

## INTRODUCTION

Volume 4 covers the cockatoos and parrots (Psittaciformes), cuckoos, koels and coucals (Cuculiformes), owls (Strigiformes), frogmouths, nightjars, nighthawks and owlet-nightjars (Caprimulgiformes), swifts (Apodiformes), and kingfishers, bee-eaters and rollers (Coraciiformes). The full introduction to the series is given in Volume 1, including the scope of each section and glossaries where needed. Some adjustments were made in subsequent volumes, and were discussed in the introductions to the respective volumes. We have followed the style and layout of the three preceding volumes without serious modification. However, a few remarks are necessary on particular aspects of the text where some minor changes have been made from presentation in earlier volumes, or where we have, in this Volume, provided information not included in earlier volumes. Where there is no comment on a particular section, we have made no changes since Volume 3. The introduction is to be fully revised in Volume 5, which begins the Passerines.

Abbreviations for all sections are listed on pages 22–4.

**TAXONOMY AND NOMENCLATURE** As in Volume 3, we continue to follow the arrangement and nomenclature of Christidis & Boles (1994) and amendments (Christidis & Boles In press). For details of subspecies and subspecific nomenclature, we have followed Schodde & Mason (1997) where it was available except in cases where it conflicted with species limits set out in Christidis & Boles (1994, In press). Any deviations from the taxonomy of Schodde & Mason (1997) are explained within the texts. The arrangements of the few species recorded in the wider HANZAB region that were not included within these publications were determined in consultation with L. Christidis & W.E. Boles, as members of Birds Australia's Taxonomic Advisory Committee, based on the principles and sources used by them in compiling their 1994 publication. English names follow those of Christidis & Boles (1994); English names for species endemic to NZ follow those of OSNZ (1990).

### REFERENCES

- Christidis, L., & W.E. Boles. 1994. *The Taxonomy and Species of the Birds of Australia*. RAOU Monogr. 2. RAOU, Melbourne.
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- OSNZ (Ornithological Society of New Zealand). 1990. *Annotated Checklist of New Zealand Birds and the Ross Dependency, Antarctica*. Third edn. Random Century, Auckland.
- Schodde, R., & I.J. Mason. 1997. *Zoological Catalogue of Australia*. 37.2. *Aves*. CSIRO Publ., Melbourne.

**FIELD IDENTIFICATION** Generally, this section remains much as described in the Introduction to Volume 3, though we have changed the arrangement a little to try to remove further duplication between Field Identification and the sections of Plumages and related matters. The latter sections complement Field Identification and need to be consulted for detail on patterns of individual feathers and of moult. The first paragraph has been expanded to include the descriptions of field characters important in identification, ageing and sexing, concentrating on the overall appearance of the birds. The discussion of

similar species also changes focus, from presenting details of the similar species to presenting those of the species under consideration. At times, where finer detail than is provided in the preceding description is required to distinguish similar species, such detail is usually given in the discussion of similar species, where comparisons can be directly made with the characters of the similar species.

**DISTRIBUTION Maps** Presentation of maps remains as in Volume 2, with breeding areas shown in full red and areas of occurrence where breeding has not been recorded in half-tone red. Because we know little of the limits of breeding and non-breeding distribution of species in New Guinea and Indonesia, distribution in these regions has usually been shown in half-tone red, giving no indication of breeding range outside the HANZAB region.

**MOVEMENTS** The patterns of movements shown by species in this Volume vary widely, from species that are sedentary (e.g. Papuan Frogmouth *Podargus papuensis*) to those that are migratory (e.g. Orange-bellied Parrot *Neophema chrysogaster*). Few species have been adequately studied using marked birds or at biologically useful scales for understanding species movements. Such studies are needed to deal with major problems with the interpretation of survey, count or presence-absence data; for example, it is often difficult to distinguish seasonal changes in conspicuousness and detectability from movements into and out of an area (this being particularly obvious with some species in this Volume, such as the cuckoos).

As in earlier volumes, a summary of banding recoveries are listed in the final paragraph of this section. Where appropriate, summaries of other banding records and the results of radio-tracking studies are also presented in the final paragraph. However, the format of banding summaries has changed from that used in earlier volumes. In this Volume, banding recoveries are presented in categories of distance from banding site (<10 km, 10–49 km, 50–99 km, ≥100 km). These figures are calculated from data supplied by the Australian Bird and Bat Banding Schemes (ABBBS) in Canberra, most of which are summarized in Baker *et al.* (1997). In some instances, it was necessary to incorporate additional recoveries, typically from the Recovery Roundup section of the journals *Corella* and *Australian Bird Bander* (e.g. for Regent Parrot *Polytelis anthopeplus*). Where a species could have been banded in islands of the sw. Pacific or New Guinea or both, these totals are also incorporated (because they could not easily be extracted from the calculations). Details are provided for all long-distance recoveries (i.e. ≥100 km) where they are available. The information on recovery rate in distance categories is excluded from species with recent taxonomic splits and where there is subsequent uncertainty as to the specific identity of banded birds (e.g. Long-billed *Calyptrorhynchus baudinii* and Short-billed *C. latirostris* Black-Cockatoos in sw. WA). Recoveries were summed for taxa that have been recently lumped and are presented separately in the ABBBS data (e.g. Australian Ringneck *Barnardius zonarius*).

