

Husbandry Manual
Grey-crowned Babbler
Pomatostomus temporalis



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November 2009

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Husbandry Manual Grey-crowned Babbler *Pomatostomus temporalis*

The information contained in this publication is intended for general use to assist those planning to maintain populations of Grey-crowned Babblers in captivity.

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Published in November 2009

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Abbreviations

ABBS	Australian Bird and Bat Banding Scheme
ARAZPA	Australasian Regional Association of Zoological Parks and Aquaria
HANZAB	Handbook of Australian, New Zealand and Antarctic Birds

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1. INTRODUCTION

The Grey-crowned Babbler (*Pomatostomus temporalis*) is one of five species of the Austro-Papuan babbler family (Pomatostomidae). All of the babblers in this family are medium-large passerine birds, with short rounded wings, long rounded tail and a medium length, decurved bill. Three are endemic to Australia (Hall's Babbler *P halli*, Chestnut-crowned Babbler *P ruficeps* and White-browed Babbler *P superciliosus*), one to New Guinea (Rufous Babbler *Pomatostomus isidorei*) and the Grey-crowned Babbler occurs in Australia and New Guinea. The babblers are omnivorous and live in highly sociable, very vocal groups. The birds are generally terrestrial and move about by hopping, typically flying when disturbed (Higgins & Peter, 2002).

History in captivity

The only published report of the Grey-crowned Babbler in captivity to have been identified is found within 2 papers reporting King's study of the social behaviour of the bird (King, 1980; Dow & King, 1984). For this study 6 babblers (4 birds from one group in the wild, and 2 from another) were caught and kept in an aviary at St Lucia, Brisbane, from February to May in 1971. The only information pertaining to these birds relates to the size of the aviary, diet and nesting behaviour.

Currently there are 14 Grey-crowned Babblers held in Australian zoos. There are 7 males and 6 females at Alice Springs Desert Park. One family group is housed in a large walk-through aviary in a mixed flock, the other smaller group in a smaller aviary. There is a single female Grey-crowned Babbler at Cleland Wildlife Park in South Australia. These two zoos and Taronga Zoo in Sydney have registered interest in acquiring more Grey-crowned Babbler birds for exhibit in the ARAZPA Regional Census and Plan (Cartwright K, pers comm)

Taronga Zoo has successfully maintained a single White-browed Babbler in a mixed flock in its Wollemi Exhibit – a large walk-through aviary 70x22 m with a variable height of average height 8m. That bird is at least 11 years old.

Value of the species as a tool for education, conservation and research

The Grey-crowned Babbler has been of special research and educational interest in light of its highly social organisation and cooperative breeding characteristics. The distribution of the Grey-crowned Babbler has declined in its southern area in eastern Australia (see below). While it could be suggested that there is no immediate value in maintaining and breeding the bird in captivity, and the focus should be on maintaining and extending its natural environment, there may be value in establishing a captive breeding program in order to:

1. Maintain the genetic base of the southern population;
2. Develop experience in captive management of the population, against a time when captive breeding may become necessary; and
3. Increase public interest in the species to protect and enhance its survival in the wild.

2. TAXONOMY

Kingdom:	Animalia
Phylum:	Chordata
Class:	Aves
Order:	Passeriformes
Family:	Pomatostomidae
Genus:	<i>Pomatostomus</i>
Species:	<i>temporalis</i>

2.1 Nomenclature

The Grey-crowned Babbler is currently considered one species of the family Pomatostomidae (the Austro-Papuan babblers). This family was previously thought to be related to the Old World Babblers (Family Timadliidae), however, recent DNA studies have established its status within the corvine radiation. Within the order Passeriformes – the Pomatostomidae are basally branching lineages of the non-core corvine radiation (Christidis & Boles, 2008).

The five members of the Pomatostomidae are all in one genus *Pomatostomus*:

<i>Pomatostomus temporalis</i>	Grey-crowned Babbler	(Vigors and Horsfield, 1827)
<i>Pomatostomus hallii</i>	Hall's Babbler	(Cowles, 1964)
<i>Pomatostomus superciliosus</i>	White-browed Babbler	(Vigors and Horsfield, 1827)
<i>Pomatostomus ruficeps</i>	Chestnut-crowned Babbler	(Hautlaub, 1852)
<i>Pomatostomus isidorei</i>	Rufous Babbler	(Lesson, 1827)

Hall's Babbler most closely resembles the White-crowned Babbler in plumage; however, based on DNA studies, it is more closely related to the Grey-crowned Babbler (Christidis & Boles, 2008).

2.2 Subspecies

Two subspecies have been identified - *P temporalis temporalis*, the nominate subspecies (eastern Australia and Papua) and *P temporalis rubeculus* (Northern Territory, Western Australia, western Queensland and northern South Australia). More sampling of birds in the zone of contact is required to determine whether the observed DNA differentiation represents a species-level difference.

2.3 Recent synonyms

The species was originally named *Pomatorhinus temporalis* by Vigors and Horsfield in 1827.

2.4 Other common names

Other current common names noted by Pizzey and Knight (2003) include Happy Family; Red-breasted Babbler; Yahoo.

A longer list of English names by which the species has been known has been compiled for the Handbook of Australian, New Zealand and Antarctic Birds (Higgins & Peter, 2002) – Australia,

Common, Northern, Red-breasted, Rufous-breasted or Temporal Babbler; Grey-crowned or Rufous-breasted Chatterer; Apostlebird; Babbler; Barker; Cackler; Catbird; Chatterer; Codlin Moth-eater; Cur-Cur; Dogbird; Fussy; Happy Family; Happy Jack; Hopper or Hopping Dick; Jumper; Long Neb; Parsonbird; Pinebird; Pine Hopper; Quackie; Twelve Apostles and Yahoo.



Grey-crowned Babbler in Alice Springs Desert Park walk-through aviary
Photograph © Lyn Fragar

3. NATURAL HISTORY

A number of studies have been reported on the biology and behaviour of Grey-crowned Babblers, including social organisation and behaviour (Counsilman, 1977, Counsilman, 1980, King, 1980, Brown, Dow, Brown, & Brown, 1983); communal nest building (Dow & King, 1984); cooperative breeding (Brown, Brown, Brown, & Dow, 1982, Eguchi, Yamaguchi, Ueda, Nagata, Takagi, & Noske, 2007, Blackmore & Heinsohn, 2007); morphology (Brown, Brown, & Brown, 1982); growth of nestlings and determination of age in juveniles (Brown, 1979, Gill & Dow, 1983, Dow & Gill, 1984); ageing and sexing (Counsilman & King, 1977)

3.1 Morphometrics

Mass and body measurements

a. Nominate subspecies *P t temporalis*

Mass

Recorded weights of the nominate subspecies of Grey-crowned Babblers from various studies are displayed in Table 3.1. All studies show male weights to be greater than female weights. The study of Counsilman and King (1977) shows increasing weight of both sexes with age. The more southern populations appear to be heavier than the northern populations.

Table 3.1 Reported mean weights in grams of *Pomatostomus temporalis temporalis* nominate subspecies of Grey-crowned Babblers. Adults unless specified.

Study	Males			Females		
	No	Mean (SD) g	Range	No	Mean (SD) g	Range
Papua New Guinea Mees,1982, cited in HANZAB,2002		75			75	
North Queensland Hall, 1974, cited in HANZAB,2002	9	67.1(4.11)	62.8-75.3	15	63.0(5.33)	51.9-72.1
SE Queensland Counsilman & King, 1977						
Adults 3-4+ years old*	36	79.4(5.22)	77-88	37	77.0(4.68)	66-86
Adults 2.5-3 years old	15	79.1(3.02)	74-87	12	76.2(5.82)	64-85
Adults 1-2.5 years old	10	77.3(5.88)	72-88	8	75.2(5.05)	62-84
First immatures 4-12 months old	14	76.7(6.77)	62-85	12	73.4(3.36)	66-78

*Difference in means of male and female mass means are significantly different at 0.05 level

Body measurements

Table 3.2 indicates wing, tail, bill and tarsus measurements reported by Counsilman and King (1977) relating to the live South-East Queensland *P t temporalis* populations reported in Table 3.1.

Table 3.2: Reported mean measurements in mm of wing, tails, bill and tarsus of *Pomatostomus temporalis temporalis* nominate subspecies of Grey-crowned Babblers.

Study	Males			Females		
	No	Mean (SD) Mm	Range	No	Mean (SD) mm	Range
Wing						
Adults 3-4+ years old*	50	109.8 (2.76)	104-119	47	108.4 (2.81)	102-111
Adults 2.5-3 years old**	22	110.0 (2.39)	106-115	21	107.0 (3.48)	102-113
Adults 1-2.5 years old	16	108.2 (3.00)	101-113	20	107.6 (3.40)	101-114
First immatures 4-12 months old	16	107.1 (2.44)	103-111	20	105.3 (3.98)	99-112
Tail						
Adults 3-4+ years old	51	111.4 (4.00)	102-120	46	110.3 (4.27)	96-118
Adults 2.5-3 years old	22	112.6 (4.27)	102-118	21	110.5 (5.49)	97-120
Adults 1-2.5 years old	17	110.1 (3.79)	102-116	20	111.2 (4.29)	103-121
First immatures 4-12 months old*	15	111.0 (3.33)	106-118	19	107.8 (4.66)	100-115
Bill (<i>Distal corner of nostril to bill tip</i>)						
Adults 3-4+ years old**	50	24.3 (1.00)	22.0-26.5	47	21.1 (0.96)	19.5-23.0
Adults 2.5-3 years old**	24	24.0 (0.78)	22.5-25.5	22	21.3 (0.89)	20.0-23.0
Adults 1-2.5 years old**	17	23.9 (0.82)	22.5-25.5	21	21.0 (1.05)	19.5-23.5
First immatures 4-12 months old**	18	23.5 (1.02)	21.5-25.5	20	21.0 (1.07)	19.0-23.0
Tarsus						
Adults 3-4+ years old*	51	34.5 (1.35)	32.0-37.0	46	33.9 (1.29)	31.5-37.5
Adults 2.5-3 years old	22	34.5 (1.54)	31.0-37.0	20	34.2 (1.16)	32.5-37.0
Adults 1-2.5 years old*	17	34.9 (0.87)	33.5-37.0	21	33.8 (1.33)	31.5-36.0
First immatures 4-12 months old	16	34.1 (1.48)	31.0-36.0	20	33.7 (1.25)	31.0-36.0

*Difference in means of male and female mass means are significantly different at 0.05 level

**Difference in means of male and female mass means are significantly different at 0.01 level

b. Subspecies *P t rubeculus*

Mass

Recorded weights of the *P t rubecula* subspecies of Grey-crowned Babblers from two studies are displayed in Table 3.3. Studies show male weights to be greater than female weights.

Table 3.3 Reported mean weights in grams of *Pomatostomus temporalis rubeculus* subspecies of Grey-crowned Babblers. Adults.

Study	Males			Females		
	No	Mean (SD)	Range	No	Mean (SD)	Range
Northern Western Australia WAM,1981, cited in HANZAB,2002		65.0			61.0	
Western Australia and Queensland Hall, 1974, cited in HANZAB,2002	11	63.4(5.84)	54.2-74.9	10	62.0(6.31)	54.1-72.5

Body measurements

Table 3.4 indicates skin measurements of wing, tail, bill and tarsus measurements of *P t rubecula* specimens from Central-west and northern Western Australia, Northern Territory and North-west Queensland (Higgins & Peter, 2002).

Table 3.4: Reported mean measurements in mm of wing, tails, bill and tarsus of skin specimens *Pomatostomus temporalis rubecula* subspecies of Grey-crowned Babblers.

