down the cheek and across the breast; absent on immatures. The flight pattern is distinctive; undulating, with a wing shuffle on landing. Unrelated to cuckoos or shrikes, the black-faced cuckoo-shrike has, however, plumage comparable to that of cuckoos and a bill shape similar to that of shrikes. Surprisingly, DNA sequencing has linked it closely to the corvids (crows), despite morphological and behavioural differences.

## Voice

'Plee-urk' and a descending, gentle 'quarieer quarieer'.

#### Habitat

This is one of Australia's most common birds, distributed throughout the country in most habitats. The black-faced cuckoo-shrike is particularly abundant in open sclerophyll woodland and forest, farmlands, roadside vegetation and tree-lined watercourses. Common also in suburban areas, parks and gardens and extends to arid regions along watercourses. Also occurs in rainforests and tall wet sclerophyll forest, but at lower densities and often for only short periods during migration.

## Movements

Migratory, large-scale movements regularly occur with seasons. Northward movements start in mid-autumn and include many individuals who travel to New Guinea for winter. A number of individuals remain throughout the year in most populations, hence they were often considered sedentary. However, complete departures occur in some areas, particularly in the southern highaltitude ranges around Wollombi, Canberra and Jamieson regions. Altitudinal movements are evident in these areas, where populations take advantage of the milder climate and greater food availability in lowland areas during winter. Occasional nomadic movements outside seasons are also thought to occur in response to available food. Seasonal movements create regular increases in density in the north during winter, with corresponding decreases in the south. The opposite trend takes place during summer. In the eastern States, migratory movements have

recently been identified as predominantly northwest, rather than directly northward. Hence populations from the south-east regions travel in a direction perpendicular to the coast of New South Wales. Migration patterns are less obvious in the west.

# Foods and feeding behaviour

Black-faced cuckoo-shrikes have a diet predominantly of insects supplemented with seeds, fruit and vegetable matter. Caterpillars (Lepidoptera), beetles (Coleoptera), grasshoppers (Orthoptera), weevils (Curculionidae) and many flying insects are commonly consumed. Individuals, pairs or small groups often perch on exposed tree branches in the upper canopy, or forage amongst the outer foliage for a variety of insects. Black-faced cuckoo-shrikes rarely feed continuously on the ground, but will dive from perches, often landing to take insects and other food. Large flocks can occur, especially during migration in spring and autumn. For example, flocks of up to 45 have been observed in the vineyards of central New South Wales during April, where it was assumed that they were migrating north for the winter.

# Breeding

A small, flat nest is carefully shaped from fine dry grass, twigs and bark, bound with spider webs and positioned in a horizontal fork of a tall tree, often a she-oak (Casuarina). Black-faced cuckoo-shrikes habitually build well-concealed nests 10-20 metres up in the canopy, although sometimes lower. Occasionally they utilise disused nests of other species, including mud nests of the magpie-lark (Grallina cyanoleuca). The flat nest often results in eggs or chicks falling out, for example during high winds. Two or three green eggs with brownish blotches  $(34 \times 24 \text{ millimetres})$  are laid once a year, typically between August and January. This species breeds throughout its range, often following rain in arid areas.

# Damage

Black-faced cuckoo-shrikes can damage orchard and vineyard fruit, including grapes, stone fruits, berries, pears and other soft fruits. Severe damage can be caused by migrating flocks taking advantage of these easily accessible energy sources. Birds damage fruit by squashing and tearing it and swallowing the pip, seeds and skin. However, they have a clear preference for insects and individual birds are likely to be beneficial in orchards and vineyards in many situations and during most of the year. For example, potentially detrimental insect pests such as vine moth caterpillars (*Hippotion celerio*) are known prey items

### Protection status

Protected.

# Sources and further reading

- Higgins, P.J., Peter, J.M. and Cowling, S.J. (2006)

  Handbook of Australian New Zealand and

  Antarctic Birds Volume 7: (Part A and B) Boatbill

  to Starlings. Oxford University Press, Melbourne.
- Pizzey, G. and Knight, F. (2001) A Field Guide to the Birds of Australia. Harper Collins, Sydney.
- Schodde, R. and Tidemann, S.C. (1986) *The Readers Digest Complete Book of Australian Birds*Readers Digest Services Pty Ltd, Sydney.
- Simpson, K. and Day, N. (2004) Field Guide to the Birds of Australia. 7th Edition. Viking, Ringwood.
- Taylor, M. and Canberra Ornithological Group. (1992)

  Birds of the Australian Capital Territory: An

  Atlas Canberra Ornithological Group Inc and the

  National Capital Planning Authority, Canberra

  ACT.

# Crimson and Adelaide rosellas

# (Platycercus elegans)

### Other names

Blue-cheeked rosella (all subspecies); mountain lowry, red lory (*P. elegans*); Murray or yellow rosella, Murray smoker, Murrumbidgee parrot (*P. elegans flaveolus*). Note: the terms 'lory' and lowry' are used interchangeably.



Photo: B. Furby.



Birds Australia Atlas (1998-2002)

## Field identification

This species now includes three rosella types that are quite distinct in geographic distribution and plumage colour. They were known previously as different species and locally by different common names: crimson rosella (*Platycercus elegans elegans* (A), and *P. elegans nigrescens* (B) of the north-east coast of Queensland); yellow rosella (*P. elegans flaveolus* (C)) and Adelaide rosella (*P. elegans adelaidae* (D)) (pictured above).

All types are medium-sized (35-38 centimetres head to tail), with prominent blue cheek patches and broad tails. The blue cheek complex is unique to this species, with the exception of the green rosella (Platycercus caledonicus), found only in Tasmania and some islands of Bass Strait, Females tend to be smaller than males with slightly smaller heads and bills. The crimson rosella (A) is a brilliant deep red with bright blue shoulder patches and tail. Juvenile plumage is olive green with patches of crimson on the forehead, breast and rump. The plumage of P. elegans nigrescens (B) is similar but darker. Yellow replaces crimson in the yellow rosella (C), except for a red frontal band. The Adelaide rosella (D) has plumage of varying amounts of orange and red which replaces the crimson or yellow of the other forms.

#### Voice

A loud 'kweek kweek' during flight, a smooth piping whistle ('psita-a-see') when perched, not unlike an alarm clock.

#### Habitat

The crimson rosella tends to prefer wetter forests and woodlands, which are commonly found in most types of rainforest and wet sclerophyll forest. Their occurrence in open habitats, farmlands, orchards, vineyards, urban parks and gardens and semi-cleared landscapes is usually associated with adjacent blocks of wet or dry Eucalyptus woodland or with riparian vegetation, or it can be attributed to the movements of immature post-breeding flocks. Adelaide rosellas are dispersed through a variety of open forest and cultivated habitats in the Mt Lofty ranges, including stringy bark and gum (e.g. Eucalyptus obliqua, E. baxteri, E. leucoxylon, E. viminalis and E. fasciculosa) habitats and orchard landscapes, but further north around the Flinders Ranges they are more restricted to river red gum (*E. camaldulensis*) communities. The distribution of the yellow rosella is even more closely associated with the occurrence of the river red gum. This subspecies is restricted to the riparian vegetation of the Murray-Murrumbidgee river systems and occurs away from watercourses only where the river red gum grows.

#### Movements

All types are sedentary, with only occasional nomadic movements at the fringes of their range, during winter, or by immature flocks. Local movements in winter may occur from *Eucalyptus* woodland to more open areas. Regional movement towards more dense vegetation communities often takes place before the onset of breeding.

# Foods and feeding behaviour

Rosellas feed predominantly on plant material, including foliage, seeds, buds, flowers, fruit and nectar. However, insects and their larvae, including Christmas beetles (Anoplognathus spp.), aphids (Aphis spp.) and psyllids (Sternorryncha) often supplement their diet. Unlike many other parrot species, these rosellas forage commonly in tree and shrub canopies. Pairs and small groups forage in the foliage and branches of Eucalyptus spp., Casuarina spp., Callitris spp., Acacia spp., Grevillea spp., Pinus spp.(roosting only), fruit and nut crops, and introduced weed species such as wild olives, blackberry, lantana (Lantana camara), sweet briar (Rosa rubiginosa) and tobacco (Nicotiana spp.). The yellow rosella is often observed foraging high in the branches of flowering and seeding river red gums. The Adelaide rosella is preferentially a ground feeding bird. Dietary studies (Reynolds 2003) confirm that introduced Mediterranean pasture species make up the bulk of their diet in modified habitats throughout it's range. Ground feeding increases in frequency during the summer months and in open areas, where small flocks feed on pasture weeds, thistles (Asteraceae), dock (Rumex spp.), clover (Trifolium spp.) seed, onion grass

(Romulea rosea), and spilled grain. Peak feeding time is in the early morning and late afternoon during winter, but is more constant in autumn. Feeding also occurs in mixed flocks with eastern rosellas (Platycercus eximius), superb parrots (Polytelis swainsonii) and ringnecks (Barnardius zonarius).

# Breeding

Rosellas breed primarily in tree hollows of Eucalyptus spp. in woodland from September to January. They chew and strip existing bark, sticks and wood chips for nest lining, rather than bring in new material. Females select sites near those occupied in the previous season, sometimes also used and lined by other species. Females incubate four to eight white, oval eggs (28 × 23 millimetres) for 21 days, leaving the nest for short periods in the mornings and afternoons to be fed by the male. Young fledge after 35 days and remain with the parents for a further four weeks. Nests produce an average of 0.4 to three fledged young per clutch and clutches are usually larger in nests used in previous seasons. Nest failure is often caused by destruction of eggs by mammals or birds, including other crimson rosellas, or by desertion.

# Damage

Various levels of damage occur to a wide variety of horticultural crops, including apples, cherries, stone fruits, almonds, chestnuts, bramble berries, grapes, pears (Figure B.1), plums, guava and quinces. Adelaide rosellas in particular can cause severe losses to cherry crops in the Mt Lofty Ranges by damaging buds, flowers and fruit. Bud damage can be considerable in some areas, with total losses resulting in some varieties. Crimson rosellas will also occasionally cause damage where they occur near orchards and vineyards. Vegetables and young wheat crops are also damaged in some areas. In the Riverland of South Australia, the yellow rosella causes damage to soft fruits such as grapes, cherries and pears.



Figure B.1. Rosella damage to pears. Photo: J. Tracey.

## Protection status

Protected.

# Sources and further reading

Aslin, V.M. (1978) Behaviour and ecology of the Crimson Rosella (*Platycercus elegans*). BSc(Hons) thesis, University of New England, Armidale.

Bridgewater, A.E. (1934) The food of *Platycercus eximius* and *P. elegans. Emu* 33: 175–186.

Crome, F. and Shields, J. (1992) Parrots and pigeons of Australia. In *The National Photographic Index* of Australian Wildlife. Angus and Robertson, Sydney: pp. 131-137.

Fisher, A.M. (1991) Bud damage by Adelaide rosellas (*Platycercus elegans adelaidae*) to different varieties of sweet cherry (*Prunus avium*) grown in the southern Mt Lofty ranges. BSc(Hons) thesis, University of Adelaide.

Golding, B.G. (1979) Use of artificial hollows by mammals and birds in the Wombat Forest Daylesford, Victoria. Unpublished MESc thesis. Monash University, Melbourne. Halse S. A. (1986) Parrot Damage in Apple Orchards in South-western Australia — a Review. Technical Report No. 8., Department of Conservation and Land Management, Western Australia.

Harman, I. (1981) *Australian parrots in bush and aviary*. Inkata press, Melbourne.

Krebs, E.A. (1998) Breeding biology of crimson rosellas (Platycercus elegans) on Black Mountain, Australian Capital Territory. Australian Journal of Zoology 46: 119-136.

Reynolds, T.M. (2003) The Feeding Ecology of the Adelaide Rosella (*Platycercus elegans adelaidae*) in Cherry Growing Districts of the Adelaide Hills. MSc Thesis. Department of Environmental Biology, University of Adelaide, Adelaide.

# Crows and ravens

# (Family Corvidae)

## Other names

Australian raven (*Corvus coronoides*), little raven (*C. mellori*), little crow (*C. bennetti*), Torresian crow (*C. orru*), forest raven (*C. tasmanicus*).



Australian raven Photo: B. Furby.



#### Field identification

Native Australian crows and ravens (Corvus spp.) are common, large (48-54 centimetres head to tail) black birds. They are the only members of the Corvus genus with white eyes. Five native species are recognised, all of similar size and appearance and difficult to distinguish: the Australian raven (C. coronoides), little raven (C. mellori), little crow (Corvus bennetti), Torresian crow (C. orru) and forest raven (C. tasmanicus). An introduced species, the house or Columbo crow (C. splendens), has also been observed in Fremantle, Rottnest Island and Port Hedland in Western Australia and near the Melbourne Zoo in Victoria, but as a result of efforts to remove them, individuals have not become established. This species is smaller (42-44 cm length), has brown eyes, and is grey-brown around the neck and breast. Native species can be distinguished by slight variations in plumage, habits and calls. The two crows have hidden white down at the base of their feathers; this down is grey in the raven species. Ravens also have more prominent throat hackles, which are especially long and pointed in the Australian raven. Other differences, particularly in their distribution and in their calls, flight pattern and flock size, can be used to distinguish species. Consult Higgins et al. (2006) for further details.

#### Voice

Crows and ravens utter a wide variety of calls that vary between species, regions and age groups. The territorial calls are the most commonly vocalised and can be used to distinguish between species where distributions overlap. The larger species, the Australian raven and the Torresian crow, utter higher notes than the other species, and have been described as tenors; while little ravens and little crows are described as baritones; and the forest raven as a bass. The territorial calls of each species are briefly described below:

(1998-2002)

Australian raven - a wailing 'aah aah aah aaaaaaah'.