For each species, long-distance recoveries are presented in the following summarized form:

Kenmore, se. Qld, to Wewak E., Sepik Province, PNG

(1)	(2)					
(2825 km,	337°,	3 months <sup>D</sup> ,	Mar.,	J,	M)	
(3)	(4)	(5)	(6)	(7)	(8)	

(1) Banding site; (2) recovery site; (3) minimum distance from banding site to recovery site (great circle distance); (4) direction from banding to recovery site (great circle); (5) number of months elapsed between banding and recovery (<sup>D</sup> = recovery of dead bird); (6) month of banding; (7) age at banding, if known (P = pullus; J = juvenile, 1 = 1 year old, blank = unknown or >1 year old); and (8) sex if known (M = male, F = female, blank = unknown).

Where appropriate, recoveries showing site-fidelity are also discussed. Longevity from banding records of wild birds is given (if >12 months). No banding maps are presented in this volume.

#### REFERENCES

Baker, B., et al. 1997. *Annual Report of Australian Bird and Bat Banding Scheme, 1995–96*. Environ. Aust., Canberra.

**FOOD** Rensen & Robinson (1990) present a classification scheme for the foraging behaviour of non-raptorial landbirds, discussing search behaviour, attack behaviour, foraging site, food taken and food-handling behaviour. This scheme is particularly useful for descriptions of attack behaviour and we have, as far as possible, standardized our descriptions using the terminology and definitions of Rensen & Robinson (1990; see below). However, it is not possible to categorize simply all forms of search behaviours used by such landbirds, and there is considerable overlap between search and attack behaviour (see Rensen & Robinson 1990); search behaviour is more readily categorized for some groups, such as the Falconiformes (see HANZAB 2 and below). Search behaviour is said to end once food or food-hiding substrates have been sighted and attacked. Variables of search behaviour that can be measured include: distance covered per unit time; number of stops per unit time; and number of attacks, including number of attacks per unit time. Birds can move between foraging sites by walking, hopping, jumping, leaping, running, climbing, gliding, fluttering or flying.

**ATTACK BEHAVIOUR:** (1) **GLEAN:** Pick food items from nearby substrates (including ground) that can be reached without full extension of legs or neck. (2) **REACH:** Completely extend legs or neck upward (Reach-up), outward (Reach-out) or downward (Reach-down) to reach food. (3) **HANG:** Use legs or toes to suspend body below feet to reach food that cannot be reached from any other perched position; includes: Hang-Up, Hang-Down, Hang-Sideways and Hang-upside-down. (4) **LUNGE:** Manoeuvres that use rapid movements of legs rather than flight to approach and capture prey beyond range of attack by Reaching. (5) **PROBE:** Insert bill into cracks or holes in firm substrate to capture hidden prey. (6) **GAPE:** Insert bill into substrate as in probe, but open bill to widen opening. (7) **PULL:** Grasp, pull or tear with bill, removing sections of substrate. (8) **SCRATCH:** Dislodge section of substrate with feet; mainly used by ground-foraging birds. (9) **SALLY** (includes snatch, hawk, hover-glean, hover, pounce of much literature): Fly from perch to attack a food item on any substrate, eventually returning to same or another perch. Sallying divided into: (A) **SALLY-STRIKE:** Attack in a fluid movement without gliding, hovering or landing, and

aimed either at flying prey or stationary substrates. (B) **SALLY-HOVER:** Like sally-strike except that bird hovers at the target substrate at end of sally. (C) **SALLY-POUNCE:** Bird lands briefly at end of sally to take food from substrate; food either taken back to perch or eaten on the spot. (10) **SCREEN:** Attack in continuous flight. (11) **FLUTTER-CHASE:** Bird accidentally flushes or dislodges prey from a substrate and then chases prey. (12) **FLUSH-PURSUE:** Similar to Flutter-chase except bird uses manoeuvre deliberately to flush prey from hiding places and then pursues flying or falling prey.

For owls (Strigiformes), description of methods of hunting largely follow methods described for raptors in HANZAB 2. For kingfishers (Alcedinidae, Halcyonidae), description of some searching and fishing behaviour followed Harper et al. (1985), as described for gulls and terns in HANZAB 3.

We have also used a new heading, **Detailed studies**, in place of the former headings of **Adults or Breeding or Non-breeding**. We did this because many detailed studies do not identify the ages of the birds for which data were obtained, and many often combine data from throughout the year. We have under this arrangement identified ages or period of the annual cycle when it is known, usually in the notes describing the data that follow.

All scientific names, other than those of birds, were checked against the following references. Plants: Poole & Adams (1963), Hnatiuk (1990) and, for *Eucalyptus* and *Angophora*, Chippendale (1988). Invertebrates: General Invertebrates: Marshall & Williams (1972); Molluscs: Vaught (1989). Insects: CSIRO (1991), Naumann (1993), and, for ants, Taylor et al. (1985). Fish: Paxton et al. (1989), Eschmeyer (1990) and Gommon et al. (1994). Amphibians and reptiles: Cogger et al. (1983). Mammals: Bannister et al. (1988) and West & Menkhorst (1995).