Study	Males			Females		
	No	Mean (SD) Mm	Range	No	Mean (SD) mm	Range
Wing	17	108.5 (3.98)	103.0-114.5	16	107.3 (6.47)	97.5-117.0
Tail*	17	107.7 (4.43)	101.0-114.5	15	104.7 (4.99)	99.0-114.5
Bill** (<i>Bill tip to naso-frontal hinge</i>)	17	32.4 (1.93)	29.0-36.5	16	30.8 (2.07)	26.5-34.0
Tarsus	17	31.9 (1.83)	28.3-35.7	15	32.7 (1.21)	30.9-34.9

*Difference in means of male and female mass means are significantly different at 0.05 level

**Difference in means of male and female mass means are significantly different at 0.01 level

Source: Higgins & Peter (2002)

Sexual dimorphism

There is no difference in plumage between the sexes. Female Grey-crowned Babblers have brood patches, not found on males (Counsilman & King, 1977).

Data above show mean weights of males to be slightly heavier than females, but with significant overlap of measurements. In live birds of the nominate subspecies, bills of males are on average longer than females for adults and first immatures. In Counsilman and King's study, no adult or first immature female had a bill of more than 23.5mm length, and no adult male had a bill less than 22.5mm (Table 3.2). There are no data for live birds for *P t rubecula*, although bills of skin specimens are longer in males.

Distinguishing features

The Grey-crowned Babbler is the largest of the Pomatostomidae family of babblers (25 cm - 23-26.5 cm). It is described as having a broad white eyebrow over a black mask, eye pale yellow (dark in immature birds) crown and nape grey, brown-black upperparts; underparts 'warm' brown in the nominate race, and chestnut brown in the *P temporalis rubeculus* race (Pizzey & Knight, 2003). It is the only member of the family without a dark crown. Wings are dark brown, and show a chestnut patch in flight (Simpson, Day, & Trusler, 2004)

3.2 Distribution and habitat

Figure 3.1 shows the geographical distribution of the Grey-crowned Babbler in Australia and Papua as displayed in HANZAB (Higgins & Peter, 2002) with the heavy line indicating the division between the two subspecies.

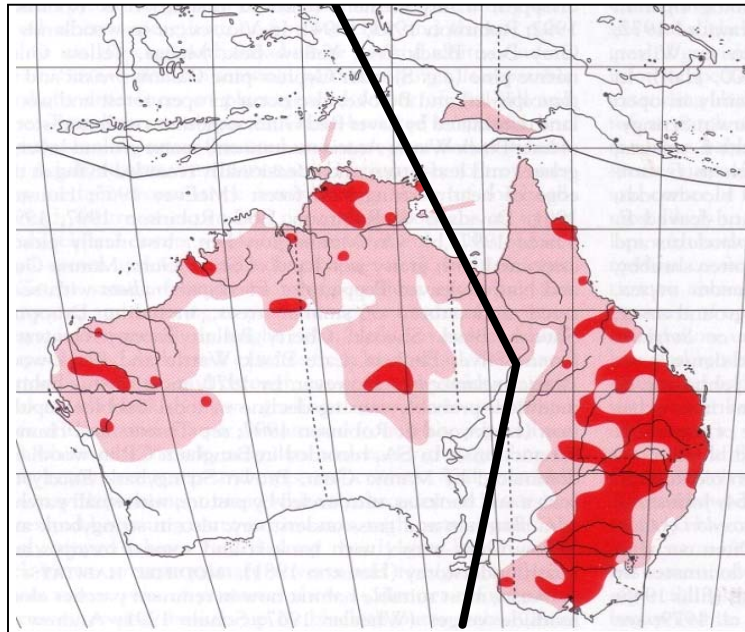


Figure 3.1: Distribution of Grey-crowned Babbler in Australia and New Guinea. *Pomatostomus temporalis temporalis* east of heavy line, *P t rubecula* west of heavy line.

Distribution map: (Higgins & Peter, 2002)

Figure 3.2 shows the most recent distribution of reported sightings of both subspecies by contributors to Birdata reporting as at 21 November 2009.

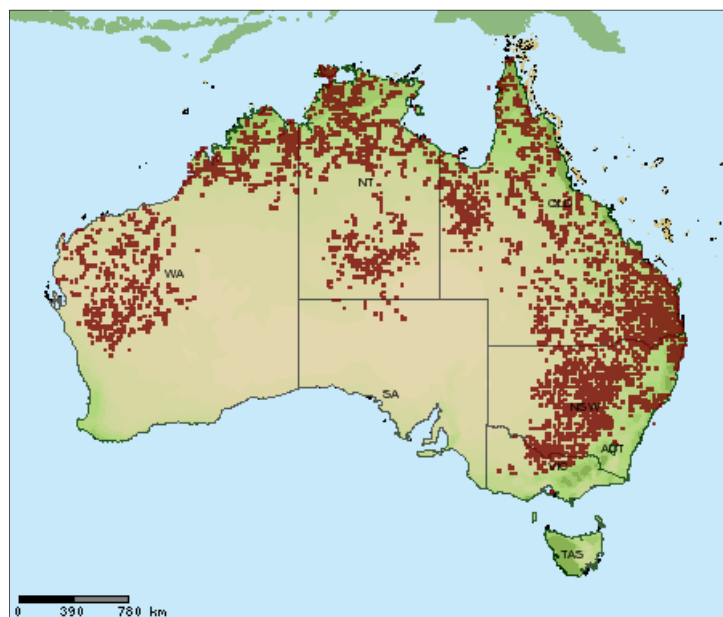


Figure 3.2: Birdata Distribution Map showing reported sightings of Grey-crowned Babbler *Pomatostomus temporalis* Atlas Number 443. 21 November 2009.

The Grey-crowned Babbler is found mainly in open forests and woodlands. HANZAB summarises the literature as indicating that they require “open shrub layer with sparse ground cover and fallen timber and leaf litter. Rarely recorded in regrowth forest, large patches of forest or woodland, forest with dense understorey or grassland with few trees.” (Higgins & Peter, 2002, p. 862) . Forests vary dependent on region, but include various eucalypts including ironbarks and mugga; cypress pine; Brigalow woodlands; casuarinas and acacia woodlands.

3.3 Conservation status

In Australia, *Pomatostomus temporalis temporalis* has “Near Threatened a” status (Garnett & Crowley, 2000a). The Taxon Summary for the species within the Action Plan for Australian Birds explains that “although the subspecies is abundant and widespread in northern Queensland, there has been a considerable and continuing decline in southern part of its range, though not at a rate or scale that warrants listing as “Vulnerable”. The status of the population in New Guinea is assessed independently of the Australian population. The Taxon Summary notes that as the Australian population makes up more than 90% of the world-wide population, the global status is likely to be “Near Threatened” (Garnett & Crowley, 2000b).

3.4 Diet in the wild

Grey-crowned Babblers are mainly insectivorous, occasionally eating seeds. Details of food items reported to be consumed by Grey-crowned Babblers have been collated in HANZAB (Higgins & Peter, 2002) and are listed in Table 3.5.

Table 3.5. Food items reported in adult diet of Grey-crowned Babblers.

Plants	Seeds Monocotyledons: Poaceae seeds																
Pseudoscorpionids																	
Spiders																	
Diplopods																	
Insects:	<table border="0"> <tr> <td>Blattodea: (cockroaches)</td> <td>Eggs, adults</td> </tr> <tr> <td>Coleoptera: (beetles)</td> <td>Carabidae (ground beetles) <i>Sarthrocrepis</i> Chrysomelidae (leaf beetles) <i>Parapsis</i> Curculionidae (weevil, snout beetles) Elateridae (click beetles) Scarabaeidae (scarab, dung beetles) <i>Onthophagus</i> Staphylinidae (rove beetles) Tenebrionidae (darkling beetles)</td> </tr> <tr> <td>Diptera: (flies, mosquitoes)</td> <td>Hippoboscidae Muscidae Hemiptera Coreidae Lygaeidae Pentatomidae Reduviidae</td> </tr> <tr> <td>Hymenoptera: (bees, wasps ants)</td> <td>wasps Formicidae <i>Pheidole</i></td> </tr> <tr> <td>Isoptera: (termites)</td> <td></td> </tr> <tr> <td>Lepidoptera: (moths, butterflies)</td> <td>Larvae, adults Noctuidae: <i>Agrotis</i> Larvae Tortricidae: <i>Cydia</i></td> </tr> <tr> <td>Neuroptera: (lace-wings, antlions)</td> <td>Myrmeleontidae</td> </tr> <tr> <td>Orthoptera: (grasshopper, crickets)</td> <td>grasshoppers Acrididae Gryllidae Tettigoniidae</td> </tr> </table>	Blattodea: (cockroaches)	Eggs, adults	Coleoptera: (beetles)	Carabidae (ground beetles) <i>Sarthrocrepis</i> Chrysomelidae (leaf beetles) <i>Parapsis</i> Curculionidae (weevil, snout beetles) Elateridae (click beetles) Scarabaeidae (scarab, dung beetles) <i>Onthophagus</i> Staphylinidae (rove beetles) Tenebrionidae (darkling beetles)	Diptera: (flies, mosquitoes)	Hippoboscidae Muscidae Hemiptera Coreidae Lygaeidae Pentatomidae Reduviidae	Hymenoptera: (bees, wasps ants)	wasps Formicidae <i>Pheidole</i>	Isoptera: (termites)		Lepidoptera: (moths, butterflies)	Larvae, adults Noctuidae: <i>Agrotis</i> Larvae Tortricidae: <i>Cydia</i>	Neuroptera: (lace-wings, antlions)	Myrmeleontidae	Orthoptera: (grasshopper, crickets)	grasshoppers Acrididae Gryllidae Tettigoniidae
Blattodea: (cockroaches)	Eggs, adults																
Coleoptera: (beetles)	Carabidae (ground beetles) <i>Sarthrocrepis</i> Chrysomelidae (leaf beetles) <i>Parapsis</i> Curculionidae (weevil, snout beetles) Elateridae (click beetles) Scarabaeidae (scarab, dung beetles) <i>Onthophagus</i> Staphylinidae (rove beetles) Tenebrionidae (darkling beetles)																
Diptera: (flies, mosquitoes)	Hippoboscidae Muscidae Hemiptera Coreidae Lygaeidae Pentatomidae Reduviidae																
Hymenoptera: (bees, wasps ants)	wasps Formicidae <i>Pheidole</i>																
Isoptera: (termites)																	
Lepidoptera: (moths, butterflies)	Larvae, adults Noctuidae: <i>Agrotis</i> Larvae Tortricidae: <i>Cydia</i>																
Neuroptera: (lace-wings, antlions)	Myrmeleontidae																
Orthoptera: (grasshopper, crickets)	grasshoppers Acrididae Gryllidae Tettigoniidae																
Reptiles:	Lizard																
Birds:	Splendid fairy-wren <i>Malurus splendens melanotus</i> nestling																
Other matter	Grit																

Adults in the wild feed by mostly by foraging on the ground – turning over leaves and bark litter, and small stones to find prey (King, 1980), and also on trunks and branches of trees and shrubs, by probing in and behind bark. Birds fed mealworms in the aviary in King’s study (1980) demonstrated occasional sharing of mealworms – by active offering of the worm to another bird.

3.5 Longevity

3.5.1 In the wild

The Victorian Department of Sustainability and Environment cites Brown (1987) as indicating that adult birds have an average life expectancy of approximately 4 years in the wild. HANZAB reports the longest time recorded for a bird between banding and recovery was 10 years 11 months (Higgins & Peter, 2002).

3.5.2 In captivity

There is no information available to publish date about longevity of the species in captivity, although records held by the Alice Springs Desert Park have yet to be reviewed. The White-browed Babbler at the Taronga Zoo has survived at least 11 years in captivity.