Forest raven - a series of short, very deep, guttural notes 'korr korr korr korrrrr'; deeper and harsher than the calls of the Australian or little raven;

Little raven - a series of rapid short notes, 'aark aark aaakaark': shorter and twice as fast as the Australian raven and higher than the calls of the forest raven.

Torresian crow - more varied than other species with shorter and sharper notes than the Australian raven; a laughing or barking 'uk uk uk uk uk uk' or a 'ok ok ok ok ok ok' sometimes followed by gargling sounds. Notes can also change mid-call.

Little crow - a series of nasal and monotonous notes, 'nark nark nark nark nark' with less variation than the other species.

### Habitat

These species occupy most types of habitat, particularly farmlands, dry open Eucalyptus woodlands and forests, open savannah and coastal and urban areas. Alpine areas, arid regions and watercourses and swamps are also frequented. The little crow is better adapted to drier habitats, including mallee (e.g. E. diversifolia, E. rugosa), mulga (Acacia aneura) and spinifex (Triodia spp.). All species avoid dense closed forests with the exception of the forest raven. This species is the only corvid found in Tasmania. It also is uncommon on the mainland with only a few isolated populations residing on the north-east coast of New South Wales and in the coastal regions of southern Victoria and South Australia. Expansion of agricultural development, particularly grazing, has facilitated increases in corvid distribution and abundance in many areas.

#### Movements

These species are all sedentary. No regular largescale movements are evident, but the little raven and little crow display more nomadic traits. These two species often perform larger movements in response to water and food availability and they often become sedentary for only three months during breeding. For example, in the Murray-Darling region, large numbers of little ravens travel south-east in summer to higher rainfall areas, returning in autumn. Individual movements are also greater for the little raven (up to 352 kilometres) and little crow (up to 691 kilometres), in comparison with those of other species. Non-breeding birds travel farther and are the main component of corvid populations. Birds typically return to the same sites to breed. They establish territories that vary in size considerably between species and habitats, from 0.4 to more than 130 hectares.

# Foods and feeding behaviour

Corvids are omnivorous scavengers and predators, consuming many types of insects, carrion and vegetable matter. Large insects usually comprise the majority of the diet, followed by carrion and plant materials, such as fruit, vegetables, seeds and foliage. Availability and hence quantities of different foods vary between habitats and season. Nestlings, eggs, small lizards and birds are also frequent prey items. Food is usually first located by aerial searches after sunrise, followed by long bouts of ground foraging. They will also occasionally consume fruit and beetles (Coleoptera), bugs (Hemiptera) and flying insects from trees and shrubs. Feeding around carcasses is most common and often includes caching surplus meat. These sites can be vigorously defended during food shortages and provide a range of insects, including dung (Scarabaeidae) and carrion (Silphidae) beetles. Spiders, grasshoppers and locusts (Orthoptera), weevils (Curculionidae), ants (Formicidae) and caterpillar (Lepidoptera) larvae are also common prey items. This predation on pasture and crop insect pest species would be beneficial to most farmers. Peak feeding occurs during the early morning and late afternoon with flocks returning to roost in the middle of the day. Crows and ravens regularly visit watering sites throughout the day, more frequently in arid areas. Mixed feeding flocks often congregate around food sources where distributions overlap; in some cases all three raven species have been observed feeding at one site.

# Breeding

Corvids make large bulky stick nests occasionally bound with mud and lined with grass, bark strips and wool. They are usually constructed by both sexes in an upright fork of the uppermost canopy, but lower in arid areas. The little raven nests are typically much lower (at less than 10 metres height), occasionally even on the ground in cleared areas. A single brood of three to six is raised in a season (July-October). Egg size varies among species, little crows laying noticeably smaller eggs (39  $\times$  26 millimetres) than other species (44-45  $\times$  30-41 millimetres). The little crow also has a more variable breeding season and clutch size and is more likely to nest in response to rainfall. Females incubate for about 20 days, and both sexes feed the young, which fledge at about 40 days.

# Damage

Corvids are known to consume various quantities of grapes, cherries, olives, plums, bramble berries, pineapples, passionfruit, potatoes, almonds, peanuts and grains. Corvids directly consume



**Figure B.2:** Crow damage to grapes: hollowedout and torn berries. Damaged bunches are always high up and exposed, near canes large enough to support the weight of the large bird. Photo: R. Sinclair.

fruit or foliage and sever seedlings. In vineyards, crows and ravens remove or damage fruit they can reach when sitting on trellis posts or strong vine canes and have been observed pushing young vines to the ground to feed from them (Figure B.2). Although netting reduces their impact on grapes, if the netting is simply draped over the vines, they can weigh it down if they perch en mass and damage the grapes through the net. They can also perch on, and forage directly from, foliage, and this is evident in grain crops. Commercial grains and storage areas are often susceptible. Oats, wheat, sorghum, maize and rice are commonly consumed, often from stock feed and during sowing, but also from stubble paddocks following harvest. Crows and ravens are also frequently implicated in causing stock losses, and are known to prey upon lambs and injure sheep. However, losses are rarely significant, as these birds are most likely to injure lambs that are already sick, dying or mismothered. Some studies suggest that only the largest species (Australian forest ravens) are capable of inflicting damage. Unlike raptors, these species have difficulty penetrating mammal skin; hence soft parts are targeted (mouth, eyes, anus, umbilicus).

#### Protection status

Protected, but unprotected in some States and regions (Section 6.1).

# Sources and further reading

Debus, S.J.S. (1995) Identifying crows and ravens. Wingspan 5: 38-42.

Higgins, P.J., Peter, J.M. and Cowling, S.J. (2006) Handbook of Australian, New Zealand and Antarctic Birds (HANZAB). Volume 7: Boatbill to Starlings, Oxford University Press, Melbourne.

Lawrence, C. (2005) Some vocal characteristics and call variations in the Australian Corvids. *Australian Field Ornithology* 22: 72–82.

Rowley, I. (1969) An evaluation of predation by 'crows' on young lambs. *CSIRO Wildlife Research* 14: 153–179.

Rowley, I. (1973) The comparative ecology of Australian corvids. I-VI. CSIRO Wildlife Research 18: 1-169.

# Eastern rosella

# (Platycercus eximius)

### Other names

Red-headed, white-cheeked or golden mantled rosella; Rosehill parrot.



Photo: G. Dabb.



Birds Australia Atlas (1998-2002)

## Field identification

This species is a medium-sized (29-33 centimetres head to tail), broad-tailed colourful parrot. The head, upper breast and tail coverts are bright red, the cheeks are white, the belly and lower breast yellow, shoulders blue, and rump green to turquoise. Females and immatures are a little duller and have a slight green area on the rear of the crown.

## Voice

Calls similar to, but higher-pitched than, those of crimson rosellas (*Platycercus elegans elegans*): rapid high-pitched 'pink pink' during flight and an ascending whistle or slow piping 'kwink kwink' when perched.

## Habitat

Eastern rosellas replace and coexist with crimson rosellas in more open habitats but rarely inhabit rainforest or wet sclerophyll forest. They are common throughout their range in open woodlands, farmlands, orchards, cultivated croplands and suburban parks and gardens. However, in drier parts they reside close to creeklines or floodplains. Their occurrence in open forests is associated with grassy understorey or adjacent grasslands. Hence this species has benefited from the clearing of dense forest or replanting of grassy landscapes. They are also often observed along roadsides and perched on fence-lines or overhead wires.

#### Movements

Considered mainly sedentary, although some seasonal movements are thought to occur as a result of dispersal before (New South Wales populations) or after (South Australian populations) breeding. In the Australian Capital Territory certain populations exhibit altitudinal movements, where birds emigrate from higher to lower altitudes in winter. Typical of most parrot species, juveniles and sub-adults tend to be more mobile. Eastern rosellas occur singly, in pairs or in small groups and occasionally in larger groups of up to 100. Daily movements are usually confined to local areas and the birds often loaf in tree branches during the middle of the day.

# Foods and feeding behaviour

Eastern rosellas prefer ground foraging on grasses, with seeds being the major component of their diet throughout the year. However, shrub and tree seeds (particularly Eucalyptus spp. and Acacia spp.), fruits, flowers, buds and nectar and a variety of insects, including caterpillars (Lepidoptera), lerp, psyllids, coccids (Sternorryncha) and galls on Eucalyptus leaves are also consumed when available. Foraging parties are usually small (less than 10 birds), largest in the morning, smallest during the middle of the day and intermediate sized groups in the afternoons. Foraging in the tree and shrub canopy for fruit, flowers, seeds or buds is often done opportunistically. A greater proportion of the day is spent feeding in the cooler months.

# Breeding

Eastern rosellas usually nest in the hollows of mature *Eucalyptus* spp., but also in tree stumps, fence posts, nest boxes and hollows of a variety of other species, including *Casuarina* spp., figs, *Melaleuca* spp. and fruit trees. Suitable hollows in cleared and open woodlands, including

orchards, are selected in August, and breeding usually occurs between September December. Nests are often used by the same pairs in consecutive seasons. Hollows are often unlined, or may be lined with small amounts of chewed bark, wood and plant material. Four to seven white, oval eggs, distinguishable from those of other rosella species by their size (26 × 22 millimetres), are laid at two-day intervals. Females are fed by the males while incubating and when their young are newly hatched. Young are then fed by both sexes. Suitable nesting sites are often usurped by starlings (Sturnus vulgaris) and mynas (Acridotheres tristis). Nesting failure is also attributed to desertion, infertility or breakage of eggs, or predation by lace monitors, brush-tailed possums or rats.

# Damage

Eastern rosellas are known to damage nuts, sunflowers, grain and a variety of fruit crops, including apples (Figure B.3), grapes, cherries, pears (Figure B.4) and plums. Impacts on viticulture include the chewing of growing vines and clipping of young vine stems. Eastern rosellas damage fruit by biting medium-sized chunks;



Figure B.3: Rosella damage to apple. Photo: J. Tracey.



**Figure B.4:** Rosella damage to pear. Photo: J.Tracey.

this often increases secondary losses caused by fungi such as botrytis (*Botrytis cinerea*) or by insects. Rosella damage is distinguishable from that caused by other species by the triangular-shaped marks made by the lower beak and by the small fragments (less than one centimetre in diameter) found underneath the fruit.

## Protection status

Protected

# Sources and further reading

Brereton, J.L.G. (1963) Evolution within the Psittaciformes. Proceedings XIII International Ornithological Congress 13: 499-517.

Cannon, C.E. (1977) The comparative feeding biology of two Australian parrots, *Platycercus eximius* and *P. adscitus*. PhD thesis, Department of Zoology, University of Queensland. Cannon, C.E. (1984) Flock size of feeding Eastern and Pale-headed Rosellas. Australian Wildlife Research 11: 349–355.

Green, R.H. (1983) The decline of eastern rosella (*Platycercus eximius diemenensis*) and other Psittaciformes in Tasmania concomitant with the establishment of the introduced European starling (*Sturnus vulgaris*). *Records of the Queen Victoria Museum*, *Launceston* 82: 1-5.

Harman, I. (1981) Australian parrots in bush and aviary.
Inkata press, Melbourne.

Penck, M. (1992) Breeding biology and vocalisation differences facilitating coexistence of Adelaide and Eastern rosellas (*Platycercus* spp.) in Adelaide. South Australian Ornithologist 32: 25–32.

# Galah

# (Elophus roseicapilla syn. Cacatua roseicapilla)

### Other names

Rose, rose-breasted or willock cockatoo.



Photo: M. Bomford.



Birds Australia Atlas (1998-2002)

#### Field identification

This species is an easily recognised, small (35–38 centimetres head to tail), pink and grey cockatoo. It is noisy and conspicuous, with an erratic flight pattern. Its generic name is derived from the Greek, 'dawn' and 'crest' referring to the rosepink crest like the rising dawn. The species name comes from the Latin 'roseus' (rose) and 'capillus' (capped). Females are distinguished by pinkish skin around the eye; males and immatures have dark brown eye skin.

#### Voice

A loud, high-pitched 'chill chill' during flight, a shrill screech in alarm, and a softer hum while roosting or feeding.

## Habitat

The galah occupies highly varied habitats throughout Australia in open savannahs, agricultural areas, open forests, woodlands, shrublands, mangroves, arid and semi-arid regions, sand-plains and urban areas. Galahs seldom occur in dense wet sclerophyll woodland or rainforests and avoid extreme desert regions, although in open country they prefer riverine or roadside habitat with remnant Eucalyptus or Casuarina woodlands. They are common in farming districts, urban parks, gardens and sporting fields. Their abundance and distribution have expanded dramatically and continue to expand owing to clearing and thinning of dense forests, expanding cereal cropping and improved access to water since European colonisation. In particular, the availability of grain from crops, storage facilities and stock feed has provided food during winter periods when it was naturally scarce. Galahs are now the most widely dispersed and probably the most abundant cockatoo in Australia. Highest densities occur in the Murray-Darling river system of south-eastern Australia and in the wheat belt of the south-west of Western Australia.

## Movements

This species is generally sedentary, with nomadic tendencies in juvenile and non-breeding subpopulations and in certain habitats. Sedentary birds will concentrate their movements around their nest sites and return to hollows to roost travelling less than 10 kilometres for food. Nomadic sub-populations may traverse larger areas (over 1000 square kilometres) and will roost near food sources. Galahs rarely display large-scale seasonal movements. Exceptions are some populations of the far north, which are thought to move to the north coast in the dry season and away from it during the wet. Extreme climatic conditions and habitats with variable food and water availability can also result in large regional movements.

# Foods and feeding behaviour

Seeds of grasses and herbs, especially cereal grains, comprise about 75% of their diet throughout the year. The remainder includes small quantities of nuts, fruits, berries, shoots, buds, flowers, tubers, corms, bulbs and insects. Galahs are ground foragers who search by sight, rarely digging except when seeds or rhizomes are close to the surface. Cultivated seed crops, particularly wheat, oats and barley, provide a stable food source in many areas. Grain is available from germinating crops, stubble, spillages around storage areas or along roadsides, and stock feed or (rarely) livestock dung.