**Abbreviations** Some special abbreviations are used in the detailed descriptions of food; these are listed on page 24.

#### REFERENCES

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- Poole, A.L., & N.M. Andrews. 1963. *Trees and Shrubs of New Zealand*. R.E. Owen, Gov't Printers, Wellington.
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- Vaught, K.C. 1989. *A Classification of the Living Mollusca*. Am. Malacologist 1989.
- West, P., & P.W. Menkhorst (Eds) 1995. *Mammals of Victoria*. OUP, Oxford.

#### SOCIAL ORGANIZATION AND SOCIAL BEHAVIOUR

There have been no major changes between this and previous volumes, though we have made an effort to remove overlap

between these sections and the Breeding section, resulting in slight changes in emphasis between the three sections. A few other changes were also made.

In Social Behaviour, COMFORT BEHAVIOUR is now an additional heading at the end of the first paragraph, covering mainly the preening and bathing of groups or individuals, as well as thermoregulatory behaviour when not breeding. Advertising displays, with their possible dual function of advertising and communicating with a mate, and advertising and communicating with rival conspecifics, often appears in the section called Territorial advertising in Agonistic behaviour rather than being placed in Sexual behaviour where it often appeared in earlier volumes. When the function of any particular behaviour or display is largely not known and cannot be classified sensibly as either agonistic or sexual behaviour, then it is usually placed in the first paragraph of the account. Behaviour associated with parents losing interest in, or repelling, their young has often been moved from Relations within family group to Social Organization, where dependence of young and length of time families stay together are discussed at the end of Parental care.

**VOICE** Sonograms were made using Canary 1.2 software (Bioacoustics Res. Prog., Cornell Lab. Orn.) on Apple Macintosh computers. Sounds were digitized at 16-bit resolution and edited using SoundEdit software (Macromedia Inc.). Irrelevant intrusions and background noises were, as far as possible, removed. The analysis used a Hamming window function, a filter bandwidth of c. 350 Hz, smooth display style, 50% overlap and 256 point FFT size. Sonograms were sent in electronic form (as PICT files) to the publisher. Each sonogram is shown with an overlay, with time on the horizontal scale and frequency on the vertical scale. The amplitude (loudness) of a sound is shown by the darkness of the tracing.

Because of the need to analyze calls longer than those shown hitherto, we have abandoned the fixed time-scale used previously. Sonograms one column wide may show 2.5 s, 5 s, 10 s or 20 s of sound. The vertical frequency scale of 0–8 kHz has, by and large, been retained, regardless of the length of time shown, so that slopes of ascending and descending calls will appear steeper in sonograms showing longer durations of sound. In a few sonograms the vertical (frequency) scale extends beyond the usual 8 kHz.

As in earlier volumes, to permit reference to the actual sound used to make a sonogram, published recordings have been used as much as possible. Recordings from the sound library of the Australian National Wildlife Collection (ANWC), CSIRO Division of Wildlife and Ecology, Canberra, or from private collections have been used to complete the coverage; in particular we have made extensive use of the large collection (c. 140 h of edited calls on digital tape) recently contributed to the ANWC by D.A. Stewart. The caption to each sonogram lists the recorder, place and date of the recording, and the source of the recording. If the source of the recording is preceded by letter P, then it is a published recording and is listed below.

#### PUBLISHED SOUND RECORDINGS

- P39 Buckingham, R., & L. Jackson. 1988. *A Field Guide to Australian Birdsong. 4: Sooty Tern to Superb Parrot*. Bird Obs. Club Aust., Melbourne.
- P40 ———, ———. 1990. *A Field Guide to Australian Birdsong. 5: Regent Parrot to Masked Owl*. Bird Obs. Club Aust., Melbourne.
- P48 ———, ———. 1991. *A Field Guide to Australian Birdsong. 6: Eastern Grass Owl to Ground Cuckoo-shrike*. Bird Obs. Club Aust., Melbourne.
- P63 Flentje, W.J. 1992. *Night Sounds of the Forest*. Author, Bendigo, Vic.

- P78 McNabb, E.G. 1995. *Nightlife of the Dandenongs*. Author, Emerald, Vic.
- P100 Wildlife Service. 1980. *Birds of New Zealand: 38 Forest and Sea Birds*. Viking Music Cassette VP445C. Viking, Auckland.
- P105 McPherson, L.B. 1990. *New Zealand Birds: A Sound Guide. 5*. Author, Christchurch.
- P106 ———. 1990. *New Zealand Birds: A Sound Guide. 6*. Author, Christchurch.

**BREEDING** Remains much as previous volumes, with no significant changes.

**FLEDGING and FLEDGING PERIOD:** There is much confusion in the literature concerning the term 'fledging'. Some authors define it as when a bird first leaves the nest; others, when a bird leaves the nest permanently; others still, when a bird first flies. Often, what individual authors intend or mean is not at all clear. We define fledging as when a young bird first leaves the nest; a fledgeling as a young bird that has left the nest at least once; and fledging period as the time from hatching till a bird first leaves the nest. All definitions have to deal with the problem of premature fledging, such as in alarm or other circumstances, or when a bird leaves the nest, often for increasing periods of time, but returns to it in between. The advantage of the definitions adopted is that it is not necessary to determine subjectively what the first flight may be, nor determine what constitutes permanent departure from the nest.