3.5.3 Techniques used to determine age in adults

King (1980) has described 4 age classes for adults, on the following bases:

Yellow-eyed adults:	Minimum age: 2.5 to 3.0 years Plumage as described for the species. Iris yellow with a greenish tinge or ring
Brown/ yellow-eyed adult:	Minimum age: 2.0 to 2.5 years Plumage as for yellow-eyed adult Iris a mixture of yellow and brown, that persists for 6 to 12 months as yellow replaces brown
Brown-eyed birds:	Second and first year birds Iris brown - the darker the colour the younger the individual. In a second year bird the iris is pale brown and easily distinguished from the pupil.
Juvenile:	Persistent calling and begging to older birds (<i>Wee-oo</i> and <i>Ook-ai</i>) In first 3-4 months ear coverts much paler than adults Bill black, becoming bi-coloured after about 71 days Bill shorter than adult (14.0-17.0mm, compared to adult 19.0-26.0mm)

Table 3.6: Summary table of characteristics indicating age of Grey-crowned Babblers [After King (1980)]

Characteristic	Yellow-eyed adult	Brown/yellow-eyed adult	Browned eyed birds	Juvenile
Typical age range (years)	2.5	2-3	0.25-2	0.25
Iris colour	Yellow	Brown/yellow	Brown	Dark Brown
Plumage, soft parts	Adult type	Adult type	Adult type	Juvenal
Gonads	M,F mature	M,F mature	Some M mature, F not mature	Not mature
Breeding recorded	Yes	Yes	No	No



Figure 3.3: Yellow-eyed adult(on right) with brown-eyed juvenile

Photograph © Deane Lewis

Used with permission: <http://dl.id.au/g.php?c=1&i=290>

4. HOUSING REQUIREMENTS

The following has been derived from discussion with Karina Cartwright relating to experience at the Alice Springs Desert Park, and from documented experiences of others in handling other insectivorous passerine species - Mohua (*Mohoua ochrocephala*)(Dilks, 1993), and Old World Babblers (Pichner, 2003) and for the (nectivorous) Yellow-tufted Honey-eaters (Krake & Thomas, 2000).

4.1 Exhibit design

Grey-crowned Babblers should be housed for exhibition, preferably in small flocks, in a planted aviary. They need plenty of space to accommodate their high energy activities of foraging, flying and chasing, for huddling as well as for nest building for roosting and breeding. See Section 4.3 below for minimum requirements.

The netting should be of one-inch (25mm) diameter wire, nylon mesh or ZOOMESH™. Smaller gauge netting may be considered for the bottom 60-70 cm to discourage rodents and predators. Zoos typically use galvanised wire for aviaries. ZOOMESH™ is a stainless steel mesh which is lightweight and strong and manufacturers claim it to be lightweight, but strong, resistant to environmental corrosion, soft to touch and resistant to chewing by rodents. It has the advantage of excellent flexibility for 'tough' installations. It can be stretched tightly to conform to a rigid structure design, or can be draped like a tent to reduce impact damage to flying birds. Supplied in Australia by ECOHABITATS at 101 Harbour Drive, Bluewater, Trinity Park, Queensland, 4879 - <http://www.ecohabitats.com.au/zoomesh.html>.



Figure 4.1: Wire netting used to house the mixed flock, including the White-crowned Babbler, at Taronga Zoo, Sydney. Photograph: L Fragar

Plants should include tree species for foraging, for example rough barked *Eucalyptus* species, acacias, *Allocasuarina* species. Tree and shrub species should be local to the site, to ensure ease of growth and maintenance. The ground should be kept dry, but with plenty of ground litter – leaves and bark as well as logs and branches for foraging on the ground.

Water in trays may be adequate for washing and cooling, however, a running stream of recycling water provides interest. Water must be kept clean.

Feeding trays should preferably be located in a number of feeding stations set off to a side of the aviary. This will assist in trapping the birds in a smaller area for recapture, checking and moving birds.

Alice Springs Desert Park in central Australia maintains its Grey-crowned Babblers in two family groups in planted aviaries. The larger group (7-9 birds) is housed in a large mixed flock (See Section 9.10 below) in a large walk-through aviary of approximate dimensions 50-60m long, 15 m deep, and 7-8m height at its greatest height. Vegetation is typical Coolabah Swamp vegetation, contiguous with the similar natural vegetation outside the aviary – based on *Eucalyptus coolabah* ssp *arida* and *E.intertexta*. More specific details regarding plant species within the aviary will be included in the next edition of this manual.

A smaller group of babblers (3-5 birds) is housed within a smaller planted aviary of approximate dimensions of 20 m long, 5 m deep and 4 m high. Black-faced Cuckoo-shrike and Yellow-throated Miners (*Manorina flavigula*) are co-housed in this aviary.

Feeding stations are provided within the aviary and in a ‘food-trap’ area to the side of the aviary.



Figure 4.2: Walk-through aviary Alice Springs Desert Park Photograph L Fragar



Figure 4.3: Aviary structure from within walk-through aviary Alice Springs Desert Park.
Note Grey-crowned Babbler nest to right. Photograph L Fragar



Figure 4.4: Feeding station to side the walk-through aviary Alice Springs Desert Park Photograph L Fragar

Taronga Zoo in Sydney, NSW, houses its single White-browed Babbler in a mixed flock (along with mammals, reptiles, amphibia and invertebrates (termites) in its Wollemi Exhibit in a large, bush walk-through stretch aviary enclosure, planted with a range of native trees and shrubs including wet sclerophyll forest vegetation moving along the 85 walking path into a dry open woodland area. There is a centrally running stream of recycling water with waterfall feature. The aviary is 70m long, 22m wide, with a variable roof height – maximum of 12 m, average of 8 m (Fiby, 2001). The aviary has double door access to visitor and keepers, with magnetic latching that ensure both doors cannot be open at the one time.

The following list of plants is that provided in Fiby (2001).

Scribbly Gum (*Eucalyptus haemastoma*), Sydney Red Gum (*Angophora costata*), Sydney Peppermint (*Eucalyptus piperita*), Hair-pin Banksia (*Banksia spinulosa*), Sunshine Wattle (*Acacia terminalis*), Native Holly (*Oxylobium ulicifolium*), Needlebush Hakea (*Hakea sericea*), White Dogwood (*Ozothamus diosmifolium*). The ground layer includes Kangaroo Grass (*Themeda australis*), Spiny-headed Matrush (*Lomandra longifolia*), Grass Tree (*Xanthorrhoea arborea*) and Tooth Daisy Bush (*Olearia tomentosa*). Features include still ponds and a dry creek bed. Above the sandstone ridge is the heath community. Characteristics include stem clasping leaves, very small leaves, woody fruit and a sparse tree layer. The heath area will become a low growing gnarled thicket with sparse eucalyptus becoming more mallee formed. The heath is made up of Heath Banksia (*Banksia ericifolia*), Scrub She-Oak (*Allocasuarina distyla*), Dwarf She-Oak (*Allocasuarina nana*), Broad-leaf Drumsticks (*Isopogon anemonifolius*), Coral Heath (*Epacris microphylla*), Native Fuchsia (*Epacris longifolia*) and Fringed Myrtle (*Micromyrtus ciliata*).” Natural mulches are used as ground cover.



Figure 4.5: Aviary structure from within Wollemi Exhibit Taronga Zoo. Photographs L Fragar



Figure 4.6: Aviary structure of top part of enclosure, showing upper feeding station structure Wollemi Exhibit Taronga Zoo. Photograph L Fragar



Figure 4.7: Enclosure within the large aviary for destructive birds Wollemi Exhibit Taronga Zoo
Photographs L Fragar



Figure 4.8: Exterior of upper feeding station enclosure of aviary Wollemi Exhibit Taronga Zoo.
Photograph L Fragar

4.2 Holding area design

Individual Grey-crowned Babblers are held in smaller planted aviaries in the Alice Springs Desert Park while being introduced to other birds in smaller numbers. Further details are being obtained.

Mohua have reacted well at initial introduction to captivity to being enclosed in a large tent aviary (4 x 3 x 2 m) provided with deep litter and food (mealworms and wax moth larvae); and in small transport cages (100 x 30 x 50 cm) with netting covered with soft mesh fronts, again provided with food.

Short term holding of Yellow tufted Honey-eaters at Healesville Sanctuary has been successful in smaller aviaries of 3 x 1 x 2 m high, or in small cages 600mm x 600 mm x 600 mm. Plenty of perching and dense vegetation was provided in each situation, and a screen was placed at the front to reduce impact of activity outside the cage (Krake & Thomas, 2000).

4.3 Spatial requirements

Standards for keeping animals in captivity in Australia are governed by various Acts, Regulations and associated Codes of Practice of individual state governments. For example, in NSW the display of animals is regulated by the *Exhibited Animals Protection Act 1986* (www.legislation.gov.au), the associated Regulation, and the *NSW Animal Welfare Code of Practice No 4 - Keeping and Trading of Birds* (<http://www.dpi.nsw.gov.au/agriculture/livestock/animal-welfare/codes/general/aw-code-4>), administered through the offices of the Department of Primary Industries in that state. Minimum standards for accommodation of birds have been defined in Codes of Practice in a number of states - Victoria, Queensland, South Australia, Australian Capital Territory and the Northern Territory. The Victorian Code of Practice for the Housing of Caged Birds (Bureau of Animal Welfare, 2001) drawn up under the Prevention of Cruelty to Animals Act 1986, specifies the following *minimum* dimensions for outdoor aviaries for birds of size 30 cm approximate length:

Number of birds	Minimum floor area (sq cm)	Minimum height (cm)
1	10000	90
2	15000	90
3	20000	150
Each additional bird	5000 sq cm additional area	

Other states require a minimum height of **180** cm for birds of this size (Environmental Protection Agency, 2008); (Government of the Australian Capital Territory)

The aviary that housed the 6 Grey-crowned Babblers in King's study (King, 1980) had dimensions of 6m x 3m x3 m high - less than the currently required minimum floor area, but providing a greater height than the minimum specifications for other birds of similar size. It is recommended that a planted aviary for a family of up to 10 birds would have a floor area of 55 sq metres and a height of at least 3 metres.

Dimensions of the exhibition aviaries for the Alice Springs Desert Parks are detailed above (Section 4.1).

4.4 Position of enclosures

The location of the aviary should take into account prevailing wind and weather direction, allowing for adequate shelter in extremes of heat and cold.

4.5 Weather protection

Trees in large planted aviaries should provide adequate shade and protection in most weather conditions; however smaller aviaries, where tree cover may not be adequate, should provide for protection in extremes of weather.

4.6 Temperature requirements

Grey-crowned Babblers in the wild inhabit and breed in a wide range of Australian climates – northern tropical and inland arid and more temperate inland areas, where temperatures may range on occasions between -3° to 40° . However, care would be needed to protect birds from extended periods of extreme temperatures.

4.7 Substrate

The substrate of the planted aviary should be soil, with natural features of rocks, logs, branches, and areas of deep litter. The ground must be well drained to allow for water run-off.

4.8 Nest boxes and/or bedding material

Grey-crowned Babblers in the wild collectively build and maintain nests for communal roosting and for breeding. Roost and brood nests are similar in design – a largish domed nest between 30 to 50 cm outside diameter, with an overhanging entrance leading to the internal chamber by a short passage. The outer twigs may be as long as 45 cm, around 4 mm thick (Figure 4.7). The inner chamber of up to 20 cm diameter is constructed of finer twigs and grass, and lined with such materials as feathers, grass, leaf litter hair and wool from animals, shredded bark fibre (Dow & King, 1984). Nests are placed in terminal branches at the top or side of trees and shrubs, in trees such as *Casuarina spp*, *Acacia spp* and *Eucalypt spp*.