Seeds of native and improved pastures and weeds, such as *Erodium* spp., clover, subclover (*Trifolium* spp.) and medic (*Medicago* spp.), wild oats (*Avena* spp.), wallaby grass (*Danthonia* spp.), western button grass (*Dactyloctenium radulans*), Flinders grass (*Iseilema membranaceum*) and Mitchell grass (*Astrebla lappacea*) are commonly consumed outside cropping areas and seasons. Winter and autumn crops such as sunflower and sorghum are also exploited, in some cases offering year-round access to commercial crops. Seed heads from introduced thistles (scotch (*Cirsium vulgare*), saffron (*Carthamus lanatus*)

and white stemless (*Onopordon acule*)) and corms of onion (Guildford) grass (*Romulea rosea*) are also frequently eaten.

Feeding flocks of 500-1000 galahs are common in cropping areas and groups are larger when food sources are more concentrated. Larger flocks form during feeding rather than when roosting or flying, and while feeding on grain rather than on pasture or in orchards. Nomadic flocks will roost within two kilometres of feeding sites and visit them repeatedly while the food source remains. They will often forage with sulphur-crested cockatoos (Cacatua galerita), long-billed (Cacatua tenuirostris) and little (Cacatua sanguinea) corellas, Major Mitchell's cockatoos (Cacatua leabeateri), red-tailed black-cockatoos (Calyptorhynchus banksii) and mallee ringnecks (Barnardius zonarius barnardi), and respond to their alarm calls. Feeding forays usually last one to four hours and begin within an hour after dawn and within five hours of dusk. Shorter foraging periods of less than 30 minutes occur during the day, especially when temperatures are low and food is scarce, and while the birds are feeding young.

# Breeding

Galahs can breed throughout the year. Breeding varies according to rainfall and food resources with peaks in February to May and August to November. Pairs form permanent bonds and remain loyal to nest sites which they both visit throughout the year. Hollows in Eucalyptus near water are selected in preference to other sites, although birds can nest in cliff crevices, logs and fence-posts. Unlike other cockatoos, galahs will line nests with Eucalyptus leaves. Two to six eggs ( $35 \times 26$  millimetres) are incubated by both sexes for about 23 days. Feeding of the young is also shared equally. Fledging occurs at around 50 days and the young remain partly dependent until 100 days. About 47% of eggs laid reach fledging, with about 19% of fledged young dying before independence. Adverse weather conditions, competition from other hole-nesting species and predation contribute to nesting failure.

# Damage

The main damage galahs cause is to germinating cereal crops because of their dependence on seeds. Although they collect grain from other sources, damage is still known to occur to commercial crops of wheat, sorghum, barley, oats, maize (Figure B.5), sunflower, canola and safflower. Although they frequently damage almonds and occasionally eat soft fruits, damage to orchards, vineyards and nut plantations is usually by pruning of leaves, buds and flowers, chewing of young canes, clipping and pulling out of young plants, stripping bark, and splitting of fruit for seeds. Citrus, apples, stone fruits, wine grapes, walnuts, chestnuts, hazelnuts, pistachios and almonds are susceptible to this type of damage. Young Eucalypt - particularly those in revegetation programmes — and other native plant species, including saltbush and bluebush, can suffer similar damage. Impacts in urban areas to structures such as timber trellising. communications aerials, rubber insulators and cables also occur and are typical of the damage caused by large parrot species with curious and intelligent natures. Temporary covers of grain stores and haystacks are often torn exposing the contents to weather and spoilage. Rhizomes. corms, bulbs and clover seed often attract galahs to sports ovals, bowling greens and golf courses where large foraging groups destroy the turf.

## Protection status

Protected, but locally unprotected in some States and regions (Section 6.1).



**Figure B.5:** Galah damage to maize where husks were pulled right back exposing the kernels, which were then completely removed. Photo: P. Fleming.

# Sources and further reading

Harman, I. (1981) *Australian parrots in bush and aviary*. Inkata press, Melbourne.

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. MSc Thesis, University of New England, Armidale.

Rowley, I. (1990) The Galah. Sydney: Surrey Beatty.

Temby, I. (1998) Reducing cockatoo damage in Victoria. *Eclectus* 5: 20–26.

# Little corella

# (Cacatua sanguinea)

#### Other names

Bare-eyed, blue-eyed, Dampier's, short-billed corella or cockatoo.



Photo: P. Bird. Inset photo: G. Dabb.



Birds Australia Atlas (1998-2002)

#### Field identification

Little corellas (36-39 centimetres, head to tail) are found only in Australia and New Guinea. They have bare, bluish skin around the eve, a small erectile crest and a small whitish bill. The underwing and undertail, seen during flight, are sulphur yellow. Cacatua sanguinea gymnopsis (A) and normatoni (B) subspecies have a pink patch between the eye and bill, which is unnoticeable in the nominate sanguinea (C) subspecies. The long-billed corella (C. tenuirostris) and western corella (C. pastinator) are similar species: distinguished by a longer bill. The long-billed corella has a prominent crimson or salmon throat bar. The western corella has small traces of colour on the throat and a deep patch between the eye and the bill. Wing beats are shallower than the galah's (Elophus [Cacatua] rosiecapilla) but deeper than that of the sulphurcrested cockatoo (C. galerita). Little corellas are usually seen in large, noisy flocks.

## Voice

Very raucous screeching calls during flight and while roosting. Calls are similar to, but distinguishable from, those of the sulphurcrested cockatoo. However, the calls are almost identical to (only slightly deeper than) the calls of the long-billed corella.

#### Habitat

Little corellas occupy a variety of timbered habitats including lightly wooded grassland, acacia shrubland, swamp sclerophyll forests, open sclerophyll, monsoon and riparian woodland and adjacent croplands, ploughed paddocks and grazing areas. Large flocks are also prominent in rural townships, around homesteads and grain silos. They have even moved into urban Adelaide and roost in gardens,

sporting fields and recreational areas. They are prevalent in the arid and semi-arid rangelands and considered a dryland species, but are uncommon in areas without permanent water. In drier parts of Australia they are replaced by Major Mitchell's cockatoos (C. leadbeateri). In South Australia they are distributed along the Murray River and tributaries in association with the river red gum (Eucalyptus camaldulensis). Eucalypt species associated with watercourses are also occupied by little corellas in other areas including southwest Victoria and the Pilbara region of Western Australia. They also occupy other woodland areas with tall grasses and in close proximity to water, including open mallee (e.g. E. diversifolia), coolibah (E. microtheca), and woodlands of Callitris - Casuarina spp., Eucalyptus — Allocasuarina spp. and Andansonia - Eucalyptus spp. During food shortages local populations will venture into more marginal habitats, such as Eucalyptus - Acacia spp. or saltbush (Atriplex spp., Rhagodia spp.) shrublands or dry mallee and arid Callitris spp. stands. On Australia's mainland the distribution and abundance of little corellas have increased since European settlement, particularly in South Australia and the wheat belt of Western Australia, because of increased access to water, clearing of native shrublands and pasture improvement.

#### Movements

This species is mainly sedentary but displays larger movements in response to extremes in climatic conditions. However, it is more nomadic than the sulphur-crested cockatoo and perhaps the galah. Typically, there are no large-scale seasonal movements, but some populations exhibit regular local movements with seasonal patterns. Pairs will separate from flocks and travel to riverine habitat during the breeding season (May-October). Immatures and non-breeding adults are more mobile and can disperse up to 250 kilometres, particularly after the breeding season. Erratic movements often occur when they follow available water and food. For example, during droughts large flocks depart from the arid regions of western Queensland and New South Wales and seek refuge around the billabongs, dams and waterholes of the semi-arid and tableland regions. Conversely, large influxes of little corellas have appeared in other areas during floods and prolific breeding can occur in these areas (for example, in Melbourne during the 1974 floods). Despite little evidence of movement across the Bass Strait, populations have become established in Tasmania where they are now widespread in central farmland areas. However, aviary escapees are a likely contributing factor, being implicated in the establishment of populations in Perth and Adelaide.

Little corellas form large communal roosts of thousands, but leave in small groups (1-20) during the dawn period to travel to feeding sites and return before sunset. During the middle of the day they normally loaf and shelter in tall trees often beside water or feeding sites.

Flocks of up to 70 000 birds have been reported in the Kimberley, Western Australia. They also regularly occur with other species such as long-billed and western corellas, galahs and sulphur-crested cockatoos. Single birds and small flocks, in particular, will join flocks of other species. In the breeding season (May-October) flocks tend to be smaller as pairs remain close to their nest hollows.

# Foods and feeding behaviour

Grass seed comprises the majority of the diet, with varying amounts of seed from other sources, as well as nuts, fruit, berries, buds, shoots, flowers, roots, bulbs, corms and occasionally insect larvae. Hence most foraging occurs on, or close to, the ground. Corellas become arboreal in some areas, particularly in urban and horticultural regions where open pasture is limited and exotic or cultivated fruit or nut trees are plentiful. In native and other agricultural environments they prefer to feed in woodlands with established perennial grasses over shrublands or shrubby woodlands with sparse grass cover. Preference for seeding grasses, herbs, shrubs and trees varies considerably with season and location. Oats, sorghum, wheat, Acacia spp., river red

gum, spinifex (Triodia spp.) and rice grass (Xerochloa spp.) are commonly consumed when available. Particular weed species are also targeted, especially doublegee (Emex australis) tick-weed (Cleome viscosa) and hogweed (Boerhavia spp.). Wood borers of Eucalyptus spp. are also sought after, and individual birds will split bark and crack limbs to retrieve the insects. Like other large parrots, little corellas have a habit of chewing various objects, ranging from fabricated structures and cables to heavy defoliation of roost trees. Although they will consume leaves, bark, buds and other vegetative matter, chewing behaviour is more likely a result of their innate curiosity; hence they often target novel items in their environment. They may also chew for beak maintenance, to fill in time with displacement behaviour due to an abundance of food, or foliage thinning to help avoid predator attack.

Little corellas regularly form large noisy flocks in the hundreds or thousands, especially while feeding, drinking and roosting. Peak feeding occurs in the early mornings and late afternoons, when they may spend a great deal of time digging for buried seeds and roots, including freshly sown seed. They usually drink twice a day.

# Breeding

Little corellas most commonly breed in hollows in riverine Eucalyptus spp., but hollows in bottletrees and mangroves, crevices in cliffs and termite mounds are used occasionally. They can usurp galahs from nests and have been known to raise galahs' young. They often nest in the same hollow in consecutive seasons, sometimes with several pairs breeding in the same tree. Breeding season (usually May-October) and clutch size vary with climatic conditions, with multiple broods possible in good seasons and little or no breeding during drought. Two or three, and occasionally four, eggs (35 × 26 millimetres) are laid in unlined hollows. Often only one young is raised per nest because the other eggs do not hatch. Both sexes incubate the eggs, males during the day and females at night.

# Damage

Little corellas can cause significant damage to fruit and nuts, particularly as their nomadic habits can result in large numbers arriving unexpectedly. Fruit damage typically occurs as a result of birds seeking seeds, rather than the fruits themselves. Citrus, apples and stone fruits are commonly damaged. However, young apples and pears and other pome fruits are also consumed directly. In some cases more fruit or nuts are knocked to the ground than are actually eaten. They seldom eat grapes but are known to prune vine foliage and actively growing canes, clip and pull out young vines and snip off entire bunches. Pruning and foliage destruction, including ringbarking. can also cause significant economic losses in nut orchards including chestnuts, hazelnuts, pistachios and almonds. Vegetable crops and peanuts are often dug up or pulled out of the ground. A variety of commercial cereal and oil seed crops suffer losses when little corellas dig up freshly sown seed, sever plants or attack seed heads. Crops targeted this way include oats, wheat, sorghum, rice, maize, canola, sunflower and safflower. When foraging in crops little corellas can hold seeds under their tongues for later de-husking and eating.

Their chewing habits can result in considerable damage to existing native vegetation and habitat restoration projects. For example, large roosting colonies (often exceeding 10 000 individuals) along watercourses of the Flinders Ranges are known to cause significant damage to many mature Eucalyptus spp., particularly river red gum (Eucalyptus camaldulensis), but also native pine (Callitris columellaris), peppermint box (E. odorata) and long-leaved box (E. goniocalyx). Rows of planted native plants in revegetation projects appear more susceptible than naturally occurring plantings of a similar age, possibly because they represent something novel.

Silos, grain bunkers and fodder storage areas, co-axial cables, communication aerials and household wiring are also at risk of damage from little corellas. They sometimes form large seasonal roosts in rural towns or suburban areas

(for example, in Adelaide) and cause considerable damage to infrastructure (particularly grassed areas such as ovals, golf courses, bowling greens and community swimming pools) and affect local amenity values through noise pollution and defoliation of, and damage to, local trees.

#### Protection status

Protected, but locally unprotected in some States and regions (Section 6.1).

# Sources and further reading

- Beardsell, C.M. and Emison, W.B. (1985) The little corella in the south-east of South Australia. *South Australian Ornithologist* 29: 206-207.
- Emison, W.B. and Beardsell, C.M. (1989) Long-billed corellas feeding in rice crops in the Riverina region of New South Wales. *Australian Birds* 22: 76-77.
- Harman, I. (1981) Australian parrots in bush and aviary.
  Inkata press, Melbourne.
- Jarman, H. (1979) The corellas in Victoria and the Riverina, N.S.W. *Australian Bird Watcher* 8: 103-117
- Kentish, B., Wallis, A., Brennan, D., Hartwell, D., Whiteford, C. and Temby, I. (2005) Corella problems in western Victoria: a chronology of the management of a native pest species. In 13th Australasian Vertebrate Pest Conference Proceedings. Landcare Research, Wellington, New Zealand: pp. 217-223.
- St John, B. (1991) Management of Little Corellas in the Flinders Ranges: Discussion Paper. South Australia: Wildlife Management Section, South Australian National Parks and Wildlife Service.
- Temby, I. (1998) Reducing cockatoo damage in Victoria. *Eclectus* 5: 20–26.