The paragraph, Fledging to maturity, has been changed to **Fledging to independence**, because maturity is not easily defined. Independence, as we use the term, refers to the stage at which a fledgeling is no longer dependent on its parents or parent for food or protection or both. Age of first breeding is now given in Social Organization (in Bonds).

**PLUMAGES AND RELATED MATTERS** There were few changes to these sections. A couple of matters need clarification.

**MOULTS MOULT-SEQUENCES:** In species for which there are few data, or unusual patterns of primary-moult have been noted, we sometimes provide moult-sequences for individual birds. A widespread method of recording moult-sequences is to score each feather on a scale from 0 to 5 (Ashmole 1962; Ginn & Melville 1983). Using this method, an unmoulted old feather is scored 0, and a fully grown new feather is scored 5; a feather in pin is scored 1; less than one-third grown, scored 2; between one- and two-thirds grown scored 3; and two-thirds to fully grown scored 4. Moult of primaries is recorded from the inside to the outside; in moult-sequences, the superscripts denote the number of adjacent primaries of a particular score, e.g. 5<sup>4</sup>4<sup>3</sup>1<sup>0</sup>.

However, additional information, useful, for example, in ageing or determining the sequence of primary-moult, can be conveyed in moult-sequences by describing the state of abrasion of fully grown feathers. We have adopted a scoring system suggested by Rogers (1990) in which fully grown feathers are labelled with letters to indicate the state of wear of each feather: old feathers are labelled O; very worn feathers are labelled V; slightly worn feathers are labelled S; and new feathers are labelled N. Growing feathers are still scored from 1 to 4, as above. Thus, for example, a bird with a sequence of N<sup>2</sup>4<sup>1</sup>2<sup>1</sup>O<sup>3</sup>V<sup>3</sup> would have two new inner primaries, p3 and p4 are growing, p5 to p7 are old and the outer three primaries are extremely worn. This bird has three different ages of fully grown primaries, and one interpretation of a sequence such as this is that the outer three primaries were not replaced in the last moult and are more

than 12 months old. Similar conventions are used for describing moult of secondaries or tail. Moult of secondaries is recorded from the carpal joint inwards, and moult of the tail recorded from above, from the outer left to the outer right.

A primary moult-score (PMS) is a sum of the individual feather scores. In birds with ten primaries the PMS will lie between 0 (moult of primaries has not yet begun) or 50 (moult of primaries has recently finished). When calculating PMS, feathers labelled O and V are scored 0; feathers labelled N are scored 5; and S can equal 5 or 0 depending on the circumstances. For example, a bird that has temporarily suspended moult of primaries may have a moult sequence of S<sup>4</sup>O<sup>6</sup> in which case S = 5 and the PMS = 20. When this bird begins moulting again it may have the sequence S<sup>4</sup>N<sup>1</sup>S<sup>1</sup>O<sup>4</sup>, again S = 5 and the PMS = 28. However, a bird that has undergone a partial moult of outer primaries may have a moult sequence of O<sup>7</sup>S<sup>3</sup>. In this case, S = 0 and the PMS = 0. Unless otherwise stated, we have scored the moult of the primaries of one wing. We have not recorded condition of moult of the remicle, or used it in moult-scores.

#### REFERENCES

- Ashmole, N.P. 1962. *Ibis* 103B: 235–73.  
 Ginn, H.B., & D.S. Melville. 1983. *BTO Guide* 19.  
 Rogers, D.I. 1990. *Corella* 14: 141–7.

**MEASUREMENTS** Largely as in previous volumes. All measurements of skins made during this study (for which we simply give the institutes holding the specimens) were taken by K. Bartram, A.M. Dunn, D.J. James or D.I. Rogers. For clarity, the following measurements of bill are defined again here.

Length of bill is measured with calipers to 0.1 mm. At times, other conventions for taking measurements of bill are used; these are defined at the top of the relevant tables:

**BILL:** Length of exposed culmen, which is chord of the culmen from frontal feathering to tip.

**BILL S:** Length of bill from junction of culmen and skull (i.e. naso-frontal hinge) to tip.

**BILL N:** Length of bill from the anterior corner of nostril to the tip.

**BILL C:** Length of bill from front edge of cere to tip.

**BILL-DEPTH (BILL D):** Depth of bill measured (except where stated within text) at junction of frontal feathering with the exposed culmen, to the lower edge of the ramus below; the minimum depth possible at this point.

**BILL-WIDTH (BILL W):** Width of bill (distance between tomia) measured (except where stated within text) at junction of frontal feathering with the exposed culmen; the minimum width possible at this point.

#### GLOSSARY

**HALF-BAR:** An incomplete bar across the web of a feather, which meets the edge but does not reach the shaft.

**CHEEKS:** Used to describe the feathering of the anterior lower face of parrots; these feathers can be pushed forward to conceal much of the lower mandible, or even bill.