The 6 babblers that were maintained for 5 months in captivity by King and Dow were reported to have been supplied with one Grey-crowned Babbler nest at the start of observations, and the group built 3 other nests at different times. The group roosted together using the 4 roost nests over the observation period (Dow & King, 1984).



Figure 4.7: Grey-crowned Babbler nest under construction in the wild. Photograph: L Fragar

Grey-crowned Babbler groups in the Alice Springs Desert Park build roosting and breeding nests, and Grey-crowned Babblers in the wild outside the aviaries have been observed passing twigs and nesting material to birds inside the enclosure (Cartwright K, pers comm).

Available information suggests that newly established groups of Grey-crowned Babblers should be supplied with a roosting nest from an existing territory at introduction of a group to an aviary. The birds should be provided with adequate vegetative material (twigs, leaves, bark, animal fibre) as ground litter and on trees and shrubs, in order for the birds to construct further roost and possibly breeding nests in forks of planted trees.



Figure 4.8: Grey-crowned Babbler taking twig material to nest in Alice Springs Desert Park walk-through aviary. Photograph: Lyn Fragar



Figure 4.9: Numerous nests built in the walk-through aviary at Alice Springs Desert Park
Photograph: Lyn Fragar

4.9 Enclosures furnishings

Whatever the size of the aviary enclosure, the aviary should be planted with plenty of perching sites and dense vegetation, along with material for construction of roosting perches. The ground should have plenty of deep litter, logs, twigs and bark. Shallow water and dust for bathing is important.



Figure 4.10: Water pool, litter and branches on section of the floor of walk-through aviary Alice Springs Desert Park. Photograph: Lyn Fragar



Figure 4.11: Features within the aviary of the Wollemi Exhibit Taronga Zoo.
Photograph L Fragar

5. GENERAL HUSBANDRY

5.1 Hygiene and cleaning

Planted aviaries can be largely self-cleaning, unless there is overcrowding of birds (Strasser, 2000).

The following regular cleaning will be necessary:

- Cleaning of bowls for mealworms before return to mealworm production area.
- Daily removal of spilled or spoiled food from feeding stations. This will reduce risk of fungal problems and rodent infestation
- Regular cleaning of water bowls – daily if practical
- Recycling water for pools, streams and waterfalls will need to be drained and replaced with fresh clean water.
- Cleaning of faeces from leaves may be necessary in places where there is visible build-up

Strasser (2000) indicates the need to be vigilant for smells – “A planted aviary should never smell bad.”

5.2 Record keeping

The ID number for each bird must be maintained. Then for each bird the following must be recorded:

- The aviary in which located
- Movements within and between institutions
- Any identified health problem
- Any observed behavioural problems
- Reproductive stage or activity
- Changes in diet
- Body mass and measurements

The Australasian Regional Association of Zoological Parks and Aquaria, of which the majority of Australian public zoos are members, has developed regional standards for animal record keeping. An animal records keeping procedures manual was produced by the Animals Records Keeping Specialist Group that has been modified by individual zoos for their local use.

The Royal Melbourne Zoological Gardens – Keeper’s Animal Records Manual may be downloaded at: [http://www.australasianzookeeping.org/Husbandry%20Manual%20Guidelines.htm#Animal Data Transfer Forms](http://www.australasianzookeeping.org/Husbandry%20Manual%20Guidelines.htm#Animal_Data_Transfer_Forms) (Vaartjes, 2006). The daily report guidelines are reproduced from the Melbourne Zoo Manual in Attachment 1.

5.3 Methods of identification

The method of identification of Grey-crowned Babblers in captivity is by leg banding. Procedures for banding birds are found in the Australian Bird Banding Manual (ABBS, 2000a) and the ABBS also provides recommended band sizes for Australian birds (ABBS, 2000b).

The **recommended band size** for *P temporalis* is 06 (alternative size 07 if 06 proves unsuitable)

Note: The Manual indicates that “for species known to show such size variation, alternative band sizes are given in brackets. A bracketed size should only be used if the first size proves unsuitable. Great care should be taken when banding these species. A band should only be applied if the bander has the equipment and the expertise to remove the band if the fit is not satisfactory. When properly fitted, a band should move freely along the tarsus or tibia to which it has been applied, without moving onto the upper or lower joints. Bands should NOT be overlapped to achieve a good fit”.

The **recommended metals** for bands of size 06(07) are Stainless Steel (SS) or INCOLOY (IN).

STAINLESS STEEL (SS): These bands are extremely durable and appear to be immune from crevice-attack and staining. However they can be difficult to close tightly due to “spring-back”. They are particularly valuable for use on parrots, marine species, birds of prey, and on long-lived species.

INCOLOY (IN): These bands, made from a nickel-chromium alloy, have most of the virtues of stainless steel and are less prone to “spring-back”. They are particularly suitable for use on waders but are relatively expensive.

5.4 Routine data collection

Attention to data collection should be a key priority for Grey-crowned Babblers held in captivity in light of the current paucity of scientific information on which to base captive exhibition and breeding programs for this species.

It is recommended that study programs be instituted to obtain data regarding:

1. Weight gain or loss outcomes, and breeding outcomes associated with:
 - Different dietary regimes
 - Differing number and mixes of same species birds in group
 - Different species in mixed flock
 - Different aviary types
2. Parasites and diseases that are common, with management regimes for control.

6. FEEDING REQUIREMENTS

6.1 Captive diet

Zoos or wildlife parks that house significant numbers of insectivores often breed their own live insects as feed. Meal worms, blowfly maggots and fruit fly may be cultivated with relative ease. These may also be available from commercial suppliers. Insects may also be collected from the wild and fed live, or frozen for use in the future. These could include moths, bees, wasps, grasshoppers, locusts, termites, ants and ant eggs and mosquito larvae from the wild, some be fed live and the rest quick-frozen for future use (Muller, 1976).

However mealworms and maggots have a very low content of **calcium, phosphorus and vitamins D, A, E and B** complex, and are proportionately lower than other insects in **protein and fats** and lower especially in **carbohydrates**. They may also contain a fairly high quantity of cellulose (chitin), which is relatively indigestible. When such insects form a substantial part of the captive diet, these deficiencies need to be compensated by various additives; otherwise they will become malnourished and die (Muller, 1976). See also Section 8.2 below.

Hence, a combination of prepared insectivore mix and live mealworms and/t blowfly larvae is usual for feeding insectivorous birds in captivity. Prepared insectivore mixes are available commercially. The following information is provided by distributors of 2 common Australian products:

Insecta-Pro™ (Vetafarm product)

- Uses the technology of food extrusion, incorporates protein from a range of sources to create a high specification food for birds. The process of extrusion of the food boosts the digestibility and also ensures purity of the product as the high pressure cooking kills bacteria and destroys toxins.

The amino acid profile and the range of vitamins and minerals in Insecta-Pro are able to replace the need for live food while ensuring the best in nutrition for health and breeding.

- Fed moist or dry, Insecta-Pro is ideal for a range of insectivores, *but not Iron sensitive species*.
- Ingredients: Australian whole grains including: Corn, Wheat, Meat and Fish Meals, Wheat Gluten.
- Feeding: It may be fed dry or, more acceptably, it may be moistened to create a soft food. Insecta-Pro can be mixed with other “soft feedstuffs” such as fruits, pupae, eggs etc

Approximate Analysis:

Crude Protein 30%
Lysine 1.4%
Crude Fat 14%
Vitamin A 3,000 iu/Kg
Crude Fibre 4%
Calcium 2.5%

Insectivore Rearing Mix (Wombaroo™)

Ingredients

Whey protein, soy protein, meat meal, fish meal, blood meal, cereal bran, lysine, methionine, vegetable oils, omega-3 and omega-6 fatty acids, vitamins A, B1, B2, B6, B12, C, D3, E, K, nicotinamide, pantothenic acid, biotin, folic acid, choline, inositol, calcium, phosphorus, potassium, sodium, magnesium, zinc, iron, manganese, copper, iodine, selenium.

Analysis

Min Crude Protein 52%

Min Crude Fat 12%

Max Fibre 5%

Max Salt 0.8%

The ***Alice Springs Desert Park*** feeds its mixed flocks, including the Grey-crowned Babblers, with a mixture of:

- Minced kangaroo meat
- Wombaroo Insectivore Powder
- Canary starter
- Boiled eggs
- Calcium powder
- Supplemented with meal worms, cockroaches, crickets and moths

Taronga Zoo currently feeds its mixed flock a diet mix:

- Insecta-Pro™ insectivore Mix
- Boiled egg
- Water
- Supplemented by mealworms and blowfly larvae .

6.2 Supplements

The commercially available insectivore mixes have incorporated critical vitamins and minerals into their mixtures. See above.

6.3 Presentation of food

Food for Grey-crowned Babblers should be fed at least twice a day with food in wide trays on stands that reduce likelihood of rodents taking food. Multiple feeding stations are required for groups of Grey-crowned Babblers in light of their inter-specific aggressive behaviour and intra-group aggression and dominance of birds establishing and maintaining their position in the group hierarchy.

Mealworm and other live insect supplements should be placed in deeper trays and covered in litter or sand to encourage the babblers to forage for the insects.

It is important not to bring the aviary insect tray to the insect propagation area as mites that may be present on an aviary floor can also infect insect breeding boxes and breeding rooms. Insects should be taken to bird feeding areas in a container that is washed before returning it to the insect breeding area.



Figure 6.1: Grey-crowned Babbler at feeder in walk-through aviary Alice Springs Desert Park.
Photograph: Lyn Fragar

A note on handling mealworms:

Mealworms can cause irritation to eyes and skin. Hands should be washed after handling mealworms to avoid skin irritation. If you suffer any skin or eye reaction be sure to tell the doctor that you have been handling mealworms.



Figure 6.2: Bring the container of live insects to the feeder (here mealworms at Taronga Zoo), and wash it before returning to the insect production area. Photograph: L Fragar

7. HANDLING AND TRANSPORT

Like Yellow-tufted Honeyeaters Grey-crowned Babblers are swift and manoeuvrable fliers that make them difficult to capture in both small and larger aviaries. The advice for capture and restraint provided by Krake and Thomas (2000) is thus pertinent to the babblers.

7.1 Timing of capture and handling

Capture will generally be at the time of routine feeding where separate feeding stations allow for capture in larger aviaries.

7.2 Catching bags

Hand-nets are only practical in small aviaries that are free of plants and perches. Woven mesh, rather than cloth on the hand-nets work best – moving easier and more quickly through the air, as well as being not so visible to the bird.

Caught birds can be placed into pillow-cases or *light cotton bags*, turned inside-out to prevent claws being entangled. These should be of dimension 400mm x 300mm, and can be used for very short journeys such as transferring birds between aviaries in the one location.

7.3 Capture and restraint techniques

Grey-crowned Babblers have been successfully captured from the wild for banding by use of mist nets- being attracted into the nest by use of a territorial call playback, and use of a robotic male model (Blackmore & Heinsohn, 2007). This would be the preferred method for capture from the wild. This method could be used for re-capture from large aviaries where there is no facility for luring birds into a feeding or service area.

Manual trapping in feeding boxes is the most successful method for Grey-crowned Babblers if a catch cage is not present. The *Alice Springs Desert Park* and *Taronga Zoo* keepers feed their passerine birds in feeding stations at the side of the walk-through aviaries, making capture a more straightforward matter by closure of the door on the birds while feeding. (See Section 4 above)

Manual handling of young birds is shown in Figure 7.1. Young birds should be gently cupped in the hand making sure that no pressure is applied as this affects its breathing. Most birds will sit quietly in the hand or in a small box (Environmental Protection Agency, 2009).