# Musk lorikeet

# (Glossopsitta concinna)

#### Other names

Red-eared lorikeet; red-crowned lorikeet; green keet; green leek.

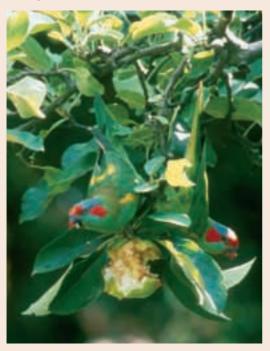


Photo: P. Charles.



Birds Australia Atlas (1998-2002)

#### Field identification

The musk lorikeet is a green lorikeet with bright red cheeks and forehead, blue to turquoise crown, olive-brown on the lower back of the neck and yellow patches on the side of the breast. The bill is black with a red-orange tip. Large flocks are often seen racing through the high canopy or among dense foliage in the tops of Eucalyptus trees. Hence they are often confused with purple-crowned lorikeets (Glossopsitta porphyrocephala) or little lorikeets (G. pusilla), especially as they frequently occur together. However, size can be used to distinguish the species, as musk lorikeets are noticeably larger (22 versus 16 centimetres head to tail) than the other two species. Females are similar to but usually duller and slightly smaller than males.

### Voice

A shrill metallic screech during flight; varied but continual noisy chattering while feeding.

#### Habitat

Musk lorikeets prefer sclerophyll woodlands, dry open forests, tall mallee (e.g. Eucalyptus diversifolia, E. rugosa) shrubland, and open parks and gardens with scattered Eucalyptus spp. They are also common in semi-cleared agricultural areas, including orchards, where remnant riparian or roadside woodland persists. They usually avoid wet sclerophyll woodlands and rainforest. Their preferences for particular vegetation types vary with flowering seasons, but some regional patterns have emerged. White box (Eucalyptus albens) and red ironbark (E. sideroxylon) communities are frequented to the north and west of the Great Dividing Range. Red bloodwood (E. gummifera) is favoured in East Gippsland, Victoria, and river red gum (E. camldulensis) near Melbourne. Musk lorikeets

avoid brown stringybark (*E. baxteri*) in the areas surrounding Adelaide. Other vegetation types, such as *Angophora* spp., coastal woodlands and open heathlands, are occasionally utilised in good flowering seasons.

Musk lorikeets avoid logged forest, and gradual declines in abundance have been attributed to the clearing of *Eucalyptus* spp. for agriculture. However, native tree planting in suburbia, or increases in *Eucalyptus* spp. plantations in rural areas have increased local populations in some areas.

#### Movements

This is a classic nomadic species, and its movements are closely associated with the flowering of Eucalyptus spp. Its erratic movements are likely to be a result of variable nectar availability, although its movements can be more predictable than those of many other lorikeets. Musk lorikeets are common in the sclerophyll forests of south-eastern Australia, particularly Victoria, but increasingly rare in Queensland. Tasmania has considerable populations that commonly move large distances but exhibit little movement to the mainland. A small feral population became established in Perth but has since been removed. Suburban populations are thought to have altered their movement behaviour because of a continuous supply of flowering plants and they have become more sedentary. Influxes to suburban areas have also been attributed to surrounding bushfires or adverse weather conditions, including drought.

# Foods and feeding behaviour

Unlike other parrots, lorikeets have no ventriculus to store grit to grind and digest food; instead they use a brush-tipped tongue for collecting nectar. Musk lorikeets are strongly arboreal and favour nectar from flowering plants, particularly *Eucalyptus* spp. Certain native plant species are preferred including river red gum (*E. camldulensis*), swamp mahogany (*E. robusta*), red ironbark (*E. sideroxylon*), *Angophora* spp., bottlebrush (*Callistemon* spp), *Banksia* spp.,

Grevillea spp. and paperbark (Melaleuca spp.). Plantations of sugar gum (E. cladocalyx) and South Australian blue gum (E. leucoxylon) are also regularly visited for nectar. Pollen, fruit, flower buds, seeds and insects are consumed as supplements in various quantities including the fruits of a variety of cultivated crops.

A very gregarious species, the musk lorikeet can form flocks of several hundred at feeding sites.

Feeding activity is often chaotic and noisy with birds excitedly flying backward and forwards among foliage. Peak feeding time occurs in the early mornings, but continuous feeding throughout the day is not uncommon. Musk lorikeets will also frequently feed in association with other lorikeets (rainbow, *Trichoglossus haematodus*; scaly breasted, *T. chlorolepidotus*; little and purple-crowned) and swift parrots (*Lathamus discolor*). Breeding pairs will often remain together within flocks during feeding and roosting. Roosting sites are in tall trees away from feeding areas.

# Breeding

Musk lorikeets build basic nests in *Eucalyptus* spp. cavities, often with very small entrances (four centimetres diameter) through which the parents push their way. Two white, rounded eggs  $(25 \times 20 \text{ millimetres})$  are laid on a small amount of chewed wood inside the cavity. The female incubates, but both sexes roost inside the hollow and then feed and raise the young. They have a 24-day incubation period, fledge at about 60 days and reach maturity at 13–14 months, but often they do not breed until they are two years old. Breeding usually occurs between September and November but is thought to depend on flowering in nectar-producing trees.

# Damage

Musk lorikeets will invade gardens, orchards and vineyards for ripening apples, pears, nashi fruit, cherries, loquats, apricots, plums, peaches, nectarines, vegetables and wine and table grapes. Damage is particularly prevalent in

South Australia and Victoria and is perhaps more severe in stone fruits than in other horticultural industries. Because of their preference for flowering eucalypts, damage is most serious during poor eucalypt flowering seasons when large incursions to horticultural areas can occur. Damage to nuts, such as almonds and hazelnuts, can occur during bud development. Partly ripe grain crops such as sorghum, corn and wheat are also consumed, although significant damage to these crops is rare. Large feeding flocks in orchards can cause significant damage within short periods, often in localised areas. Hence damage occurs to many fruits on a single tree, rather than evenly over the crop. Musk lorikeets are persistent feeders. For example, in the Mt Lofty Ranges large flocks were observed to visit a pear orchard every day for three weeks until the crop was eliminated. Lorikeet damage is distinguished from that of other species by the horseshoe-shaped marks made by the lower beak and triangular marks made by the upper beak. Fruit and skin fragments under trees bearing damaged crops are similar or smaller than those left by rosellas (less than one centimetre in diameter).

#### Protection status

Protected.

# Sources and further reading

- Ford, H.A. and Paton, D.C. (1986) *The Dynamic Partner-ship: Birds and Plants in Southern Australia*. D.J. Woolman Government Printer, Adelaide.
- Harman, I. (1981) *Australian parrots in bush and aviary*. Inkata press, Melbourne.
- Hutchins, B.R. and Lovell, R.H. (1985) *Australian Parrots:*A Field and Aviary Study. Avicultural Society of Australia, Melbourne.
- Neilsen, L. (1969) Psittacines of southern Queensland. South Australian Ornithologist 25: 89-93.
- North, A.J. (1912) Nests and Eggs of Birds found Breeding in Australia and Tasmania. Volume III. Special Catalogue No. 1. Australian Museum, Sydney.
- Paton, D.C. and Reid, N.C.H. (1983) Preliminary observations on damage to apricots by birds near Murray Bridge, South Australia. *Agricultural Record* 10: 8-11.
- Paton, D.C., Carpenter, G. and Sinclair, R.G. (1994) A second bird atlas of the Adelaide region. Part 1: Changes in the distribution of birds: 1974-75 versus 1984-85. *South Australian Ornithologist* 31: 151-193.
- Temby, I. (2002) Bird and Flying-fox Bat Damage to Orchard Fruit: an Identification Guide. Department of Natural Resources and Environment, Melbourne

# Noisy friarbird

# (Philemon corniculatus)

#### Other names

Leatherhead; knobbynose; four-o'clock; monk.



Photo: G. Dabb.



#### Field identification

This species is a large (30-35 centimetres head to tail) brown-grey honeyeater with an obvious bald black head. There is a distinctive knob on the bill which is smaller on immature birds and absent from juveniles. It has a silver-grey crown, nape and throat and a white underbelly and tail tip.

## Voice

Conspicuous raucous 'four o'clock'.

## Habitat

The noisy friarbird inhabits open dry sclerophyll forests and woodlands, swampy woodland and heath, including coastal heath, mallee (e.g. Eucalyptus diversifolia, E. rugosa), brigalow (Acacia harpophylla), gidgee (Acacia cambagei), parks and gardens. Riverine habitats with river red gum (E. camaldulensis) and black box (E. largiflorens) or coolibah (E. microtheca) associations are also commonly occupied, including those that extend into arid areas. This species avoids rainforest, dense wet sclerophyll, sedgeland, open savannah, and pure stands of Callitris spp. or introduced pine (Pinus spp.).

#### Movements

The noisy friarbird can be migratory. Most populations also display nomadic movements following good quality nectar flows of flowering trees and shrubs. Southern populations have more pronounced migratory habits and large numbers regularly move to lower altitudes and north during winter, returning for spring and summer. The longest recorded movement was that of a bird that moved from Mudgee south to Mitta Mitta in north-east Victoria, a distance of 510 kilometres. In comparison, fewer movements are apparent in the northern extremities of their range where many individuals are sedentary.

# Foods and feeding behaviour

Noisy friarbirds mainly feed on nectar but also fruits, flowers, pollen, seeds, insects, lerps, manna, honeydew and occasionally bird eggs and nestlings. Flowering trees and shrubs with abundant nectar are sought after and aggressively defended. Preferences for plant species fluctuate with flowering seasons. Favoured species include swamp mahogany (E. robusta). red ironbark (E. sideroxylon), yellow gum (E. leucoxylon), white box (E. albens), Blakely's red gum (E. blakelyi), red bloodwood (Corymbia gummifera), Angophora spp., paperbarks (Melaleuca or Callistemon spp.), Banksia spp. and Grevillea spp. They are mainly arboreal, foraging in the high canopy on flowers and foliage though they will also forage in the shrub layer and occasionally on the ground. They often hawk insects and during spring and summer can consume large quantities. Cicadas (Cicadidae and Tettigarctidae) are a preferred food source when available and are thought to influence breeding success in some areas. Noisy friarbirds feed in mixed flocks with lorikeets, red wattlebirds (Anthochaera carunculata) and other honeyeaters (Meliphagidae) until competition intensifies due to food shortages. Usually friarbirds feed in noisy small flocks of less than 20, but larger congregations can occur around food sources.

# Breeding

Noisy friarbirds build basket-shaped nests from strips of bark, dry grass and long thin twigs carefully interwoven and bound together by spider webs. The nest cup has softer material including soft bark fibres, leaves, hair and wool. Nests are suspended by the rim amongst leafy branches of *Eucalyptus* spp., kurrajongs (*Brachychiton populneus*) or other species and are usually well concealed but more conspicuous than red wattlebird nests. Breeding adults will often return to the same nesting sites in consecutive seasons despite migratory habits. However, young are eventually forced from their natal areas if they do not disperse and seldom return. Two to four blotched pale pink to pink-

brown eggs are laid up to four times a year, but more commonly three. Females incubate for around 16 days, but both sexes feed the young and defend the nest. Young continue to be fed until two or three weeks after fledging. Predation, abandonment during dry seasons, and parasitism by the common koel (*Eudynamys scolopacea*) and other cuckoos are the main causes of nesting failure. When successful, nests produce an average of about two fledglings. Adults are known to live for more than nine years.

# Damage

This species is often a pest of orchards and vineyards, especially during nectar shortages in autumn. Significant losses can occur to grapes, cherries, stone fruit, pears, tropical fruit, blueberries, mulberries, bilberries, blackberries and figs. In some situations overripe or damaged fruit is targeted in preference to viable fruit. For example, greater numbers of birds have been recorded in blocks of freshly machine-harvested wine grapes than in adjacent unharvested blocks. The damage is similar to that of red wattlebirds, with large pecks and hollowed-out flesh.

#### Protection status

Protected.

# Sources and further reading

- Ford, H.A. and Trémont, S. (2000) Life history characteristics of Australian honeyeaters.

  Australian Journal of Zoology 48: 21–32.
- Ford, H.A. (1998) Faithfulness to breeding site and birthplace in noisy friarbirds (*Philemon* corniculatus). Emu 98: 269–275.
- Ford, H.A. (1999) Nest site selection and breeding success in large Australian honeyeaters: are there benefits from being different? *Emu* 99: 91-99.
- Saunders, A.S.J. and Burgin, S. (2001) Selective foliage foraging by red wattlebirds, Anthochaera carunculata, and noisy friarbirds, Philemon corniculatus. Emu 101: 163-166.
- Saunders, A.S.J. (1993) Seasonal variation in the distribution of the noisy friarbird *Philemon corniculatus* and the red wattlebird *Anthochaera carunculata* in eastern New South Wales. *Australian Bird Watcher* 15: 49-59.

# Noisy miner

# (Manorina melanocephala)

#### Other names

Micky miner; southern black-backed miner; cherry eater; snakebird; squeaker; soldier bird.



Photo: B. Furby.



Birds Australia Atlas (1998-2002)

#### Field identification

The noisy miner is a pale grey, medium-sized (24-28 centimetres head to tail) honeyeater with a black crown, face and ear, a bare yellow patch behind the eye and a yellow bill. It has a darker grey wing, with an olive to yellow streak. The noisy miner is distinguishable from the yellow-throated miner (*Manorina flavigula*) and black-eared miner (*Manorina melanotis*) by the darker head plumage. This distinction is particularly important in the Murray mallee region of South Australia, Victoria and New South Wales. Work is under way to conserve the black-eared miner, now very rare in this region.