**NOTE:** In the accounts for kingfishers, there are many references to Curl (1998); the date of publication will in fact be 1999 but it was too late to change the texts here.

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ectoparasites of Australian, New Zealand and Antarctic birds (Appendix I) for the species in this Volume was prepared by M.D. Murray, R.L. Palma and R.L.C. Pilgrim.

### General

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**Proof-reading** was done by M.A. Cameron, J. Hurley, A. Rogers, L. O'Mahoney, W.K. Steele and G.D. Price.

Lastly, we extend our thanks to our partners and families, who cannot fail to be in some way involved in, or affected by, a project of this size.

## EDITING AND ARTWORK

### Editing

D.W. Eades prepared or edited all **Field Identification** accounts; most texts were also reviewed by the editors of Plumages and related matters. J.M. Peter prepared or edited all the accounts for **Habitat** and **Distribution and Population**. The **Movements** sections were prepared or edited by M.A. Weston (Psittaciformes, Cuculiformes, Apodiformes) and P.S. Lansley (Strigiformes, Caprimulgiformes, Coraciiformes). K.Y. Al-Dabbagh prepared or edited all the **Food** sections. S.R. Pywell (Psittaciformes, Cuculiformes, Apodiformes and Rainbow Bee-eater) and M. Considine (Strigiformes, Caprimulgiformes, and Coraciiformes except Rainbow Bee-eater) prepared or edited all the accounts for **Social Organization** and **Social Behaviour**. The sections on **Voice** were prepared or edited by T. Howard (Cuculiformes, Strigiformes, Caprimulgiformes, Apodiformes and Coraciiformes), and P.J. Fullagar (Psittaciformes); these editors were also responsible for preparation of the accompanying sonagrams. **Breeding** was prepared or edited by J.R. Starks (Psittaciformes, Cuculiformes, Apodiformes), M. Considine (Strigiformes) and K.Y. Al-Dabbagh (Caprimulgiformes, Coraciiformes). **Plumages and related matters** were prepared by K. Bartram, A.M. Dunn, D.J. James, D.I. Rogers and P. Scofield (the editor responsible for each species account is acknowledged in the text).

The introductions to the Order Apodiformes and Family Apodidae were prepared by R. Schodde. The introductions to all other orders and families were prepared and edited by the section editors: for Habitat, Distribution and Population

(including threatening processes), Movements, Food, Social Organization and Behaviour, Voice and Breeding, the individual editors were responsible for their sections for the groups for which they prepared the species accounts. The formal diagnoses and discussions of plumages and related matters were prepared by A.M. Dunn (Psittaciformes, Strigiformes, Coraciiformes, and the component families), D.J. James (Caprimulgiformes and its families), and D.I. Rogers (Cuculiformes and its families).

S.J.S. Debus did the first edit of the texts for the Strigiformes and Caprimulgiformes, and M. Considine that for the Coraciiformes; S. Marchant assisted with the initial edits of most of the Cuculiformes. G.D. Price compiled and conducted preliminary edits of all texts and had the painstaking task of entering most of the edits of the senior editors. C.M. Myers, J.M. Peter, and J.R. Starks, and the Section Editors as required, assessed and entered the review comments we received. C.M. Myers and S.J.J.F. Davies edited much of the text; and P.J. Higgins edited all species accounts and introductory matter.

### Artwork

The colour plates were painted by J.N. Davies (plates 1–8, 12–14, 31–49, 54), P. Marsack (plates 9–11, 15–30) and P. Slater (plates 50–53). Line drawings were prepared by F. Knight, M.J. Bamford and B. Brooker.

### Maps

The distribution maps were prepared by S.J. Cowling.

## CONTRIBUTORS AND REVIEWERS

Many people have assisted with the production of this Volume by preparing or reviewing texts, either in part or in full, for a species or for groups of species. Birds Australia insists on the review of all HANZAB texts by ornithologists or biologists expert in particular fields, or with expertise in individual species or groups of species. Reviewing of texts is an essential part of the preparation of the texts and we would like to thank all who made the time to assist us in this regard. Their assistance has greatly improved the accuracy and completeness of the texts. However, any errors within the text remain the responsibility of the editors. We apologize for any inadvertent omissions from the following list.

While it is not possible to attribute credit in detail for all texts reviewed by individuals, a number of people provided special assistance by reviewing all or most of the accounts for some of the major groups of species in this Volume: For Psittaciformes, J.M. Forshaw reviewed all species accounts, and S. Sindel reviewed most. S. Marchant, M.G. Brooker and L.C. Brooker reviewed all of the Cuculiformes. S.J.S. Debus and D.G.W. Hollands reviewed all the texts for the Strigiformes and Caprimulgiformes; and P. Olsen reviewed all of the Strigiformes. M.K. Tarburton prepared many and reviewed all the texts for the Apodiformes. D.A. Curl reviewed all the Coraciiformes as well as the texts for Channel-billed Cuckoo and Pheasant Coucal.