Handling adult birds needs care to avoid bill and claws. See Figure 7.2

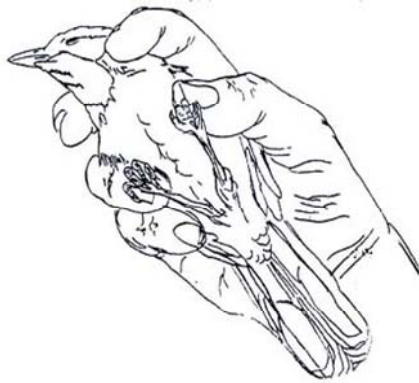


Figure 7.1: Handling of young birds
Source: (Environmental Protection Agency , 2009)



Figure 7.2: Handling Figbird – similar sized bird – suitable restraint grasp to protect from claws
Source: (Environmental Protection Agency , 2009)

Restraint during short transfer periods is by use of cotton bags only; otherwise Grey-crowned Babblers should not be restrained.

7.4 Weighing and examination

Grey-crowned Babblers can be weighed in the cotton carry bag described above, and examined using the grasping techniques above.

7.5 Release

The key issue for release relates to the introduction of a bird into a group of Grey-crowned Babblers. Newly introduced birds will generally be rejected and attacked if introduced into a new group. A bird returned to its group following a period of care for a leg injury was attacked by its group in the Alice Springs Desert Park, presumably because a new hierarchy had been developed within the group (Cartwright K, pers comm).

Introductions of birds to groups at Alice Springs Desert Park requires careful planning, often necessitating rebuilding of a group starting by putting 2 birds together, then slowly and carefully introducing further birds, using smaller aviaries behind the exhibit area.

7.6 Transport requirements

Wild captured birds must be held for 2 weeks after capture and be in good health before being transported long distances.

Transport of birds is subject to various regulations and Codes of Practice promulgated by State and Territory governments of Australia. The following guidelines are directly sourced from the Code of Practice for the Welfare of Captive Birds in the Australian Capital Territory (Government of the Australian Capital Territory, 1995).

- Transport inevitably causes stress and therefore should be kept to the minimum necessary.
- Transport cages should not be too large but should be spacious enough for the birds to move around.
- Containers should be darkened. All wire metal cages should be covered with dark cloth during transport, taking care not to obstruct ventilation.
- Feed should always be available during transport and water should be provided at intervals, especially in hot periods.
- Birds do not tolerate extremes of temperature and should not be left in parked vehicles in the sun or hot weather.

7.6.1 Box design

Transfer of birds from aviary for weighing, examination, short walk between aviaries etc

Handlers at the ***Alice Springs Desert Park*** carry Grey-crowned Babblers very short walk distances (ie next door cages or rooms) using calico carry bags.

Short period carry cages - up to 2 hours transport time

Codes indicate that containers should be sufficiently robust for the species they contain and should be securely closed during transport to ensure no injury or escape is possible.

- A strong, clean, ventilated cardboard box may be suitable.
- Containers should preferably be of non-toxic material, and ventilation must be provided.
- To simplify the measurement requirements, five cage sizes are recommended with examples of the size of birds suitable for each cage. For birds of 300 mm length box dimensions for 2 birds are Height 200mm x Length 360-600mm x Width 180mm.

Handlers at the ***Alice Springs Desert Park*** transport Grey-crowned Babblers in purpose built wooden boxes, with a wire mesh front. These are used to transport the birds between aviaries, perhaps 500m away, by vehicle.

Long Period Carry Cages – up to 36 hours maximum

- All cages should be of wood or metal and should be thoroughly cleaned and disinfected between consignments of birds, and should be sturdy to prevent the escape or injury of birds contained therein.
- Floors should be solid.
- Carry cages should be stowed in a manner and position to provide adequate ventilation to all cages during transport. Where cages are stacked for transport, adequate ventilation should be

provided by either the design of the carry cage or by placing spacer blocks between cages to ensure adequate air movement. Ventilation may be provided by drilling 1 cm diameter holes at 10 cm intervals in two staggered rows along the back and each side of the carry cage. The holes are to be in the upper one-third of each side.

- Birds should not be delivered to the dispatch point more than two hours prior to the scheduled departure time.
- Each carry cage being consigned interstate (apart from those carried in a private motor vehicle by the consignee or consignor) must carry a label measuring at least 10 cm x 15 cm upon which is legibly printed the following details:
 - the consignee's name, address and telephone number;
 - the consignor's name, address and telephone number;
 - the number of birds and the time and date the birds were placed in the container.
 - The words "Live Birds" should be displayed on similar sized labels on at least two sides of the container.

7.6.2 Furnishings

The base of the cage should be furnished with old non-plush carpet to prevent the birds slipping. The roof should be fitted with foam rubber to prevent head injury.

7.6.3 Water and food

Food should be available during period of transport. Water should be provided at intervals of every 8 hours, every 6 hours in hot weather. Water should not be placed in a container during transport (Northern Territory Animal Welfare Advisory Committee, nd).

7.6.4 Animals per box

For short journeys 2 birds per cage as specified above would be suitable. There is no experience of consigning larger numbers of Grey-crowned Babblers. While separation of individual birds is recommended for many passerines, the social behaviour of huddling by Grey-crowned Babblers may indicate suitability for transporting larger numbers in suitably designed cages.

7.6.5 Timing of transportation

There is no information available about the optimal timing of transportation for this species. However, as light reduction is advised for transporting of birds, long-distance transportation would be best planned for overnight where possible.

7.6.6 Release from box

Birds should not be released into existing groups of Grey-crowned Babblers, as aggression is likely to occur between birds as hierarchies are re-established. Birds should initially be maintained in pairs or singly pending their planned integration into social groups. See Section 7.5.

8. HEALTH REQUIREMENTS

There is no recorded information regarding the health requirements specific to the Grey-crowned Babbler or its family. The following information relates to avian health and passerines in captivity. As more records become available regarding Grey-crowned Babblers, the information will be updated.

8.1 Daily health checks

Checks must be made of each bird on a daily basis, part of the routine in the course of feeding and cleaning activity. Routine observations will include:

Limbs and movement:	All limbs should be moving freely; check that birds are not perching in an unusual perching or roosting location.
General appearance:	Health birds should have tight feathers. Sick birds often have a fluffed appearance, and may have laboured breathing and tail bobbing.
Eyes:	Eyes should be bright and alert. Sick birds may have half-opened eyes and an appearance of lack of alertness
Changes in behaviour:	Babblers should be active during the mornings and much of the afternoons. Check that the bird is not sleeping during the day
Appetite:	Loss of appetite may indicate disease. Checks should be made that food consumption remains constant
Discharges:	Eye or nasal discharge, or vent feathers that are pasted with faecal matter will indicate disease
Droppings:	Check droppings every day. Changes may indicate disease

8.2 Detailed physical examination

More detailed physical examination will be required to check on conditions of birds with any of the above signs, or to monitor health and wellbeing more closely. This will usually be undertaken with the bird under manual restraint as described in Section 7 above.

8.2.1 Chemical restraint

Where chemical restraint is required for an invasive procedure, or to reduce stress, then a veterinary practitioner will administer a general anaesthetic (probably using isoflurane and oxygen, although developments in veterinary anaesthesiology may dictate newer options).

8.2.2 Physical examination

A checklist that indicates the key features to be examined to assess health and diagnose disease is provided in the *Checklist for Clinical Examination of Captive Birds* by the Australian Government as one of the Hygiene Protocols for the Prevention and Control of Diseases in Australian Birds (Department of the Environment and Heritage, 2006). This is provided in Attachment 2. While this

checklist and associated guidelines have been developed specifically to address the risk of Beak and Feather Disease, the checklist is useful to guide general examination and testing of body fluids (blood work-ups, and examination of secretions) for most disease states. The website provides information of use to keepers and veterinarians working to diagnose disease in birds and is found on the website: www.environment.gov.au/biodiversity/threatened/publications/tap/hygiene-protocols

8.2.3 Routine treatments

Routine treatment regimes are not known to the author at the date of production of this edition of the manual, aside from the nutrients – minerals and vitamins included in the regular feeding mixes.

8.2.4 Known health problems

There are no published reports of diseases specific to Grey-crowned Babblers. Few necropsies are performed on dead birds at the Alice Springs Desert Park, in light of the early and rapid decomposition of dead birds that occurs in that environment.

A general taxonomy of diseases of passerines provides a framework for considering the range of potential disease conditions.

1. Genetic conditions

Genetic conditions will result in high proportion of the cases of embryo and nestling failure to develop and thrive.

2. Nutritional related conditions

Metabolic disorders can arise from feeding of diets with inadequate essential energy, fat, protein, vitamins and minerals. More detailed information is provided in Tollefson (1982) and information from pages 221 to 228 is summarised as follows:

Carbohydrates and fats

These needed to provide energy and heat. Fats also aid in absorption of fat-soluble vitamins. Inadequate energy results in failure to grow or thrive and loss of weight.

Proteins

Proteins and their component amino acids are essential for muscle growth, maintenance, repair of tissues and egg production. Plant protein tends to be deficient in the 'essential amino acids' – those that the body cannot manufacture, and hence must be provided in animal based foods. Protein deficiencies will result in failure to thrive and grow, poor egg production and breeding outcomes.

Vitamins

These are required in minute amounts to maintain essential metabolic activity. Vitamin deficiency often becomes obvious following shipping of birds with only maintenance feeds.

VITAMIN A – essential for all birds, stored in the liver. Low Vitamin A results in changes in the lining cells of respiratory, alimentary and reproductive systems, lowering resistance to infections. Deficiency also results in low hatchability rates and high hatchling mortality.

VITAMIN D – required for calcification of bones in young birds, associated with levels of calcium and phosphorus in the diet. Deficiency is also associated with soft-shelled eggs and egg-binding. Severe deficiency can result in rickets in young birds.

VITAMIN E – has many roles, and it is thought that its antioxidant role may be important. Encephalomalacia and muscular dystrophy can occur in Vitamin E deficient chicks.

VITAMIN B GROUP OF VITAMINS -

- *Vitamin B₁* (thiamine) deficiency results in severe anorexia, retarded growth, weakness, nervous derangements and death.
- *Vitamin B₂* (riboflavin) deficiency causes curly toe paralysis, not to be confused with a similar condition resulting from keeping birds on smooth surfaces.
- *Niacin* deficiency also results in poor growth, poor feathering, deformity of the leg bones and scaly dermatitis.
- *Vitamin B₆* (pyridoxine) deficiency causes poor protein and amino acid metabolism. Production of eggs and hatchability of eggs are markedly affected.
- *Pantothenic acid* deficiency results in reduction in growth and feather development, dermatitis, granulation of eyelids, liver damage, ulceration, neurological conditions and lowered hatchability of eggs.
- *Vitamin B₁₂, Folic acid and Choline* deficiencies all affect egg hatchability and chick development

Minerals

Minerals are also essential to life and are important for skeletal development and regulation of key metabolic activity.

CALCIUM and PHOSPHORUS

Area necessary for bone development and growth, and also for muscle contraction and nerve impulse transmission. Calcium metabolism is closely linked to Vitamin D and phosphorus, needing adequate levels of each. Deficiencies cause soft bones, spontaneous fractures difficulties in movement, hypocalcaemic tetany and poor shell quality.

3. Toxicities

Birds may be subject poisoning by organic compounds or inorganic substances such as heavy metals. They may occur naturally (eg botulism) or are synthetically produced (eg pesticides). Chemicals may be introduced in contaminated food, by cleaning or pest-reduction activities of the zoo, or be carried into the enclosure by other animals, or on the wind. The effects of poisons will vary to a degree depending on the chemical involved.

4. Trauma

Injury to legs and body has occurred to babblers in the Alice Springs Desert Park, as a result of *AGGRESSION* by other birds. Injury will also occur during transportation and on introduction to a new cage.

AVASCULAR NECROSIS, or other injury of legs may be associated with leg bands that are too small, or not properly fitted.