## Voice

Distinctive, high-pitched and noisy 'tiee, tiee, tiee, tiee, tiee' in alarm, with a variety of other calls.

## Habitat

Noisy miners prefer open woodlands and forests, particularly edges and isolated patches without a distinct shrub layer. For example, dry Eucalyptus woodlands, grassy forests, mixed dry sclerophyll with Callitris spp. and lightly timbered farmlands, parklands, gardens and pasture, orchards, vineyards and road reserves. Bird densities are known to increase with decreasing area of woodland; hence the birds are generally absent from large forest remnants (greater than 500 hectares) but are most abundant in small fragments (one to two hectares). Noisy miners are also occasionally found in remnant or planted fragments of wet sclerophyll, coastal heath, Melaleuca spp., Acacia spp., brigalow (Acacia harpophylla) and mulga (A. aneura). This species avoids dense forests and woodlands and has benefited from grazing, clearing and fragmentation of native vegetation.

#### Movements

Noisy miners are sedentary throughout their range. Most individuals remain within small, well defined territories with home ranges less than 200 metres in diameter. Female home ranges are even smaller, commonly less than 100 metres. Occasionally, larger movements of up to 18 kilometres have been recorded perhaps as a result of juvenile dispersals or the return of translocated birds to their previous territories. They are very sociable and are seldom observed singly or in pairs. Small groups of 6–30 birds aggressively defend core areas within a larger home range. Communal roosts are often at new sites each evening usually in the outer branches of feeding trees and shrubs.

# Foods and feeding behaviour

Omnivorous feeders, noisy miners consume a variety of insects, nectar, fruit, seeds, vegetables and occasionally frogs and reptiles. They commonly forage in and defend high nectar bearing trees and shrubs, including Eucalyptus spp., Banksia spp., Grevillea spp., and Camellia spp. Arthropods are regularly consumed, especially spiders, beetles (Coleoptera), weevils (Curculionidae), bugs (Hemiptera) and wasps (Apocrita). Psyllids, lerps (Sternorryncha) and manna (bark exudates) are also occasionally gleaned from leaves and bark. Noisy miners, however, exclude many other bird species that are thought to maintain insect populations at lower levels. Fruits from orchards and from trees and shrubs such as native tamarind (Diploglottis australis), Moreton Bay fig (Ficus macrophylla), saltbush (Rhagodia spp.) and seeds of Poaceae, goosefoot (Chenopodium spp.) and peppercorn (Schinus areira), are also eaten opportunistically.

Active, aggressive and gregarious, noisy miners forage within colonies in sub-flocks (or coteries) of 6-30 birds, but hundreds can congregate in clumps of flowering plants. Noisy miners feed mainly in foliage, but also in the tree canopy, along branches, trunks, and on the ground. Mixed feeding groups rarely occur because of the birds' defensive behaviour, but birds may feed alongside other species in more structured vegetation.

# Breeding

Two to six eggs (mean 2.9) are laid in a fragile bowl of sticks, bark and leaves lined with softer material such as hair or fur and held in a tree or shrub fork. Communal breeding takes place year round, but most commonly between June and September with up to 22 males and one female attending a single nest during a season. Twice as many nests have been observed during June and September as in the warmer months of October to January, despite the presence of fewer insects. This may be a strategy for limiting predation. Four broods can be raised in a year with the building of a new nest starting directly after the young are independent, at about 16 days after fledging. About 34% of eggs produce young that fledge, with an average of 0.89 fledged young per nest. Mortality is mainly due to starvation, abandonment, failure to hatch, predation and adverse weather conditions.

# Damage

Noisy miners are known to damage horticultural crops, particularly soft fruits such as grapes (Figure B.6), plums, apricots, cherries, peaches, nectarines, pears, apples and berries. Using their brush-tipped tongues, they collect flesh and juice from sharp angular punctures in the fruit. Smaller fruits such as berries and grapes are often swallowed whole. They are known to swallow the seeds of weed species such as peppertree (*S. areira*), and blackberry, but their potential to spread environmental weeds is probably limited by their sedentary habits.



**Figure B.6:** Distinctive noisy miner pecking damage to grapes. Photo: R. Sinclair.

Although noisy miners occasionally remove insect pests, they are also associated with increased *Eucalyptus* spp. dieback. This has been attributed to the miners' aggressive exclusion of insectivorous birds. Removal of noisy miners in one area causes a significant increase in the abundance and diversity of other insectivorous birds and potentially decreases the impacts of defoliating insects. Most bird species entering the territories of noisy miners are mobbed and chased and in some cases killed.

#### Protection status

Protected.

# Sources and further reading

- Arnold, K.E. (2000) Strategies of the cooperatively breeding noisy miner to reduce nest predation. *Emu* 100: 280-285.
- Barrett, G.W., Ford, H.A. and Recher, H.F. (1994) Conservation of woodland birds in a fragmented rural landscape. *Pacific Conservation Biology* 1: 245–256.
- Clarke, M.F. and Oldland, J.M. (2007) Penetration of remnant edges by noisy miners (*Manorina melanocephala*) and implications for habitat restoration. *Wildlife Research* 34: 253–261.
- Dow, D.D. (1977) Indiscriminate interspecific aggression leading to almost sole occupancy of space by a single species of bird. *Emu* 77: 115-121.
- Dow, D.D. (1979) Agonistic and spacing behaviour of the noisy miner *Manorina melanocephala*, a communally breeding honeyeater. *Ibis* 121: 423-436.
- Grey, M.J., Clarke, M.F. and Loyn, R.H. (1997) Initial changes in the avian communities of remnant eucalypt woodlands following a reduction in the abundance of noisy miners, *Manorina melanocephala*. *Wildlife Research* 24: 631-648.
- Grey, M.J., Clarke, M.F. and Loyn, R.H. (1998) Influence of the noisy miner (*Manorina melanocephala*) on avian diversity and abundance in remnant grey box woodland. *Pacific Conservation Biology* 4: 55–69.

# Pied currawong

# (Strepera graculina)

## Other names

Currawong; bell magpie; black magpie



Photo: H. Pollock.



Birds Australia Atlas (1998-2002)

## Field identification

The pied currawong is a large (41–51 centimetres head to tail), mainly black bird with white patches on the wing and the base and tip of the tail. The wing patch is crescent-shaped and prominent during flight but also visible while perching. The intense yellow eye is distinctive and can be used to distinguish it from other large black and white birds. Similar species of the same genus, the black currawong (Strepera fuliginosa) of Tasmania and the grey currawong (Strepera versicolor) (Figure B.7) of southern and western Australia, are also known to damage horticultural crops. They occupy similar habitats and have comparable movements and feeding and breeding behaviours, but several differences have been identified (see below).

## Voice

Distinctive ringing; deep guttural 'curra-wong'.



**Figure B.7:** The grey currawong (Strepera versicolor). Photo: B. Furby.

## Habitat

Currawongs occupy a wide range of habitats, including open *Eucalyptus* woodland and forest, wet sclerophyll, rainforest, shrubland, coastal woodland, parks and gardens, orchards, vineyards and agricultural areas with scattered *Eucalyptus* species. The pied currawong is rare or absent from open savannahs and arid and semi-arid regions. This species is most abundant along the coasts of New South Wales and Queensland.

## Movements

This is a nomadic species. No large-scale seasonal movements are evident, but many populations travel to lower altitudes during winter. These relatively short movements (less than 80 kilometres) are also associated with populations moving to urban areas, particularly in the south-east. Increases in abundance of pied currawongs in the Murray-Darling catchment indicate that many of them visit the region in winter. Altitudinal movement as well as a small northward shift is apparent in south-east Queensland, where there are large influxes of the birds to nearby low-lying areas during autumn and winter. Movements are confined during breeding (September-November) when pairs aggressively defend small territories. In Canberra and Sydney there are increasing numbers of pied currawongs that breed in urban areas and remain there throughout the year. Black and grey currawongs are more sedentary throughout their range.

# Foods and feeding behaviour

Pied currawongs are omnivores, consuming a variety of insects, small birds, eggs and reptiles, fruits and vegetable matter. Proportions vary with availability, habitat and season. Insects and small invertebrates are the major dietary component during breeding. In some cases swarms of insects, particularly stick insects (Phasmatodea), cause large influxes of currawongs. Fruit from orchards and vineyards are increasingly consumed in agricultural regions during summer and autumn.

Populations in urban areas during this period and also in winter often scavenge a variety of foods including vegetable scraps, pet food and garden fruit. Feeding flocks are conspicuous and range in size from solitary birds to large flocks. Large congregations are typical around food sources and during roosting. Up to 200 have been observed foraging on a single vineyard and in suburban gardens. Grey currawongs are more elusive and occur only in small flocks on the mainland; they are usually solitary or in pairs, and rarely in groups greater than five.

# Breeding

A large but often shallow bowl of sticks lined with grass, bark and rootlets is assembled in an upright fork of the uppermost canopy. The tallest trees, often Eucalyptus spp., are selected in preference if they occur within small clumps. Isolated trees are rarely used. Permanent pairs return to nests of the previous season, establish territories and start nest building usually in August. Populations in northern Queensland often breed earlier than southern populations, but most breeding occurs between September and November. Two to four light-brown eggs (41 × 30 millimetres) with darker spots are laid and incubated for 21 days. One brood is raised per year. Males help by feeding the females during nesting and both sexes feed the young for about nine weeks after fledging. Breeding usually occurs in forested habitats, but increasingly in urban areas (see Movements).

# Damage

Large flocks of pied currawongs frequently raid vineyards, orchards and market gardens for fruit, nuts and vegetables. Significant losses can occur to grapes, cherries, persimmons, olives, and nuts as well as other crops. Small plantations near favoured roosting habitat are particularly susceptible, in some cases sustaining 100% crop loss. Persistent and intelligent feeders, they have been observed consuming fruit through nets by landing and swinging on them (Figure B.8). The majority of smaller fruits are removed completely



**Figure B.8:** Currawongs have been observed landing on nets and feeding through them. Photo: J. Tracey.

and swallowed whole. They are also responsible for carrying the seeds of weed species such as camphor laurel (*Cinnamomum camphora*), *Cotoneaster* spp. and privet (*Ligustrum* spp.) and have a potential role in their dispersal. Pied currawongs are known to prey on large numbers of native birds including fairy-wrens, thornbills and honeyeaters (Meliphagidae). However, the decline of native birds is linked to many other factors. Introduced species such as starlings (*Sturnus vulgaris*) and sparrows (*Passer domesticus*) are also common prey.

## Protection status

Protected. The Lord Howe Island sub-species Strepera graculina crissalis is listed as vulnerable under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

# Sources and further reading

Bayly, K.L. and Blumstein, D.T. (2001) Pied currawongs and the decline of native birds. *Emu* 101: 199-204.

Bell, H.L. (1983) Forty years of change in the avifauna of a Sydney suburb. *Australian Birds* 18: 1-6.

Buchanan, R.A. (1989) Pied currawongs (*Strepera graculina*): their diet and role in weed dispersal in suburban Sydney, New South Wales. *Proceedings of the Linnean Society of New South Wales* 111: 241–255.

Major, R.E., Gowing, G. and Kendal, C.E. (1996) Nest predation in Australian urban environments and the role of the pied currawong, *Strepera graculina*.

Australian Journal of Ecology 21: 399–409.

# Rainbow Iorikeet

# (Trichoglossus haematodus)

## Other names

Bluey, rainbow or coconut lory; Swainson's, bluebellied or blue mountain lorikeet; blue mountain parrot.



Photo: N. Morenos, Fruit Tree Media.



Birds Australia Atlas (1998-2002)

## Field identification

Well known and brightly coloured, this is Australia's largest lorikeet (25–31 centimetres head to tail). Race 'haematodus' (A) has a green upper wing, back and tail; dark blue head and abdomen; bright red bill and eye; red and dark grey underwing; yellow collar and under-tail; and a bright yellow stripe through the primary and secondary feathers. In the 'red-collared' race (rubritorquis)(B), red replaces the yellow collar that extends down the chest, and the abdomen is a darker blue-black.

#### Voice

Musical screech in flight, feeding chatter softer than that of other lorikeets.

## Habitat

Rainbow lorikeets inhabit a diverse range of habitats, including tropical rainforest, wet and dry sclerophyll forest and woodlands, savannah woodlands, and farmlands. They commonly visit orchards and farmlands with remnant or replanted stands of *Eucalyptus* spp. They are abundant in suburban parks and gardens and widely dispersed through cities such as Adelaide, Brisbane and Sydney. Feral populations also occur in Western Australia. Rainbow lorikeets tend to prefer the riverine habitat of tall open Eucalvptus woodland at lower altitudes. following nectar flows into other habitats when suitable species are flowering. They venture into the fringes of rainforest and wet sclerophyll at higher altitudes for blossoms of suitable feed trees such as beach acronychia (Acronychia imperforata) and umbrella trees (Schefflera actinophylla) or where artificial food sources are present. Coastal plains and heath, mangroves and Melaleuca woodlands are also utilised for flowering species such as Banksia spp., Xanthorrhea spp., Grevillea spp. and Callistemon spp. However, the understorey structure appears relatively unimportant unless the plants are flowering. Populations reside in woodlands and forests with dense shrub layers or an exclusively grass and herb understorey.

#### Movements

The rainbow lorikeet is a nomadic species that often relocates to exploit nectar from a wide range of flowering plants. Abundance varies considerably between seasons. Mass departure takes place during some years and, conversely, peaks in abundance occur during ideal flowering conditions. As a result, no regular large-scale movements are apparent, although individuals and flocks are able to travel large distances. In areas with reliable food sources, particularly in suburbia, some individuals have become more sedentary. This is likely because of the availability of a diverse range of flowering plants and supply of artificial feeding stations. However, even in these areas large numbers of transient birds can arrive suddenly during peak flowering periods. Some local populations are suspected to have declined as a result of clearing for agriculture.