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R.N. Holdaway & T.H. Worthy	R. Schodde (introductions to	(Kea)
(Laughing Owl)	Apodiformes and Apodidae)	

## ABBREVIATIONS AND CONVENTIONS

### Compass directions

N, NE, E, SE, S, SW, W, NW + standard intermediates. Note, however, when used as an adjective (e.g. northern Aust., north-eastern coast, and so on) the style is lower case with a full period: n., ne., e., se., s., sw., w., nw., and so on.

### Units

Standard SI units and their recommended abbreviations are followed throughout.

### Statistical arrangement

Throughout, simple statistical data are presented in the form: MEAN (STANDARD DEVIATION; RANGE; SAMPLE SIZE), e.g. 285 g

(5.23; 276–298; 14). By presenting the data in this way, if any one figure is missing from within the brackets it is obvious what it is. If only range is available, it should be presented in brackets as before, e.g. 285 g (276–298). If only standard deviation is available it should be presented as MEAN±STANDARD DEVIATION, e.g. 285±5.23 g. If only the sample size is available it should be presented as MEAN (n=...), e.g. 285 g (n=14).

In the sections on Measurements and Weights, the last column of the tables indicates significance of the t-test of the sample means:

ns	no significant difference
*	means are significantly different at 0.05
**	means are significantly different at 0.01

### GENERAL ABBREVIATIONS

A'asia(n)	Australasia(n)	NZ	New Zealand
ACT	Aust. Capital Territory	p.	page
Arch.	Archipelago	p.a.	per annum
asl	above sea-level	Pen.	Peninsula
Aust.	Australia(n)	Pl.	Plate
BMR	Basal Metabolic Rate	PlI	Plates
C.	Cape	PNG	Papua New Guinea
c.	<i>circa</i>	pp	pages
Ck	Creek	ppt	parts per thousand
CP	Conservation Park	Pt(e)	Point(e)
CSN	Classified Summarised Notes (see Bird Reports below)	Qld	Queensland
Div.	Division (e.g. Kimberley Div.)	R.	River
Grp	Group	Ra.	Range
h	hour(s)	Ras	Ranges
Hwy	Highway	Rd	Road
I.	Island	Rs	Rivers
Is	Islands	s	second(s)
Isl.	Islet(s)	SA	South Australia
L.	Lake	SF	State Forest
Ls	Lakes	SI	South Island, NZ
MIA	Murrumbidgee Irrigation Area	sp.	species
min	minute(s)	spp	species
Mt	Mountain	St	Saint
Mts	Mountains	Stn	Station
NI	North Island, NZ	Str.	Strait
NP	National Park	Tas.	Tasmania
NR	Nature Reserve	UK	United Kingdom
NSW	New South Wales	USA	United States of America
NT	Northern Territory	Vic.	Victoria
		WA	Western Australia

### MUSEUMS AND OFFICIAL ORGANIZATIONS

AAD	Australian Antarctic Division	ANARE	Australian National Antarctic Research Expedition
ABBBS	Australian Bird and Bat Banding Schemes	ANWC	Australian National Wildlife Collection, CSIRO, Canberra
ABC	Australian Bird Count (Birds Australia)	AOU	American Ornithologists Union
AIM	Auckland Institute and Museum, Auckland	AWSG	Australasian Wader Studies Group
AM	Australian Museum, Sydney		
AMNH	American Museum Natural History, New York		

BARC	Birds Australia Records Committee (formerly RAOU Records Appraisal Committee [RAC])	NRS	Birds Australia Nest Record Scheme
BAS	British Antarctic Survey	NSW NPWS	NSW National Parks and Wildlife Service
BMNH	British Museum of Natural History	NTM	Northern Territory Museum, Darwin (now MAGNT)
BOU	British Ornithologists Union	NZ NRS	OSNZ Nest Record Scheme
BTO	British Trust for Ornithology	OM	Otago Museum, Dunedin
CALM	Department of Conservation and Land Management (WA)	OSNZ	Ornithological Society of New Zealand
CAMBA	China Australia Migratory Bird Agreement	PWH	Department of Parks, Wildlife and Heritage (Tas.)
CCNT	Conservation Commission of the Northern Territory	QDEH	Queensland Department of Environment and Heritage
CM	Canterbury Museum, Christchurch	QM	Queensland Museum, Brisbane
CSIRO	Commonwealth Scientific and Industrial Research Organization (Aust.)	QNPWS	Queensland National Parks and Wildlife Service
DOC	Department of Conservation, Wellington (NZ)	QVM	Queen Victoria Museum and Art Gallery, Launceston
DSIR	Department of Scientific and Industrial Research (NZ)	RAC	RAOU Records Appraisal Committee (now BARC)
HLW	H.L. White Collection (housed in MV)	RAOU	Royal Australasian Ornithologists Union
JAMBA	Japan Australia Migratory Bird Agreement	RBC	OSNZ Rare Birds Committee
MAGNT	Museum and Art Gallery of the Northern Territory, Darwin (formerly NTM)	RFBPS	Royal Forest and Bird Protection Society (NZ)
MM	Macleay Museum, University of Sydney	RNZAF	Royal New Zealand Air Force
MV	Museum of Victoria, Melbourne	RSPB	Royal Society for the Protection of Birds
NMNH	National Museum of Natural History, Leiden	SA NPWS	SA National Parks and Wildlife Service
NMNZ	Museum of New Zealand Te Papa Tongarewa, Wellington (formerly National Museum of New Zealand)	SAM	South Australian Museum, Adelaide
NRE	Department of Natural Resources and Environment (Vic.) (formerly Conservation & Natural Resources [CNR])	TMAG	Tasmanian Museum and Art Gallery, Hobart
		WAM	Western Australian Museum, Perth
		WWF	World Wide Fund for Nature
		ZMA	Zoological Museum, Amsterdam
		ZMM	Zoological Museum, Moscow