5. Infection' / infestation

Infectious and parasitic diseases of captive passerines have been described by Joseph (2003). Whether these occur in *Pomatostomus* spp is not known

Viral infection

Viral infections may be transmitted by bird-to-bird contact and airborne infection, and include:

- *PARAMYXOVIRUS* infection - causing conjunctivitis, yellow diarrhoea, rapid breathing and sometimes neurological problems.
- *AVIPOXVIRUS* - causing conjunctivitis and vesicular or warty lesions on head and bare areas of skin.
- *POLYOMAVIRUS* - causing early embryonic death and nestling mortality
- *PAPILLOMAVIRUS* – causing wart-like lesions on skin of feet and legs
- *EASTERN EQUINE ENCEPHALOMYELITIS (EEE)* – transmitted by mosquitoes in the Americas, causing respiratory and neurological signs
- *CYTOMEGALOVIRUS* – causes respiratory problems, anorexia, swollen eyelids
- *AVIAN INFLUENZA A (H5N1)*– causing respiratory and general signs in birds, and severe disease if transmitted to humans

Bacterial infection

- *ENTEROBACTERIAL INFECTIONS* (*Escherichia coli*, *Enterobacter* spp, *Klebsiella* spp, *Salmonella* spp are transmitted by food and water and can cause diarrhoea conjunctivitis, septicaemia . *Yersinia pseudotuberculosis* can cause illness in winter
- *Campylobacter* spp may cause voluminous faeces
- *SKIN INFECTIONS* – associated with *Staphylococcus* spp and *Streptococcus* spp causing abscesses and other skin lesions, and foetal death.

Fungal infection

Most fungal infections are associated with poor husbandry – poor ventilation causing fungal growth in the environment, or poor nutrition that increases susceptibility to fungal disease.

- *CANDIDIASIS* - *Candida albicans* overgrowth can cause regurgitation, anorexia, crop stasis and diarrhoea.
- *ASPERGILLOSIS* - *Aspergillus* spp can cause respirator signs, vomiting and diarrhoea and can be passed from bird to bird.

Parasitic infestation

There are a number of protozoan infections that affect passerines and require treatment with specific drugs to prevent further shedding of oocysts and infection of other birds. These can cause acute and chronic disease with signs including huddling, ruffled feathers diarrhoea etc and include:

- *COCCIDIOSIS* – *Isospora* spp
- *ATOXOPLASMOSIS* – *Atoxoplasma* spp
- *CRYPTOSPORIDIOSIS* – *Cryptosporidium* spp
- *TOXOPLASMOSIS* – *Toxoplasma* spp
- TRICHOMONIASIS, GIARDIASIS, COCHLOSOMIASIS
- *PLASMODIUM* – *Plasmodium* spp

Intestinal Worm infestation can be caused by:

- *CESTODES*
- *NEMOTODES*

MITE infestation may affect birds internally (respiratory tract) or externally, as blood sucking parasites. A note by Hobbs (1955) in *The Emu* suggested that the observed mutual preening activities of Grey-crowned Babblers were actually a de-lousing activity.

6. Cancer

Lymphomas (cancers of the lymph system) have been found in many avian species at necropsy (Reece, Barr, & Scott, 1992). Other cancers found were tumours in footpad, muscle and kidneys.

7. Other chronic conditions

Other chronic conditions have been found at necropsy such as gout, osteodystrophy, congestive heart failure and fatty liver.

8.2.5 Quarantine requirements

There are practical guidelines about the principles of quarantining birds, and particularly sick birds provided by the Department of Agriculture, Fisheries and Forestry and downloaded at:

http://www.daff.gov.au/animal-plant-health/pests-diseases-weeds/biosecurity/animal_biosecurity/bird-owners#guidelines .

These are reproduced in Attachment 3.

9. BEHAVIOUR

Unless otherwise referenced, the following information is derived from observations reported by King (1980) from studies of the Grey-crowned Babbler in the wild.

9.1 Activity

In the wild family groups of Grey-crowned Babblers have been reported to leave the communal roost nest at or before dawn in quick succession and return to a roosting nest at or before sunset – earlier if light levels are low (Gill & Dow, 1985). Foraging and flight are the most common activities throughout the day. The groups of babblers at the Alice Springs Desert Park are active though most of the day, providing a good exhibit of socially cooperative birds (Cartwright K, pers comm).

9.2 Social behaviour

Grey-crowned Babblers are highly social birds, found in tight groups comprising a single breeding pair, and other members, total group size usually between 3 to 10 but up to 25 birds (Counsilman, 1980; Brown, Brown, & Brown, 1982). The non-breeding members of groups are generally offspring of the breeding pair, although occasionally others are admitted to the group. They keep in close contact during foraging sessions, and come together for other close group activity during the day. At night they roost communally in a roost nest.

The 6 birds that were maintained in King's aviary (see above) consisted of 4 from one group in the wild and 2 from another, and apparently formed a group that roosted and behaved as a group. Once individuals have been assimilated into the group at Alice Springs Desert Park, they behave as a close social group.

They are fairly noisy during the day, moving about in their tight-knit flock and foraging by actively searching crevices of tree trunks, branches, and in litter on the ground, usually within 30 m of each other. Foraging is accompanied by a soft chuck call, apparently serving to maintain contact between birds in the group. Flight between trees and to cover occurs in 'follow-the-leader' fashion, preceded and accompanied by flight calls – similar to the *chuck* calls, but in two syllables.

In the later, warmer parts of the day **clumping**, associated with allopreening is common. Clumping involves the group moving up into foliage, gathering into one or more clusters along a branch, touching each other. Activities during clumping include inactive perching, auto- and allopreening. Sessions may last up to an hour.

Huddling is a group display in which all members of a group participate. It is instigated by the primary breeding pair with a 'chuckling' call, and at the onset, all other activity stops, and members arrive and take up this call. The group crowds together on a branch with bodies held low, tails and wings spread and flattened. Huddling occurs at all times of the year and may be in response to meeting other babbler groups.

Antiphonal duetting occurs between the breeding pair, often associated with huddling activity of the group. Referred to as the *Ya-Hoo* duet the breeding male gives a high-pitched *Hoo* (*awoo*) call, that is responded to by the breeding female by a harsh *Yah*. This is repeated many time (8-23).

Hierarchies are maintained with **agonistic behaviour**, with the breeding male dominant over all, followed by the breeding female. Threat display occurs with the bird pointing its bill at the threatening bird, body held low, tail closed and wings close to body. Submissive behaviour involves the bird holding its body low, its head lower than the dominant bird wings folded with a slight quiver, and plumage ruffled.

Chasing and fighting may occur between birds within the group, with birds gripping the other's bill, pulling and twisting, wings being used to keep balance. Counsilmann (1980) could not determine whether the vigorous chasing that occurred among birds was agonistic behaviour or play. Intra-group aggression is not uncommon in the groups at Alice Springs Desert Park, and may be related to establishing the hierarchy within the group.

9.3 Reproductive behaviour

Courtship behaviour sometimes develops from the huddle (see above) and only involves the breeding pair. Both birds perch together, facing in the same direction, bodies touching. Plumage is sleeked, wings close to body but tails widely spread. Birds then turn to face each other, bills are turned upwards and bills are touched. After a short wing-fluttering, the male mounts the female and copulates. The whole process lasts less than 10 seconds.

9.4 Bathing

Water bathing involves a bird standing at the edge of a shallow pool, hopping into the water, fluttering wings and ruffling plumage, hopping out and beginning to preen.

Dust bathing is a group activity; generally late in the afternoon shortly before roosting – flicking up dry earth and sand with bills. Some individuals may roll over and sessions can last several minutes, followed by groups retiring to a tree to undertake auto-and allopreening.

9.5 Behavioural problems

In the wild, aggression within the group is said to be rare, although fighting may occur (see above). Experience from Alice Springs Desert Park has found that aggressive behaviour is common within the group, and must be monitored and managed. In the wild groups are established and reformed as young birds leave the group and join or form new groups, thus it is to be expected that the fluidity of group dynamics will require development of good management skills.

9.6 Signs of stress

There have been no reports of birds specifically trying to escape the enclosure, except when the victim of aggressive attacks by other members of the group.

9.7 Behavioural enrichment

Adequate space for flight and foraging, and materials for the ongoing activity of communal nest building for roosting or breeding are key requirements for this species.

Careful observation of the social interaction between birds is also required and readiness to remove birds and go through the process of assimilation into compatible groups is obligatory. Knowledge of the natural constitution of groups will assist this process. The breeding male is the dominant bird in the wild, followed by the breeding female. The young usually require up to 2 years to develop skills before leaving the group, and after 12 months participate to some extent in cooperative nest building and feeding of young.

9.8 Introductions and removals

Section 7.5 describes the problems of introduction of a bird into a group of Grey-crowned Babblers. As was noted, newly introduced birds will generally be rejected and attacked if introduced into a new group. Introductions of birds to groups at Alice Springs Desert Park requires careful planning, often necessitating rebuilding of a group starting by putting 2 birds together, then slowly and carefully introducing further birds, using smaller aviaries behind the exhibit area.

9.9 Intra-specific compatibility

As noted above, aggression within a group in the wild is said to be rare. No mention was made of problems associated with the 6 captive babblers in King's study. However, the experience of **Alice Springs Desert Park** is described above, showing that compatibility within a close-knit group may be undone by introductions, re-introductions, and sometimes development of younger birds.

9.10 Inter-specific compatibility

Mobbing behaviour in the presence of a number of other bird species and other animals in the wild has been described, and housing with these species would not be recommended. These include the Australian Magpie *Gymnorhina tibicen* that showed aggression towards the babblers, and Blue-faced Honeyeaters *Entomyzon cyanotus* that have been observed nesting on top of babbler nests and to attempt to occupy the babblers' nest (Higgins & Peter, 2002). When attacked by Noisy Miners *Manorina melanocephala* or Grey Butcherbird *Cracticus torquatus* the babblers were observed to retreat.

The Grey-crowned Babblers housed in the walk-through aviary of the **Alice Springs Desert Park** are in a mixed flock with:

- Australasian Grebe (*Tachybaptus novaehollandiae*)
- Grey Teal (*Anas gracilis*)
- Eurasian Coot (*Fulica atra*)
- Red-tailed Black-Cockatoo (*Calyptorhynchus banksii*)
- Australian Ringneck Parrot (*Barnardius zonarius*)
- Grey-headed Honey-eater (*Lichenostomus keartlandi*)

- Black-faced Cuckoo-Shrike (*Coracina novaehollandiae*)
- White-browed Woodswallow (*Artamus superciliosus*)
- Black-faced Woodswallow (*Artamus cinereus*)
- Bush Stone-curlew (*Burhinus grallarius*)



Figure 9.1: Information signage showing bird species within the walk-through aviary Alice Springs Desert Park. Photograph: Lyn Fragar

Those housed in the smaller aviary are in the company of:

- Black-faced Cuckoo-Shrike (*Coracina novaehollandiae*)
- Yellow-throated Miner (*Manorina flavigula*)

9.11 Suitability to captivity

Along with other soft-bills, keeping and breeding the Grey-crowned Babbler in captivity represents a major commitment to time, space and attention to detail to ensure their health and wellbeing.

However, the communal behaviour of the Grey-crowned Babbler adds a greater challenge to the management of this species. They must be managed as groups, as this is the basis of their exhibit and educational value. They appear to be hardy, and tolerate the diet and enclosure requirements given adequate space; however, care must be taken, and individuals within the group carefully observed to ensure that there are not losses due to intra-group aggression.

10. BREEDING

Information about breeding is derived from studies of the Grey-crowned Babblers in the wild, and is from King (1980) unless otherwise referenced. Application of the information for breeding of Grey-crowned Babblers in captivity has yet to be tested.