Daily movements usually involve travelling several kilometres from large communal roosts at dawn to feeding sites. Roosts can be comprised of several thousand birds. The birds feed throughout the day, often moving to other feeding sites; or they loaf in tall nearby *Eucalyptus* spp. Flocks are often seen darting among the canopy between feeding sites. They return to the roost before dusk where they remain in dense foliage or hollow branches.

# Foods and feeding behaviour

Like other lorikeets, rainbow lorikeets prefer nectar and pollen from flowers but will also consume native and orchard fruit, berries, seeds and insects. Flocks gather in various habitats, utilising nectar from a wide variety of species, including red-flowering gum (*Corymbia ficifolia*), blue gum (*E. globulus*), northern woollybutt (*E. miniata*), forest red gum (*E. tereticornis*), blackbutt (*E. pilularis*), bottlebrush, paperbark

(both Callistemon spp. and Melaleuca spp.), Banksia spp. and blackbean (Castanospermum australe). They also commonly feed on blossoms of introduced plants such as coral trees (Erythrina spp.), peppertree (Schinus areira) and palms (Phoenix canariensis and Washingtonia filifera); seeds from Casuarina spp., pine trees (Pinus spp.), lantana (Lantana camara) and Solanum spp., and fruit from orchards, figs, lilly pilly (Acmena smithii), camphor laurel (Cinnamomum camphora) and Calytrix spp.

Arboreal and agile foragers, rainbow lorikeets can hang upside down in the outer canopy to reach flowers or fruit with their brush-like tongues. High canopy branches are usually preferred. However, red-collared lorikeets will forage lower in the canopy during the dry season and many low shrubs are frequented. Feeding flocks range from solitary birds to thousands but they usually occur in groups of up to about 50. They will feed alongside scaly-breasted, musk and varied lorikeets but are usually partly segregated. Early morning and afternoon are favoured feeding times with brief forays during the middle of the day.

# Breeding

Rainbow lorikeets usually breed from September to November, but this can extend from July through to January during ideal conditions when they occasionally produce double broods. Pairs, which may bond for life, prepare cavities in hollow branches or knotholes at the tops (up to 25 metres high) of tall trees, often along watercourses. Open woodland dominated by Eucalyptus spp., Angophora spp. or Melaleuca spp. is preferred for breeding. Two white, oval eggs ( $27 \times 23$  millimetres) are laid in a small layer of wood shavings. Females incubate eggs for 10 days during which time the males regularly visit and roost inside the hollows. Both sexes feed the young until two or three weeks after fledging and the birds reach sexual maturity after two years. Nest success has not been studied away from captivity but is thought to be affected by the presence of other hole-nesting species such as mynas (Acridotheres tristis), starlings (Sturnus vulgaris) and ringnecks (Barnardius zonarius).

# Damage

When good quality nectar is unavailable, large flocks can cause significant damage to mango, custard apple, apple (Figure B.9), plum, cherry, peach, nectarine, apricot, pear, and citrus orchards. Wine and table grapes are also susceptible (Figure B.10). Fruit damage, as with other lorikeets, is characterised by horseshoe-shaped marks made by the lower beak and triangular marks made by the upper beak. Chunks (about one centimetre diameter) are taken from the fruit, squeezed for their juice, and the remaining pip and skin discarded directly from the tree. Rainbow lorikeets also occasionally damage ripening corn or sorghum crops in Queensland and Northern New South Wales, where flocks of thousands of rainbow and other lorikeets can feed opportunistically throughout the day. Nut crops are sometimes damaged, and growing shoots, buds and flowers can be clipped.





Figure B.9: Rainbow lorikeet feeding on an apple. Photo: N. Morenos, Fruit Tree Media. Figure B.10: Rainbow lorikeet damage to grapes. Photo: R. Sinclair.

## Protection status

Protected in all States and Territories except Western Australia. In Western Australia the rainbow lorikeet is listed as 'acclimatised fauna' under a Wildlife Conservation (Acclimatised Fauna) Notice, 15 September 1992 (Wildlife Conservation Act 1950). Rainbow lorikeets can be 'taken' (shot or livetrapped) on private property

in the South-West Land Division, without the need to obtain a licence from the Department of Environment and Conservation (DEC), in accordance with an Open Season Notice, 25 August 1989 (Wildlife Conservation Act 1950). The lorikeets must be taken in a manner that does not cause damage to trees, and people trapping or attempting to trap the lorikeets must be licensed under the Wildlife Conservation Regulations 1970. Rainbow lorikeets may be kept in captivity only by a person holding a Regulation 12 aviculture licence which costs \$10 per year (Wildlife Conservation Regulations 1970). The rainbow lorikeet is also a declared pest of agriculture in the South-West Land Division, excluding the Perth metropolitan area, under the Agriculture and Related Resources Protection Act 1976. To prevent the lorikeets from establishing new populations in the wild, any lorikeets that are seen outside the metropolitan area should be humanely destroyed or reported to DEC or the Department of Agriculture and Food Western Australia (Lamont and Massam 2002).

# Sources and further reading

Chapman, T. (2005) The Status and Impact of the Rainbow Lorikeet (Trichoglossus haematodus moluccanus) in south-west Western Australia.

Miscellaneous Publication 04/2005. Department of Agriculture, Western Australia.

Harman, I. (1981) *Australian parrots in bush and aviary.*Inkata press, Melbourne.

Lamont, D.A. and Massam, M. (2002) Rainbow Lorikeet:
Farmnote No. 8/2002. Department of Agriculture
and Department of Conservation and Land
Management, Government of Western Australia.

Neilsen, L. (1969) Psittacines of southern Queensland. South Australian Ornithologist 25: 89–93.

Temby, I. (2002) Bird and Flying-fox Bat Damage to Orchard Fruit: an Identification Guide. Department of Natural Resources and Environment, Melbourne.

Wyndham, E. and Cannon, C. (1985) Parrots of eastern Australian forests and woodlands: the genera *Platycercus* and *Trichoglossus*. In *Birds of Eucalypt Forests and Woodlands: Ecology, Conservation, Management*. Keast, A., Recher, H.F., Ford, H. and Saunders, D. (eds). Surrey Beatty and Sons, Chipping Norton NSW: pp. 141-150.

# Red wattlebird

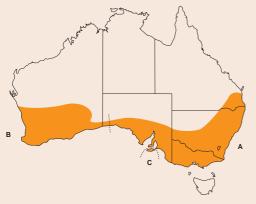
# (Anthochaera carunculata)

#### Other names

Wattled honeyeater; barkingbird; gillbird; what's o'clock; chock.



Photo: L. Pedler.



Birds Australia Atlas (1998-2002)

#### Field identification

The red wattlebird is a large (32–36 centimetres head to tail) honeyeater with grey-brown plumage that is streaked white. Primary wing feathers and tail feathers have white edges that are obvious in flight. It has a silver-white cheek patch, red wattle and eye, and yellow underbelly. Juveniles are similar (but without the wattle or yellow belly) and have a red-brown iris. There are separate races in south-east (carunculata)(A) and western (woodwardi)(B) Australia, and an isolated population on Kangaroo Island (clelandi)(C).

#### Voice

Noisy harsh calls, 'tobacco box' or 'what's o'clock', grating 'chock'.

## Habitat

Red wattlebirds occupy a range of habitats, including open sclerophyll woodlands, mallee (Eucalyptus diversifolia, E. rugosa), coastal heath and shrublands. They are common also in farmlands, parks, gardens, vineyards and orchards, particularly those with stands of remnant woodland or native regrowth. Occasionally they inhabit the edges of denser forests, including rainforest. This species is widespread and prominent in lowland open Eucalyptus woodland in the temperate zone. In particular, habitats with diverse shrubby understorey consisting of Banksia spp., Callistemon spp. and Acacia spp. are preferred.

#### Movements

Movements have not been well studied, but most populations are probably sedentary. Nomadic movements also occur often as a result of prolific flowering of shrubs and trees. Visiting

migrants can also increase resident populations in various seasons. Regular altitudinal and latitudinal movements have been recorded in some areas, particularly in southern New South Wales and the Australian Capital Territory where some flocks are believed to migrate up the coast for winter with large numbers of yellow-faced (*Lichenostomus chrysops*) and white-naped honeyeaters (*Melithreptus lunatus*). Small eastwest migrations also occur in Western Australia during some seasons.

# Foods and feeding behaviour

Red wattlebirds are mainly nectivorous, preferring Eucalyptus spp., Banksia spp., Angophora spp., Eremophila spp., Xanthorrhoea spp., mistletoe, Grevillea spp., Hakea spp. and other native flowering plants with high nectar loads. Exotic trees and shrubs are also common sources of nectar, particularly in urban areas. A variety of insects are consumed regularly, with quantities varying according to the availability of nectar and other food sources. In some cases insects comprise the majority of their diet. The sugary outer coating and excretions of psyllids, scale, and coccids (Sternorryncha) such as lerps (Psylloidea) or honeydew, or tree exudates such as manna, are also frequently gleaned from plants, particularly Eucalyptus. Fruit comprises a small proportion of their diet but increases in importance during shortages of other food types.

Sometimes large flocks of more than 100 birds will congregate around favoured food sources. However, this species is usually solitary or in small groups when feeding. Their long bills and brush-tipped tongues are well suited for probing tubular flowers. However, inflorescences from species with shallow flowers are often selected in preference. Arboreal and active feeders, they are most commonly observed accessing blossoms in the outer canopy but also forage among foliage and bark and occasionally on the ground. They habitually establish feeding territories of up to 100 metres in diameter. Red wattlebirds aggressively defend their territories

from many insectivorous and nectar-feeding species, including other wattlebirds. Peak feeding occurs in the early mornings and late afternoons, with less time spent foraging during periods of abundant nectar.

# Breeding

Considerable effort is given to nest building, which can take several weeks. A small cup of fine grass, bark and twigs, lined with fur, hair or wool, is shaped within a larger nest of carefully intertwined long thin sticks and grass. Nests are usually well concealed within foliage of a tall shrub or tree, often Eucalyptus spp., mistletoe or Acacia spp. Two or three oval, speckled, pink eggs (33 × 22 millimetres) are laid two to five days after the nest has been completed. Two, or occasionally, three broods are raised in a season (July-February). Females, with occasional help from the males, incubate the eggs for 17 days until hatching after which both sexes feed the young until two or three weeks after fledging. In recorded studies, as few as 26% of young reach fledging, resulting in an average of 0.51 young per nest. Mortality is mainly due to adverse weather conditions and predation by goshawks (Accipiter spp.), currawongs (Strepera spp.), butcherbirds (Cracticus spp.), ravens (Corvus spp.), possums, cats and snakes. The age of the oldest recorded red wattlebird from banding records is 12 years, 11 months.

# Damage

This species is often observed in vineyards and orchards and is known to cause damage to grapes (Figure B.11), peaches, plums, figs, cherries, olives, loquat, apples, apricots, pears and berries. The birds' sharp bills cause large angular punctures from which juice and flesh are extracted. Occasionally smaller fruits (less than  $10 \times 10$  millimetres) are swallowed whole. Damage is more significant during shortages of nectar or insects. In some cases fruit consumption is evident only on overripe fruit left on trees.



**Figure B.11:** Red wattlebird damage to Shiraz grapes. Photo: R. Sinclair.

## Protection status

Protected, but locally unprotected in some States and regions (Section 6.1).

- Ford, H.A. and Paton, D.C. (1977) The comparative ecology of ten species of honeyeaters in South Australia. Australian Journal of Ecology 2: 399-407.
- Ford, H.A. and Trémont, S. (2000) Life history characteristics of Australian honeyeaters.

  Australian Journal of Zoology 48: 21–32.
- Ford, H.A. (1999) Nest site selection and breeding success in large Australian honeyeaters: are there benefits from being different? *Emu* 99: 91-99.
- Saunders, A.S.J. and Burgin, S. (2001) Selective foliage foraging by red wattlebirds, *Anthochaera* carunculata, and noisy friarbirds, *Philemon* corniculatus. Emu 101, 163–166.
- Saunders, A.S.J. (1993) Seasonal variation in the distribution of the noisy friarbird *Philemon corniculatus* and the red wattlebird *Anthochaera carunculata* in eastern New South Wales. *Australian Bird Watcher* 15: 49-59.

# Ringneck

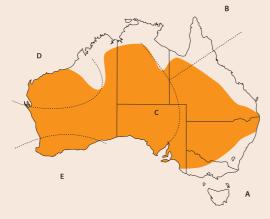
# (Barnardius zonarius)

#### Other names

Port Lincoln ringneck; twenty-eight parrot; mallee ringneck.



Photo: G. Dabb.



Birds Australia Atlas (1998-2002)

#### Field identification

The ringneck is a small to medium-sized (28-44 centimetres head to tail) parrot with mostly green plumage and a prominent yellow 'ringneck' half-collar. Hence the specific name is derived from the Latin 'zona' (girdle or belt). The five distinguished races,' mallee ringneck' (barnardi) (A), 'Cloncurry ringneck' (macgillivrayi) (B), 'Port Lincoln' (zonarius) (C), occidentalis (D), 'twentyeight' (semitorquatus) (E), differ in appearance, vocalisations and distribution. The green-headed races (mallee and Cloncurry ringnecks) are rarely implicated in damage to agriculture except in the Riverland of South Australia; hence this section focuses on the dark-hooded races. The 'Port Lincoln' and 'twenty-eight' parrots both have black heads, dark blue cheeks, and blue leading edges to otherwise green wings. The 'twentyeight' race has a unique red frontal band above the beak and the 'Port Lincoln' has a yellow belly and flank.

## Voice

Repeated melodious whistling as a contact call (or a trisyllable 'twent-ti-eight' for the 'twenty-eight' race), and a series of clamorous calls when alarmed, usually in flight. The species was first described in Western Australia by the French, and an alternative interpretation of their call is that it is a two-syllable 'vingt-huit' rather than 'twent-ti-eight'.