## STANDARD REFERENCES

- Some references appear *ad nauseum* throughout the book. These are given in an abbreviated form in running text and are not cited in the list of references at the end of each text.
- |               |  |            |   |
|---------------|--|------------|---|
| ACT Atlas     | Taylor, M., & Canberra Ornithologists Group. 1992. <i>Birds of the Australian Capital Territory. An Atlas</i> . Canberra Orn. Grp & National Capital Planning Auth., Canberra.   | FAB        | Barker, R.D., & W.J.M. Vestjens. Undated [c. 1989]. <i>The Food of Australian Birds. 1. Non-passerines</i> . CSIRO, Canberra. AND Barker, R.D., & W.J.M. Vestjens. Undated [c. 1991]. <i>The Food of Australian Birds. 2. Passerines</i> . CSIRO, Canberra. |
| Aust. Atlas   | Blakers, M., S.J.J.F. Davies, & P.N. Reilly. 1984. <i>The Atlas of Australian Birds</i> . Melbourne Univ. Press, Melbourne.  | Gould      | Gould, J. 1865. <i>Handbook to the Birds of Australia</i> . Privately, Lond. (Facsimile edn. 1972. Lansdowne, Melbourne.)   |
| Aust. CL      | Condon, H.T. 1975. <i>Checklist of the Birds of Australia. 1. Non-Passerines</i> . RAOU, Melbourne.  | Hall       | Hall, B.P. (Ed.) 1974. <i>Birds of the Harold Hall Australian Expeditions, 1962-70</i> . Br. Mus. (Nat. Hist.), Lond.   |
| Aust. CL 1926 | RAOU Checklist Committee. 1926. <i>Official Checklist of the Birds of Australia</i> . Second edn. H.J. Green, Melbourne.   | Lea & Gray | Lea, A.H., & J.T. Gray. 1935-36. <i>Emu</i> 35: 63-98, 145-78, 251-80, 335-47.  |
| Aust. RD      | <i>Reader's Digest Complete Book of Australian Birds</i> . 1976. <i>Reader's Digest</i> , Sydney. AND Schodde, R., & S.C. Tidemann (Eds). 1986. <i>Reader's Digest Complete Book of Australian Birds</i> . Revised edn. <i>Reader's Digest</i> , Sydney. | Mathews    | Mathews, G.M. 1910-27. <i>Birds of Australia</i> . Witherby, Lond. (All volumes and supplements.)   |
| BWP           | Cramp, S., & K.E.L. Simmons. 1977, 1980, 1983, 1985, 1988, 1992, 1993, 1994. <i>The Handbook of the Birds of Europe, Middle East and North Africa — The Birds of the Western Palearctic. Volumes 1-9</i> . OUP, Oxford.                                  | North      | North, A.J. 1901-14. <i>Nests and Eggs of Birds found Breeding in Australia and Tasmania</i> . Spec. Cat. 1; Aust. Mus., Sydney.  |
| Campbell      | Campbell, A.J. 1900. <i>Nests and Eggs of Australian Birds</i> . Privately, Sheffield.   | NZ Atlas   | Bull, P.C., P.D. Gaze, & C.J.R. Robertson. 1985. <i>The Atlas of Bird Distribution in New Zealand</i> . OSNZ, Wellington.   |
| Cleland       | Cleland, J.B., J.H. Maiden, W.W. Frogatt, E.W. Ferguson, & C.T. Musson. 1918. <i>Scient. Bull. Dept Agric.</i> NSW 15: 1-112.  | NZCL       | Ornithological Society of New Zealand (E.G. Turbott, Convenor, Checklist Committee). 1990. <i>Checklist of the Birds of New Zealand and the Ross Dependency, Antarctica</i> . Third edn. Random Century, Auckland.  |
|               |  | NZCL 1970  | Ornithological Society of New Zealand (F.C. Kinsky, Convenor, Checklist Committee). 1970. <i>Annotated Checklist of the Birds of New Zealand</i> . Reed, Wellington.  |