10.1 Mating systems

Grey-crowned Babblers are cooperative breeders. In the wild the primary breeding pair is socially monogamous, helped by a varying number of subordinate, younger, non-breeding helpers of both sexes that are usually offspring or siblings of the pair. Only the breeding female undertakes and brooding of nestlings. Ten percent of helpers may be from outside the family group (Blackmore & Heinsohn, 2007). While unassisted breeding pairs have been observed to breed successfully, studies have demonstrated the reproductive success benefits of assistance from helpers (Brown, Brown, Brown, & Dow, 1982). Eguchi et al (2007) consider that the species should be considered obligate cooperative breeders, as unaided pairs were unable to raise offspring in their study in northern Australia.

It is not known whether breeding as unassisted pairs would be more successful in captivity. It is likely that with constancy of food availability a breeding pair could successfully breed. Breeding activity in the smaller aviary at *Alice Springs Desert Park*, with fewer birds in the group is reportedly less successful than in the large-walk-through aviary. Given the extended period of learning to forage, and the opportunity for more than one brood in each year with assistance to feed fledglings, it would seem appropriate to support a cooperative breeding program.

10.2 Ease of breeding

While the larger flock at *Alice Springs Desert Park* have reportedly bred successfully, there is no documented experience of breeding of the species in captivity. However, information on King's six babblers from two different groups and kept in captivity from February to May – the non-breeding season, indicates that the birds formed into one group, jointly built 3 nests and used these for communal roosting. This might encourage optimism of successful breeding of mature male and female in company of younger birds (related if possible).

10.3 Reproductive condition

10.3.1 Females

Only breeding females develop a fully-formed brood patch – a large patch extending from the upper breast to cloaca. There is associated swelling of lips of cloaca with a broad base, projecting to the posterior. Other non-breeding females have slightly swollen cloacae, but no patches early in the season (Counsilman & King, 1977).

10.3.2 Males

Males do not incubate or brood, and do not have brooding patches. Cloacal swelling does not appear to be reliable in indicating breeding males.

10.4 Techniques used to control breeding

For birds being maintained for exhibition, breeding can be controlled by separation of the sexes in different aviaries or sections of aviaries.

However, if breeding has taken place then the situation is made more complicated for the development and learning needs of young to be optimised. Fledglings are jointly fed by male and female parents and helpers for an extended period, and weights at fledging are low compared to adult weights. Young birds apparently need to stay and learn foraging behaviour from the group. If no re-nesting is planned, removal of the breeding female a few weeks post-fledging may be tried, however, with risk that a junior female may take the place of the dominant breeding female.

No information is available about effects of removal of eggs from the nest as a method of controlling breeding.

10.5 Occurrence of hybrids

There is no report of hybrid breeding with other species - however, the species has not been bred in captivity with other species. Hybrids could conceivably (pun not intended) occur with other *Pomatostomus* species in captivity.

10.6 Timing of breeding

Time of breeding in the wild has been summarised in HANZAB (Higgins & Peter, 2002, p. 872), and is displayed in Figure 10.1. Timing of planned breeding in captivity in sites in Victoria, NSW and southern Queensland would be June/July to December.

Latitude	State	J	F	M	A	M	J	J	A	S	O	N	D
15-20°	Western Australia												
20-25°	Queensland												
20-25°	Western Australia												
20-25°	Northern Territory												
25-30°	Queensland												
30-35°	NSW												
35-37°	Victoria												

Figure 10.1: Month of reported breeding of Grey-crowned Babblers as summarised in Handbook of Australian, New Zealand and Antarctic Birds Volume 6: Pardalotes to Shrike-thrushes (2002)

10.7 Age at first breeding and last breeding

Age for first breeding is delayed to between 2 and 4 years. Gonads continue to develop until 2-3 years old.

10.8 Ability to breed every year

Breeding pairs have ability to breed every year, and often stay in the same pair between seasons in the wild.

10.9 Ability to breed more than once per year

Females in studies in central west NSW attempted up to 4 nests in each season. Likelihood of re-nesting following successful first nesting increased with availability of male helpers in the family group, and with previous experience of the female – ie, no first year breeding female re-nested (Blackmore & Heinsohn, 2007).

10.10 Nesting, hollow or other requirements

A planted aviary should provide adequate access to small sticks and twigs, and soft material for construction of both breeding and roosting nests, and access to suitable sites for building the nests in small terminal branches towards the tops of trees of tall shrubs. See Section 4.8.

10.11 Breeding diet

There is no information available relating to the diet of breeding females or males. During incubation of eggs the breeding male and older helpers visit the nest with food for the breeding female. At Alice Springs Desert Park, more live food is provided during breeding – mealworms, cockroaches, moths and crickets.

10.12 Incubation period

Incubation is by the breeding female. Primary male and helpers bring food to the brooding female. Incubation period is 17-25 days, with nestlings hatching on successive days.

10.13 Clutch size

Usually 2-3 eggs (1-4). More have been reported and may include eggs of other females. Eggs elliptical, greyish brown, or purplish grey, and marbled and veined with dark, often criss-crossing hairlines. Vary greatly in size, shape and markings.

Eggs measurements:

<i>P t temporalis</i>	28.1 x 18.9 mm (SD 1.65, 0.85).
<i>P t rubeculus</i>	26.6 x 18.4 mm (SD 1.14, 1.23)

10.14 Age at fledging

Age of fledging in the wild has been reported as 20-22 days (most commonly 22 days) by Brown (1979), and 17-22 days (mean 19.3) by Gill and Dow (1983), although Gill and Dow indicate that daily handling to measure growth may have hastened fledging in their study.

10.15 Age of removal from parents

Studies in the wild have shown that there is a long period of development of some skills by young babblers. These skills are developed by participation in the family group. Counsilmann (1980) suggests that young birds cannot efficiently feed themselves in the wild until at least two years after leaving the nest. Birds being bred for release back into the wild should be maintained within a family group for at least 2 years.

10.16 Growth and development

At hatching young are naked, with no natal down. The bill is the same colour as skin. Weight at hatching has been measured between 3.7g and 4.0g. Table 10.1 (overleaf) indicates changes in key characteristics over time as nestlings develop.

Growth, in terms of weight, appears to vary between broods. Growth rate of the first hatched nestling appears to be greater than for younger siblings. Figure 10.2 graphs the growth curve :

$$\text{Weight at Day } d = a / (1 + e^{-K(d-i)})$$

where $a=56$, $K= 0.438$ and $i=7.49$, the parameter values determined by (a small number of) measurements by Brown (1984) in southern Queensland. More observations of nestling weights are required to establish more accurate growth curves.

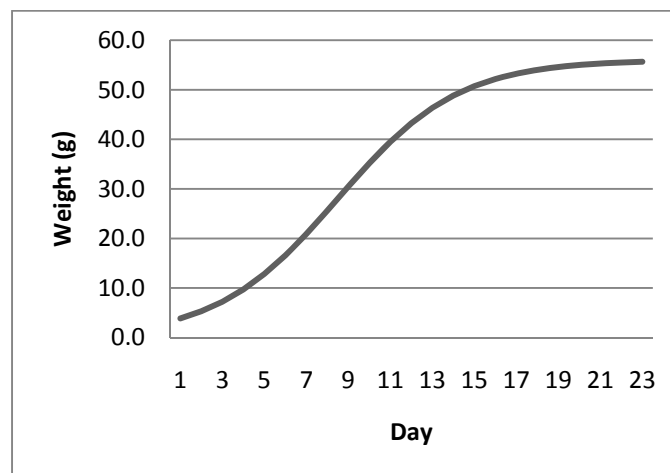


Figure 10.2: Growth curve of nestling Grey-crowned Babblers. Source: Brown (1984)

Table 10.1: Days at which key features emerge Grey-crowned Babbler nestlings

	Plumage	Bill	Eye	Weight
Day 1	Naked, no down Bristles on wings and tail	Tip mandible 1mm longer than maxilla Overhang gets greater, before reducing	Skin cover	3.44 g (3.0-3.9)
Day 2	Fine, sparse down days 2-4. Down confined to dorsum: - White on head - Grey humeral and femoral Tips of developing pin-feathers projecting from bristles days 2-5		Slit develops day 2-7	
Day 3				
Day 4				
Day 5	Down reduced to traces day 5			
Day 6				
Day 7	Length primary pins to tip of bristle = 11mm Alar feather erupt from sheaths days 7- 10	Darkening of bill begins		
Day 8		Tips of mandible and maxilla meet days 8- 11		
Day 9	Caudal feathers erupt days 9-12. Most feathers present in all pterylae			
Day 10				
Day 11				
Day 12				
Day 13				
Day 14				
Day 15	Days 15-17 No or very little sheathing visible on folded wing Head fully feathered	Bill almost black		
Day 16				
Day 17 +				54.0 g (50-59) at fledging days 17-25

Source (Gill & Dow, 1983)

11. ARTIFICIAL INCUBATION AND REARING

Artificial breeding of Grey-crowned Babblers is NOT recommended. This is in light of the extreme social behaviour of this species (and the wider family of species) and the need for nestlings and fledglings to be supported by, and learn from the activities of the wider family group.

The priority for captive breeding of this species is the development of effective regimes for breeding of captive Grey-crowned Babblers in as near to natural surroundings within planted aviaries. This will require attention to programs that closely monitor and record factors associated with maximising breeding in these conditions.

The following information is provided in the event that artificial incubation and rearing is attempted. As there is no history for this species, nor for closely related species, the following details are proposed on the basis of breeding reports of other passerine species. As more relevant information becomes available, it will be included in further editions of the manual.

11.1 Incubator type

Yellow-tufted Honeyeater eggs are incubated at the Healesville Sanctuary using Marsh Rolex fan-forced incubators. Eggs were placed in a shallow tray lined with cotton wadding and turned manually four times each day (Krake & Thomas, 2000).

Eggs of the critically endangered Mauritius Fody (*Foudia rubra*) have been successfully incubated using a Hatchmaker™ incubator with manual turning every 2 hours between 0800 and 1800 hrs until they pipped internally, and using an Incetec 100™ incubator with the turning motor set to roll eggs for 15 out of every 90 minutes (Cristinacce, et al., 2008).

11.2 Incubation temperatures and humidity

Incubators at Healesville Sanctuary were run at 37°C and relative humidity at 65% for Yellow-tufted Honeyeater eggs.

Incubators were run at 37.2°C and relative humidity of 65% for Mauritius Fody. Once eggs pipped internally they were moved to a Hatchmaker™ with relative humidity above 70%.

11.3 Desired percentage egg mass loss

No information is available regarding desired weight loss for Grey-crowned Babblers. For Yellow-tufted Honeyeaters the daily weight loss is 1.7% and the total eight loss 22%

11.4 Hatching temperature and humidity

Hatching temperature was maintained at 37°C for Yellow-tufted Honeyeater chicks and 37.2°C for the Mauritius Fodies.

11.5 Normal pip to hatch interval

Krake & Thomas (2000) report that at Healesville, chicks have hatched within 24 hours of the first signs of pipping.

11.6 Brooder types/design

Both Yellow-tufted Honeyeater and Mauritius Fody chicks have been placed in small plastic tubs, lined with tissue or other paper. For Grey-crowned Babblers it would be appropriate to place 2-4 eggs in one tub to simulate natural nest conditions.

11.7 Brooder temperatures

Temperature in the brooder room in Healesville Sanctuary was maintained at 28°C initially and then gradually reduced to ambient temperatures by the time chicks were 40 days old.

11.8 Diet and feeding routine

Mauritius Fody chicks that are insectivores, have been fed a mixture of bee larvae, scrambled egg and papaya soaked in Ringer's lactate with supplements of Nutrobal™ (Vetark Professional, Winchester, UK).