# Habitat

Although races of ringnecks occur in a diverse array of vegetation communities, these birds' habitat requirements are generally similar. They prefer open woodlands, shrublands and grasslands and often reside in remnant vegetation along watercourses, particularly in arid areas. The 'Port Lincoln' is a very successful

race. It is the most common parrot in Western Australia's wheat belt and utilises all types of timbered habitats. It occurs in abundance in any arid areas that have river red gums (Eucalyptus camaldulensis). There are few stands of mallee in eastern Australia without populations of 'mallee ringneck' although some populations are thought to have contracted as a result of clearing and settlement. Similarly, populations of 'Cloncurry ringnecks' appear to have retreated to remnants following the expansion of farmlands. In contrast, the dark-hooded races are increasingly observed in orchards and croplands and in gardens in towns and cities, including Perth. The 'twenty-eight' occurs in denser vegetation of the southwest including tall stands of jarrah (E. marginata), karri (E. diversicolor), marri (Corymbia calophylla), and wandoo (E. wandoo), and is displaced by the 'Port Lincoln' race where this vegetation has been cleared. Habitat clearing is a major factor in the increasing range and abundance of the 'Port Lincoln' race.

# Movements

A mainly sedentary species, but population influxes are known to take place in wetter areas during drought. Regular movements occur in arid areas in response to rainfall. Hence ringnecks are often more nomadic in drier areas, irregularly visiting desert regions. They frequently occur in mixed flocks with other species such as rosellas (Platycercus spp.), red-capped parrots (Purpureicaphalus spurius), red-rumped parrots (Psephotus haematonotus) and blue bonnets (Northiella haematogaster), particularly at water or feeding sites. They leave the roost at sunrise, perch in trees during the heat of the day and return to roost before sunset. In drier areas they are observed at watering points before feeding and roosting, although this is uncommon in the wetter areas of the southwest of western Australia.

# Foods and feeding behaviour

Ringnecks prefer feeding on seeds of grasses, herbs and low shrubs, but they often consume bulbs, corms of onion grass (Romulea rosea), berries, flowers, beetles, lerp, insect galls and larvae and grain from crops, spills or storage areas. Some populations are more arboreal, regularly feeding in the outer branches of orchard trees and Eucalyptus spp. during flowering and fruiting seasons. The fruits of Eucalyptus spp., Angophora spp., mistletoe and cultivated crops are often consumed when available. These birds will also chew tree and shrub foliage for food and beak maintenance including Xanthorrhea spp. and a range of Eucalyptus species. In suitable trees they will consume sap which often has a similar sugar content to nectar. They gain access to the sap by stripping the bark and scraping the exposed cambium and phloem with their beaks.

Unlike red-capped parrots and other species that split fruit for their seeds, ringnecks usually avoid unripe fruits. Hence this species tends to cause greater damage to orchards closer to harvest. When feeding in orchards, birds enter soon after first light, reaching peak numbers after an hour and then dispersing within three hours after sunrise. Undisturbed birds will often remain in orchards or nearby roosting habitat throughout the day, feeding occasionally. Feeding frequency is higher again before sunset. Certain populations, predominantly of the greenheaded races, are quite timid when appropriate refuge habitat is absent. Pairs or small groups of up to 12 are usually observed feeding, but much larger groups occur at water sources and favoured feeding sites. They often feed in association with other parrot species.

# Breeding

Females prepare hollows in tree branches, trunks or logs, often showing preference for Eucalyptus spp. within dense copses. In the drier parts of their range they retreat to remnant Eucalyptus spp. along watercourses to breed, particularly in river red gums. The breeding season varies noticeably among races and distributions and with rainfall in the more arid regions, but it generally occurs between September and December or March and May. The same hollows are often occupied in consecutive years. Ringnecks reach sexual maturity at two years and lay four to six (average 4.6) white eggs directly on the wood inside hollows or in a small bed of bark shavings. grass or leaves. Incubating females are fed by the male, who remains close to the nest. Eggs hatch after about 20 days, and hatchlings are fed by both parents. During suitable conditions broods have high fledging success (more than 65%), but the number of nests and brood size declines dramatically during drought. Nesting success is also influenced by starlings (Sturnus vulgaris), goannas, honeybees and occasionally galahs (Elophus [Cacatua] roseicapilla).

# Damage

The majority of damage by ringnecks in horticulture is attributed to the 'Port Lincoln' and. to a lesser extent, the 'twenty-eight' parrots. The other races are generally declining in range and abundance and rarely occur in populations large enough to cause economic impact. The darkheaded races, however, can cause significant damage to apples, pears, plums, peach, nectarines, cherries, grapes, blueberries, blackberries, Citrus spp., olives, almonds, vegetables and cultivated flowers. A preference for red-skinned apple varieties and pears, plums and nectarines is evident in some regions. Fruit damage occurs when ringnecks tear chunks of fruit and remove and discard the skin, but they will also consume fallen fruit. Secondary losses also occur with fungal and other infections. Ensuing damage is also done by western rosellas which more often consume fruit already attacked by ringnecks or red-capped parrots. Ringnecks are also known to damage cereal crops, garden plants and forestry plantations. Damage to plantations of York gum (*E. loxophleba*), Tasmanian blue gum (*E. globulus*) and wandoo (*E. wandoo*) is common; damage to the trunks, foliage and young shoots can cause deformities. The greatest economic damage occurs when trees are young and the base sawlog is vulnerable. Young plants in revegetation programmes and native plants and shrubs such as *Xanthorrhea* spp. or farm trees are also at risk. Damage is particularly severe during seasons of poor *Eucalyptus* spp. flowering.

## Protection status

Protected.

- Harman, I. (1981) *Australian parrots in bush and aviary.*Inkata press, Melbourne.
- Long, J.L. (1984) The diets of three species of parrots in the south of Western Australia. *Australian Wildlife Research* 11: 357-371.
- Long, J.L. (1985) Damage to cultivated fruit by parrots in the south of Western Australia. *Australian Wildlife Research* 12: 75–80.
- Long, J.L. (1989) Breeding Biology of Four Species of Parrots in the South of Western Australia. Technical Series No. 6. Agriculture Protection Board, South Perth.
- Ritson, P. (1995) Parrot Damage to Bluegum Tree Crops: a Review of the Problem and Possible Solutions. Resource Management Technical Report 50. Agricultural Protection Board of Western Australia, Perth.
- Ritson, P., Wyre, G., Shedley, E., Coffey, P. and Morgan, B. (2001) Parrot Damage in Agroforestry in the Greater than 450 mm Rainfall Zone of Western Australia. Department of Agriculture Western Australia TreeNote No. 26.
- Sindel, S. and Gill, J. (1999) Australian Broad-Tailed Parrots: The Platycercus and Barnardius Genera. Chipping Norton New South Wales: Surrey Beatty and Sons Pty Ltd.

# Scaly-breasted lorikeet

# (Trichoglossus chlorolepidotus)

#### Other names

Green, green and gold, or green and yellow lorikeet; greenie; lory; green keet.



Photo: G. Chapman.



Birds Australia Atlas (1998-2002)

#### Field identification

This is the only lorikeet with a completely green head. The scaly-breasted lorikeet has a bright red bill. There are yellow borders to the neck and breast feathers, giving a scaly appearance, but otherwise it is a uniformly leaf-green lorikeet, with an orange-red underwing. The spectacular underwing colour is often used to distinguish species during flight. Scaly-breasted lorikeets exhibit similar habitat use, movement, feeding and breeding patterns to rainbow lorikeets (*Trichoglossus haematodus*). They often co-occur in mixed flocks and also occasionally interbreed.

#### Voice

Resembles the call of the rainbow lorikeet but is often sharper and louder.

## Habitat

Scaly-breasted lorikeets occupy a similar distribution and habitats to rainbow lorikeets in eastern Australia, but are more prevalent in open agricultural and coastal lowland areas. They avoid rainforest. Scaly-breasted lorikeets are common in woodlands and heaths dominated by *Eucalyptus* spp., *Melaleuca* spp., dry *Casuarina* spp., *Xanthorrhea* spp., *Banksia* spp. and *Callistemon* spp. They are widespread in suburban parks and gardens and horticultural areas.

## Movements

Like other lorikeets, scaly-breasted lorikeets are nomadic and their population densities fluctuate in accordance with the flowering patterns of plants and shrubs. They utilise mainly coastal habitats, occasionally travelling inland along river systems. No substantial north-south movement is evident with the seasons, but flocks can traverse large distances in short periods. The scalvbreasted lorikeet is predominantly a lowland species, more so than the rainbow lorikeet, although northern populations will venture to higher altitudes. Some individuals display more sedentary traits, especially in urban areas. An isolated breeding population has become established around Melbourne from aviary escapees and these are also largely resident birds. The species is gregarious, particularly when feeding and roosting. They travel from roosting sites at dawn and congregate in feeding trees, usually high in the canopy. Typically, the scalybreasted lorikeet loafs in nearby trees during the middle of the day, before it begins its pre-roost feeding activities.

# Foods and feeding behaviour

Primarily nectivorous, scaly-breasted lorikeets feed from a range of native plants, particularly Eucalyptus spp., Melaleuca spp., Tristania spp., Banksia spp., Callistemon spp. and Xanthorrhea spp. Trees and shrubs planted in urban areas are also commonly visited for their blossoms and include coral trees (Erythrina indica), flowering rain trees (Pithecolobium saman) and umbrella trees (Schefflera actinophylla). Fruit, flowers, pollen, seeds and insects also comprise various proportions of their diet. Fruits of figs, mistletoes (for example, Notothixos cornifolius), native elms (Celtis paniculata) and horticultural cultivars are commonly consumed when available.

Mixed flocks with rainbow, musk and little lorikeets often form at feeding sites where large groups (more than 500) can congregate. Typically, feeding groups are smaller, averaging about five. Scaly-breasted lorikeets are acrobatic feeders, but because of their leaf-green plumage

they are usually first acknowledged by their noisy chattering, rather than by sight. They habitually forage in the outer canopy branches where blossoms are often more abundant. Occasionally pairs or individuals may defend food trees, driving away other species such as other lorikeets and noisy miners, although this is uncommon, particularly in areas of abundant fruit or nectar. Groups will feed throughout the day, but peak feeding usually occurs in early mornings and late afternoons.

# Breeding

Breeding can occur at any time during the year, possibly in response to abundant flowering, but it usually takes place between July and November. Tree hollows with small entrances, high in Eucalyptus spp. trees, are prepared by both sexes by chewing entrances and lining nests with a fine layer of wood dust. Considerable effort is given to removing decaying wood and any nesting material of other species. Two, or rarely three, eggs (25  $\times$  20 millimetres) are laid and then incubated by the female for about 25 days. Both sexes feed the young and may roost inside the hollow for the eight weeks until the young leave the nest.

# Damage

Scaly-breasted lorikeets, often in association with other lorikeets, can cause damage in vineyards and peach, nectarine, orange, mandarin and custard apple orchards. Damage can be severe, particularly in localised areas of Queensland, where large flocks cause considerable damage in short periods. They are likely also to damage a variety of other stone and pome fruits, including plums, cherries, apricots, apples and pears. Large flocks also invade grain crops, causing damage to *Sorghum* spp. and maize fields in Queensland and northern New South Wales. Chewing and consumption of buds, flowers and leaves of horticultural crops is common; hence cultivated flowers are also susceptible.

## Protection status

Protected.

- Ford, H.A. and Paton, D.C. (1986) *The Dynamic Partner-ship: Birds and Plants in Southern Australia*.

  Government Printer, Adelaide.
- Harman, I. (1981) *Australian parrots in bush and aviary.*Inkata press, Melbourne.
- Neilsen, L. (1969) Psittacines of southern Queensland. South Australian Ornithologist 25: 89–93.
- Paton, D.C. and Reid, N.C.H. (1983) Preliminary observations on damage to apricots by birds near Murray Bridge, South Australia. *Agricultural Record* 10: 8-11
- Temby, I. (2002) Bird and Flying-fox Bat Damage to Orchard Fruit: an Identification Guide. Department of Natural Resources and Environment, Melbourne.
- Wyndham, E. and Cannon, C. (1985) Parrots of eastern
  Australian forests and woodlands: the genera
  Platycercus and Trichoglossus. In Birds of Eucalypt
  Forests and Woodlands: Ecology, Conservation,
  Management. A. Keast, H.F. Recher, H. Ford, and
  D. Saunders (eds): pp 141-150.

# Silvereye (Zosterops lateralis)

#### Other names

Wax-eye; white-eye; grey-breasted white-eye; ring-eye.



Photo: L. Pedler.



Birds Australia Atlas (1998-2002)

## Field identification

Small, evasive and fast moving, silvereyes are the smallest (10–13 centimetres head to tail) pest birds of horticulture. They have olive yellow to olive green on the head, upper surface of the wings, rump and tail with the abdomen varying from dull cinnamon through grey-brown to grey or white with the under tail being white or light yellow. Their name comes from their characteristic white eye-ring and they have a short, sharp-pointed bill. They are often seen in large flocks flying at height or darting between foliage of shrubs and trees. Eight races are now recognised in Australia and are distribution.

All races are grey-backed, except the Western Australian race 'chloronotus'(A), which has an olive-green back, green-yellow throat, and pale buff flanks. Grey-backed races include 'lateralis'(B), which has deep rufous flanks and breeds in Tasmania and migrates, overlapping the mainland races and extending as far north as Rockhampton (shown by arrow); 'cornwalli'(C), which has pale rufous flanks and occurs from south-east Queensland to Victoria; 'pinarochrous'(D), which is the same as 'lateralis' but duller and resides in south-east South Australia; and 'vegetus' (E), the same as 'cornwalli' but smaller and lives in coastal northeast Queensland. Isolated island populations are those of 'chlorocephala'(F), the largest of the races, which has a heavier bill and is restricted to the Bunker and Capricorn islands off Gladstone, Queensland: 'tephropleurus' of Lord Howe Island: and 'ochrochorus' of King Island in Bass Strait. Another possible race, 'westernensis', replaces 'cornwalli' in south and south-east Victoria. The following sections focus on the mainland races and 'lateralis', as they are the ones that cause damage to horticulture.