NZCL 1953	Ornithological Society of New Zealand (C.A. Fleming, Convenor, Checklist Committee). 1953. <i>Checklist of New Zealand Birds</i> . Reed, Wellington.	19	— 1984. Revised List of Queensland Birds. <i>Rec. West. Aust. Mus. Suppl.</i> 19.
NZRD	<i>Reader's Digest Complete Book of New Zealand Birds</i> . Reader's Digest, Sydney.	21	— 1985. Birds of the Gascoyne Region, Western Australia. <i>Rec. West. Aust. Mus. Suppl.</i> 21.
OED	<i>The Oxford English Dictionary</i> . Clarendon Press, Oxford. Includes abridgements, such as <i>The Shorter Oxford English Dictionary</i> .	22	— 1985. Birds of the Mid-eastern Interior of Western Australia. <i>Rec. West. Aust. Mus. Suppl.</i> 22.
Oliver	Oliver, W.R.B. 1955. <i>New Zealand Birds</i> . Reed, Wellington. (Reprinted 1974.)	24	—, R.E. Johnstone & P. Griffin. 1986. Birds of the Houtman Abrolhos, Western Australia. <i>Rec. West. Aust. Mus. Suppl.</i> 24.
Peters	Peters, J.L. 1937. <i>Check-list of Birds of the World</i> . 3. Harvard Univ. Press, Cambridge, Mass.	26	— 1986. Birds of the South-eastern Interior of Western Australia. <i>Rec. West. Aust. Mus. Suppl.</i> 26.
	— 1940. <i>Check-list of Birds of the World</i> . 4. Harvard Univ. Press, Cambridge, Mass.	27	— 1987. Birds of the Eucla Division of Western Australia. <i>Rec. West. Aust. Mus. Suppl.</i> 27.
	— 1945. <i>Check-list of Birds of the World</i> . 5. Harvard Univ. Press, Cambridge, Mass.	28	—, & R.E. Johnstone. 1988. Birds of the Swan Coastal Plain. <i>Rec. West. Aust. Mus. Suppl.</i> 28.
Serventy & Whittell	Serventy, D.L., & H.M. Whittell. 1976. <i>Birds of Western Australia</i> . Univ. West. Aust. Press, Perth.	35	— 1991. Birds of the South-western Division of Western Australia. <i>Rec. West. Aust. Mus. Suppl.</i> 35.
Storr 7	Storr, G.M. 1977. Birds of the Northern Territory. <i>Spec. Pubs West. Aust. Mus.</i> 7.	Vic. Atlas	Emison, W.B., C.M. Beardsell, F.I. Norman, R.H. Loyn, & S.C. Bennett. 1987. <i>Atlas of Victorian Birds</i> . Dept. Cons. Forests and Lands and RAOU, Melbourne.
11	— 1980. Birds of the Kimberley Division, Western Australia. <i>Spec. Pubs West. Aust. Mus.</i> 11.		
16	— 1984. Birds of the Pilbara Region, Western Australia. <i>Rec. West. Aust. Mus. Suppl.</i> 16.		

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Several references are used as standard references in this Volume only:

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Fleay	Fleay, D. 1968. <i>Nightwatchmen of Bush and Plain</i> . Jacaranda Press, Brisbane.
Forshaw	Forshaw, J., & W.T. Cooper. 1981. <i>Australian Parrots</i> . Second (revised) edn. Lansdowne, Melbourne.

Hollands	Hollands, D. 1991. <i>Birds of the Night</i> . Reed, Sydney.
Schodde & Mason	Schodde, R., & I.J. Mason. 1980. <i>Nocturnal Birds of Australia</i> . Lansdowne, Melbourne. (Note: Published 1981, not 1980 as dated, which has taxonomic implications.)
Strahan	Strahan, R. (Ed.) 1994. <i>Cuckoos, Nightbirds and Kingfishers of Australia</i> . Angus & Robertson, Sydney.

#### BIRD REPORTS

As with other standard references, they are cited in an abbreviated form. For most, the name of the report is followed by the year that the bird report covers (not the year in which the report was published); for Classified Summarised Notes and Tasmanian Bird Reports, the volume number of the journal in which the report is published is given instead.

CSN	Classified Summarised Notes, published in <i>Notornis</i> (OSNZ)
ACT Bird Rep.	Published in <i>Canberra Bird Notes</i> (Canberra Orn. Grp)

NSW Bird Rep.	Published in <i>Australian Birds</i> (formerly <i>Birds</i> ) (NSW Field Orn. Club)
Qld Bird Rep.	Published in <i>Sunbird</i> (Qld Orn. Soc.)
SA Bird Rep.	Published in <i>South Australian Ornithologist</i> (S. Aust. Orn. Assoc.)
Tas Bird Rep.	Published in <i>Tasmanian Bird Report</i> (BIRDS Tas. [formerly Bird Obs. Assoc. Tas.])
Vic Bird Rep.	Published by the Bird Obs. Club Aust.
WA Bird Rep.	Published by WAGroup of the RAOU

#### OTHER ABBREVIATIONS

Several abbreviations are special to various sections.

FOOD	
%freq.	% frequency
%no.	% number
%vol.	% volume
%wt	% wet weight

A	Autumn
W	Winter
S	Spring
Su	Summer

ad.	adult	ads	adults
excl.	excluding	fl.	flowers
fru.	fruits	imm.	immature(s)
incl.	including	indet.	indeterminate
juv.	juvenile(s)	larv.	larva, larvae
lvs	leaves	sh.	shoots
sds	seeds	tr.	trace
unident.	unidentified		

#### PLUMAGES

PMS primary moult-score