#### Voice

A characteristic high, sharp 'tseep' as a contact call; other calls vary from a series of shrill short notes to softer drawn-out mimicry.

#### Habitat

Silvereyes frequent a diverse range of habitat types, including wet and dry sclerophyll forest and woodland, rainforest, mallee (e.g. Eucalyptus diversifolia, E. rugosa) shrubland, coastal heath, mangroves, farmlands, parks, gardens, orchards and vineyards. Some regional preferences are evident, with favoured habitats including marri (Corymbia calophylla) and coastal heath in Western Australia; manna gum (Eucalyptus viminalis)/peppermint (E. radiata) associations and red ironbark (E. sideroxylon) in the eastern States; Banksia spp. and Grevillea spp. shrublands; and fruiting trees and shrubs from suburbia and horticultural areas. Open savannah and arid areas are avoided.

#### Movements

This species is mainly migratory, travelling large distances, particularly along Australia's east coast, where movements of up to 1600 kilometres have been recorded. Southern populations, especially 'lateralis', exhibit clear migratory patterns, regularly traversing Bass Strait in early autumn and extending as far as Rockhampton, Queensland, by May. In eastern Australia, seasonal movements increase with latitude; hence northern races such as 'vegetus' rarely migrate large distances. Instead, they are mainly sedentary or display regional nomadic movements in response to fluctuating food supplies. In Western Australia, silvereyes ('chloronotus') are also primarily nomadic. This race travels inland when coastal food sources diminish and return to utilise spring flowering species, rather than displaying innate migratory movements. In comparison, numerous individuals of the south-eastern mainland races regularly move north during winter and are replaced by the Tasmanian race as they advance north. Most migrate at night following established routes and visit particular sites in consecutive seasons. Some pairs and individuals will not migrate and certain silvereyes migrate in some years but not others.

Daily movements vary highly with food availability. During the breeding season (August to February) males and females establish small territories which they defend, but they often traverse a larger home range and occasionally congregate around important food sources. They will also travel to distant food sources despite the presence of equivalent locally available food. Perhaps this is for the benefits of communal feeding or to detract predators and other silvereyes from their nesting sites. Despite occasional forays for food, home range size during breeding is often confined to less than one hectare. After January large flocks congregate including many juveniles that disperse natal areas or begin annual migration.

# Foods and feeding behaviour

Silvereyes are generalist feeders, favouring insects, nectar and fruit. They prey upon a variety of insects and consume nectar, fruit and seeds from a range of native and introduced plants. High volumes of invertebrates are regularly consumed in larvae and adult form, particularly moths (Noctuidae), bugs (Hemiptera), scale insects (Sternorryncha), spiders, beetles (Coleoptera), wasps (Hymenoptera) and flies (Diptera). They also often exploit nectar and fruit, preferring native trees and shrubs such as marri (Corymbia calophylla), karri (Eucalyptus diversicolor), red ironbark (E. sideroxyloni), Leptospermum spp., Callistemon spp., seaberry saltbush (Rhagodia candolleana) and native rose (Boronia serrulata). Introduced species, including coral trees (Erythrina spp.), lantana (Lantana camara), holly (Ilex europaeus), wild tobacco (Nicotiana spp.), cape gooseberries (Physalis peruviana) and many cultivated fruits, are utilised especially when nectar from native species is scarce. Food scraps in suburban areas are also consumed on occasion.

Frequently arboreal, they access lower branches of trees and shrubs, hawking insects and gleaning psyllids (Sternorryncha) and other insects from leaves and twigs. Ground and high canopy feeding is also common. During migration, silvereyes travel large distances daily to visit feeding sites. Sedentary sub-populations often move short distances but vary their daily travel according to food accessibility. Extremely large flocks can arrive at feeding sites. Although flock size varies with latitude, the largest flocks usually occur following the influx of juvenile birds after January.

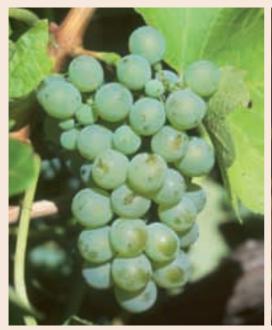
# Breeding

Both sexes build a small nest cup from hair, fine grass and spider-web, which is well concealed in the outer foliage of shrubs, low tree canopy or grape vines. Two to four pale blue eggs (17 × 13 millimetres) are laid, usually twice, but up to four times, in a season (August-February). Hence, populations can increase rapidly in ideal conditions with maximum numbers of juveniles during January. The ten-day incubation period and the feeding of young are shared between sexes. High mortality rates following breeding

are likely but difficult to measure in migratory populations. The main causes are probably vulnerability to exposure and fatigue during migration and predators such as birds of prey, goannas, mice, rats and cats. Silvereyes are known from banding records to live up to 11 years in the wild, but the average age is two.

# Damage

Silvereyes probably cause the greatest damage to Australian horticulture of any native bird. They frequently damage wine and table grapes (Figure B.12), cherries, peaches, nectarines, plums, blueberries, apricots, apples, pears, tropical fruit, olives, tomatoes and capsicum, Losses are particularly severe when native nectar sources are unavailable and during migration when highenergy food sources are sought. Nectar and native fruit are preferred over horticultural crops but are often in short supply due to clearing of native vegetation, during dry seasons through lack of flowers, or in excessive wet periods when nectar may become diluted. Although variable, higher nectar yields often occur following warm autumns and springs. Cooler temperatures during nectar production also increase nectar yields.





**Figure B.12:** Silvereye pecking damage to grapes (left). Photo: R. Sinclair; and silvereyes feeding on persimmon (right). Photo: W. Taylor.

Silvereyes puncture fruit with their sharp bills, creating small diamond-shaped holes and they lap at the flesh with their brush-tipped tongues. This often causes secondary losses by attracting insects such as wasps (Hymenoptera), bees, and ants and promotes the growth of fungi including Botrytis cinerea, yeast and other infections. They will also feed on fallen and previously damaged fruit, in some cases targeting these in preference to unspoiled portions. They also potentially contribute to the dispersal of weeds such as bridal creeper (Asparagus asparagoides), lantana (Lantana camara), bitou bush (Chrysanthemopides monilifera) and privet (Ligustrum spp.). However, they often avoid swallowing large fruit, so they may be inefficient at dispersing seeds of large-fruited weed species.

Outside or during the early stages of the ripening period, silvereyes can be important predators of insects. For example, they are known to consume large volumes of codling moth (*Cydia pomonella*) larvae, a serious pest in apple orchards, and are implicated in controlling the potato moth (*Phthorimaea operculella*), a vector of the granulosis virus.

## Protection status

Protected, but locally unprotected in some States and regions (Section 6.1).

- Rooke, I.J. (1983) Research into the Biology of the Silvereye Leading to Methods for Minimizing Grape Damage in Vineyards of South-west Australia. Technical Series No. 2. Agricultural Protection Board of Western Australia. Perth.
- Rooke, I.J. (1984) The silvereye, Zosterops lateralis Aves: Zosteropidae: a review. Journal of the Royal Society of Western Australia 66: 163-169.
- Paton, D.C. and Reid, N.C.H. (1983) Preliminary observations on damage to apricots by birds near Murray Bridge, South Australia. *Agricultural Record* 10: 8-11.
- Matthiessen, J.N. and Springett, B.P. (1973) The food of the silvereye, *Zosterops gouldi* (Aves: Zosteropidae), in relation to its role as a vector of a granulosis virus of the potato moth, *Phthorimaea operculella* (Lepidoptera: Gelechiidae). *Australian Journal of Zoology* 21: 533–540.
- Rey, P.J., Gutierrez, J.E., Alcantara, J., and Valera, F. (1997) Fruit size in wild olives: implications for avian seed dispersal. *Functional Ecology* 11: 611-618.

# Sulphur-crested cockatoo

# (Cacatua galerita)

#### Other names

White cockatoo; greater sulphur-crested cockatoo.



Photo: M. Bomford.



Birds Australia Atlas (1998-2002)

#### Field identification

This species is a large (48-55 centimetres head to tail) white bird with a prominent yellow crest that curves forward (downward over the beak when the crest is raised). Both sexes are similar, differing slightly in size and iris colour. This species has a distinctive uneven flight pattern, with a series of wing beats followed by a glide. Often seen in large flocks and communal roosts, but also occurs in pairs and small groups, particularly in the tropics and during the breeding season. They associate with galahs (*Elophus [Cacatua*] roseicapilla) and corellas (long-billed (Cacatua tenuirostris), western or little (C. sanguinea)) while feeding. Corellas can be distinguished by their smaller and leaner stature and shallow wing beats during flight.

#### Voice

A single distinctive screech as a contact call; an occasional high-pitched call while roosting or feeding, and a series of harsh screeches when alarmed.

#### Habitat

Sulphur-crested cockatoos are common in a variety of habitats in eastern, northern and southern Australia in sclerophyll forests, pine forests and rainforests; *Eucalyptus* and *Casuarina* woodland; cultivated areas; parklands; and open savannas. Open pasture and croplands, where vegetation persists along watercourses, are preferred. Hence this species has benefited from clearing, cropping and improved access to water. They often roost in tall, dense stands of *Eucalyptus* spp. where water is close by, but will move some distance to feeding sites.

#### Movements

Considered mainly sedentary, this species seldom moves large distances between seasons, although it may occasionally relocate for breeding or food or to escape adverse climatic conditions. Local movements usually occur along watercourses, but flocks can transverse large open areas for food. Despite daily movements of up to six kilometres, they maintain fidelity to roosting sites. They form larger flocks and travel further in autumn, when not breeding. During this period flocks are often more likely to travel into cleared or cultivated areas. Similarly, during the breeding season birds are more dispersed and tend to be resident. Highest densities occur just after breeding.

# Foods and feeding behaviour

Sulphur-crested cockatoos have a varied diet of grass and plant seeds, nuts, fruits, green leaves and stems, flowers, bark, roots, bulbs, rhizomes and insect larvae. Where available, seeds, grain and onion grass (*Romulea rosea*) corms comprise the majority of their diet. Hence birds are mainly observed feeding in open areas. They are also attracted to fruit, seeds and flowers of trees more common in northern parts of Australia.

Larger flocks form while feeding, rather than when day-time roosting or flying, where groups can consist of a few birds to several hundred. Feeding flocks also tend to be larger in more open habitats. The majority of feeding usually occurs in the morning and afternoon. Morning feeding usually takes place around one hour after sunrise and in the afternoon in the two to three hours before sunset. Larger flocks gather during the afternoon session. Feeding forays usually last one to two hours, but this varies with the season and region. For example, in some regions feeding is more common in the middle of the day, especially during the cooler months. Conversely, midday feeding is rare in summer, when temperatures are highest.

# Breeding

Breeding normally occurs from July to December. Hollow entrances and linings are chewed in branches or trunks of mature trees. Most commonly, nest hollows occur at 5-20 metres height in *Eucalyptus* spp. trees, in close proximity to water. Nesting also occasionally occurs in cliff faces and in mature *Melaleuca* spp. and *Angophora* spp. trees. A single pair of cockatoos will nest in each tree despite the regular occurrence of multiple hollows. They have, however, been recorded sharing trees with other species, including galahs, kookaburras (*Dacelo novaeguineae*), barn owls (*Tyto alba*) and starlings (*Sturnus vulgaris*).

Males and females usually visit hollows throughout the year. Both sexes prepare the nest, incubate eggs (which takes about 30 days) and feed the young. Two or three white eggs are laid on a bed of wood chips 2–10 centimetres deep. However, pairs average less than one fledgling per year as a result of egg infertility, egg predation by lace monitors, possums, and carpet pythons, nest occupation by bees and trapping for aviculture. Fledging occurs at around 10 weeks, but juveniles are fed by their parents for a further six weeks after leaving the nest. From banding studies cockatoos are known to live beyond eight years in the wild, but many are likely to be older as captive birds have lived beyond 100 years.

# Damage

Damage to horticulture is often to buds, shoots and growing stems, rather than fruit. However, sulphur-crested cockatoos are well known for removing large chunks of, or splitting, pome and stone fruit to get at the seeds. Seeds of citrus fruits are also consumed. The size of the bitten-off pieces can be used to distinguish cockatoo damage from damage by smaller species. Damage to fruit occurs when the birds consume fruit on the branch and knock others to the ground or remove whole fruits and fly to an adjacent roosting tree. They also damage nuts, such as hazelnuts, almonds, walnuts, pecans, chestnuts and pistachios, by cracking the shells.



Figure B.13: Cockatoo damage to sunflower. Photo: P. Fleming.

Cockatoos also chew buds and young shoots including those of cherries, grapevines and peanut shrubs; and they chew bark and foliage and strip it from orchard trees. Significant damage to limbs and fruiting spurs can occur when a flock lands in a single orchard tree, simply due to the weight of the birds. Mature grape bunches are often snipped directly from the vines. The birds also damage a range of cereal grain and oilseed crops (e.g. sunflower, Figure B.13) by digging up sown seed and feeding on seed heads. Vegetable crops are also susceptible to cockatoo damage and the birds can cause havoc in nurseries by damaging seedling stock.

Cockatoo and parrot species chew on various materials to maintain their beaks. Damage to infrastructure such as irrigation systems, coaxial cables, electrical insulators, radio and television aerials and red cedar building materials for beak maintenance is common.

## Protection status

Protected, but locally unprotected in some regions (Section 6.1).

# Sources and further reading

Harman, I. (1981) *Australian parrots in bush and aviary.*Inkata press, Melbourne.

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. Master of Science Thesis, University of New England, Armidale.

Temby, I. (1998) Reducing cockatoo damage in Victoria. *Eclectus* 5: 20–26.