Further research is required into ensuring that feeding requirements of not only incubated Grey-crowned Babbler chicks are met, but that nutritional requirements of captive brooding females, feeding adults, nestlings and fledglings are met in a captive breeding program.

11.9 Specific requirements

The range of nesting material should be available to the babblers for construction of both roosting and breeding nests. This will include twigs, leaves, bark, litter, as well as some fine soft materials – lambs' wool, feathers. Observations should be made of material used to ensure future provision.

<p>Grey-crowned Babblers outside the large aviary at Alice Springs Desert Park have been observed passing nesting materials (twigs) through the aviary wire to nesting babblers inside the enclosure (Cartwright, pers comm.)</p>

11.10 Pinioning requirements

Grey-crowned Babblers do not require to be restrained within captive areas by use of pinioning or other similar methods.

11.11 Data recording

Data should be gathered regarding all breeding episodes of Grey-crowned Babblers in captivity and shared amongst the regional group of zoos, in order to develop the necessary body of knowledge as soon as possible about more effective breeding.

Where possible the following should be recorded:

- Breeding female ID
- Breeding Male ID
- Number and ID of birds in group
- Dates breeding nest building
- Dates and number of eggs laid
- Dates, number hatchlings
- ID of feeding adults
- Growth of nestlings
- Date nestlings banded and IDs
- Date and weight at fledging

11.12 Identification methods

The optimal time for banding nestlings in the wild is 11 or 12 days. Before that time, legs and feet are too small, after that time result in premature fledging – the birds jump out of nest and are difficult to return to the nest. It has been found best to undertake the banding out of sight and sound of nest and parents (Brown, 1977).

11.13 Hygiene

At this stage, no special hygiene requirements for the breeding group have been defined.

11.14 Behavioural considerations

Fledglings require the company of their groups to develop foraging, communal nesting and breeding skills.

11.15 Use of foster species

This is not applicable to this species at this time.

11.16 Weaning

Young birds should probably not be removed from the group until around 2 years of age. Careful monitoring is required to determine whether young (?males) need to be removed earlier if there is aggression from other birds.

11.17 Rehabilitation procedures

This is not applicable to this species at this time.

ACKNOWLEDGEMENTS

Maggie Watson provided encouragement and very welcome editorial assistance.

Karina Cartwright, of Healesville Sanctuary, provided invaluable information and advice drawn from her experience of handling the Grey-crowned Babbler populations at the Alice Springs Desert Park. This manual could not have been brought to its current form without the benefit of Karina's advice. With her help, more detailed information is still to be gathered from the Alice Springs Desert Park.

Cathy Alexander provided useful information about handling the White-browed Babbler at Taronga Zoo, and Dean Ingwersen headed me in the right direction to contact Karina.

The generous and cheerful help of these people is appreciated.

REFERENCES

- ABBS. (2000a). *Banding birds: The Australian Bird Banding Manual (compiled by KW Lowe)*. Australian Parks and Wildlife.
- ABBS. (2000b). *Recommended band size list - birds of Australia and its territories, no24*. Canberra: Environment Australia.
- Blackmore, C., & Heinsohn, R. (2007). Reproductive success and helper effects in the cooperatively breeding grey-crowned babbler. *Journal of Zoology*, (273) 326-332.
- Brown, J. (1977). Growth of nestling Grey-crowned Babblers, with notes on determination of age in juveniles. *The Emu*, (79)1-6.
- Brown, J., Brown, E., & Brown, S. (1982). Morphological variation in a population of Grey-crowned Babblers: Correlations with variables affecting social behavior. *Behav Ecol Sociobiol*, (10) 281-287.
- Brown, J., Brown, E., Brown, S., & Dow, D. (1982). Helpers: Effects of experimental removal on reproductive success. *Science*, (215) 421-422.
- Brown, J., Dow, D., Brown, E., & Brown, S. (1983). Soci-ecology of the Grey-crowned Babbler: population structure, unit size and vegetation correlates. *Behav Ecol Sociobiol*, (13) 115-124.
- Bureau of Animal Welfare. (2001). *Code of Practice for the Housing of Caged Birds*. Melbourne: Department of Primary Industries.
- Christidis, L., & Boles, W. (2008). *Systematics and taxonomy of Australian birds*. Collingwood: CSIRO Publishing.
- Counsilman, J. (1977). A comparison of two populations of the Grey-crowned Babbler (Part 1). *Bird Behaviour*, (1) 43-82.
- Counsilman, J. (1980). A comparison of two populations of the Grey-crowned Babbler (part 2). *Bird Behaviour*, (2) 1-109.
- Counsilman, J. & King, B. (1977). Ageing and sexing the Grey-crowned Babbler (*Pomatostomus temporalis*). *Babbler*, (1) 23-41.
- Cristinacce, A., Ladkoo, A., Switzer, R., Jordan, L., Vencatasamy, V., de Ravel Koenig, F., et al. (2008). Captive breeding and rearing of critically endangered Mauritius Fody *Foudia rubra* for reintroduction. *Zoo Biology*, (27) 255-268.
- Department of the Environment and Heritage. (2006). *Checklist for Clinical Examination of Captive Birds by the as one of the Hygiene Protocols for the Prevention and Control of Diseases (Particularly Beak and Feather Disease) in Australia*. Canberra: Australian Government.
- Dilks, P. (1993). *Mohua captive management plan*. Wellington: Department of Conservation, New Zealand Government.

Dow, D., & Gill, B. (1984). Measuring growth in nestling Grey-crowned Babblers. *The Emu* , (84) 185-187.

Dow, D., & King, B. (1984). Communal building of brood and roost nests by the Grey-crowned Babbler *Pomatostomus temporalis*. *The Emu* , (84) 193-199.

Eguchi, K., Yamaguchi, N., Ueda, K., Nagata, H., Takagi, M., & Noske, R. (2007). Social structure and helping behaviour of the Grey-crowned Babbler *Pomatostomus temporalis*. *Journal of Ornithology* , (148) (Suppl) S203-S210.

Environmental Protection Agency. (2008). *Code of Practice- Aviculture* . Brisbane: Environment Protection Agency, Queensland Government.

Environmental Protection Agency . (2009). *Rescuing Birds*.
http://www.epa.qld.gov.au/nature_conservation/wildlife/caring_for_wildlife/carers_kit/birds/rescuing_birds/?format=print: Queensland Government.

Fiby, M. (2001). *Streets Creatures of the Wollemi*. ZooLex Exhibit
(www.zoolex.org/zoolex/cgi/view.py?id=286).

Garnett, S., & Crowley, G. (2000a). *Taxon Summary Grey-crowned Babbler (eastern) The Action Plan for Australian Birds* . Environment Australia.

Garnett, S., & Crowley, G. (2000b). *The Action Plan for Australian Birds*. Environment Australia.

Gill, B., & Dow, D. (1983). Morphology and development of nestling Grey-crowned and Hall's Babblers. *The Emu* , (83) 41-43.

Gill, B., & Dow, D. (1985). Waking and roosting of Grey-crowned Babblers *Pomatostomus temporalis* in south-east Queensland during Spring. *The Emu* , (2) 97-105.

Government of the Australian Capital Territory. (1995). *Code of Practice for the welfare of captive birds in the ACT*. Canberra: Government of the Australian Capital territory.

Government of the Australian Capital Territory. (1995). *Code Of Practice for the Welfare of Captive Birds in the Australian Capital Territory* . Canberra : Government of the Australian Capital Territory.

Hall, B.(1974) Cited in (2002). *Handbook of Australian, New Zealand & Antarctic Birds. Volume 6 Pardalotes to shrike thrushes*. Melbourne: Oxford University Press.

Higgins, P., & Peter, J. (. (2002). *Handbook of Australian, New Zealand and Antarctic Birds Volume 6: Pardalotes to Shrike-thrushes* . Melbourne: Oxford University Press.

Hobbs, J. (1955). Grey-crowned Babblers removing parasites from plumage . *The Emu* , 313.

Joseph, J. V. (2003). Infectious and parasitic diseases of captive passerines. *Seminars in Avian and Exotic Pet Medicine* , 12 (1) 210-28.

King, B. (1980). Social organisation and behaviour of the Grey-crowned Babbler *Pomatostomus temporalis*. *Emu* , 59-76.

Krake, D., & Thomas, J. (2000). *Husbandry Manual for Yellow-tufted Honeyeaters L M cassidix and L M gippslandicus*. Healesville: Healesville Sanctuary.

Mees, G. 1.(1974) Cited in (2002). *Handbook of Australian, New Zealand and Antarctic Birds*. Melbourne: Oxford University Press.

Muller, K. (1976). Maintaining insectivorous birds in captivity . *International Zoo Yearbook* , 16 (1); 1 - 450.

Northern Territory Animal Welfare Advisory Committee . (nd) *Guidelines for the care and welfare of caged birds* . Darwin : Northern territory Government .

Pichner, J. (2003). *BABBLERS Husbandry and Management*. Apple Valley: Minnesota Zoo.

Pizzey, G., & Knight, F. (2003). *The field guide to the birds of Australia. Seventh Edition*. Sydney: HarperCollins Publishers.

Reece, R., Barr, D., & Scott, P. (1992). Common necropsy findings in captive birds in Victoria, Australia (1978-1987). *Journal of Zoo and Wildlife medicine* , 23 (3) 301-312.

Simpson, K., Day, N., & Trusler, P. (2004). *Field Guide to the Birds of Australia*. Camberwell: Penguin Books Australia.

Strasser, P. (2000). PLanted Aviaries for softbills . *American Federation of Aviculture Convention, Los Angeles* (pp. 172-179). Phoenix: American Federation of Aviculture.

Tollefson, C. (1982). Nutrition. In M. Petrak, Lee, & (. Febiger, *Diseases of cage and aviary birds* (pp. 220-232). Philadelphia.

Vaartjes, S. (2006). *Royal Melbourne Zoological Gardens Keeper's Animal Records Manual*. Melbourne: Melbourne Zoo.

West. Aust. Mus.(1981) Cited in (2002). *2002 Handbook of Australian, New Zealand and Antarctic Birds*. Melbourne: Oxford University Press.

ATTACHMENT 1: Daily report guidelines, from The Royal Melbourne Zoological Gardens – Keeper’s Animal Records Manual (Vaartjes, 2006) (P31-32)

ANIMAL RECORDS – DAILY REPORT ENTRY GUIDELINES – 2006

INTRODUCTION

The purpose of the Animal records and Daily Report system is to provide easily retrievable information about the animals in the collection, so that they can be managed appropriately. This includes keeping records of total numbers and sexes of each species; individual identification, enclosure data, and all other information regarding behavioural, reproductive and medical details for each animal.

WHO RECORDS THE DATA?

Any keeper on a section who makes an observation (ie: behavioural, reproductive), moves an animal to a new enclosure, receives or transfers an animal in or out of their section, treats an animal etc.

WHERE IS THE DATA RECORDED?

All entries should be written on the Daily Report. Everything entered onto the Daily report (with the exception of Seal training – recorded at Seals) is entered onto ARKS. General notes made by keepers to keepers are not recorded.

WHAT DATA TO RECORD?

1. All entries **MUST** use the animal’s ARKS#. It is also useful to enter a further ID, into that column on the Daily Report – eg: house name, tag etc. Sections are given an ARKS# update monthly by the Records Officer and can use this for quick reference when entering their data.
2. **BIRTHS/DEATHS/ARRIVALS/DEPARTURES** must be written up on the day that they happen.
3. **ENCLOSURE MOVES** using individual ARKS# for each animal (or if an entire group is moved – a note stating that all individuals of that species from that enclosure were moved) and the enclosure codes of the old and new enclosure.
4. **SEX** if a young animal was recorded as unknown sex at birth, a note should be written up as soon as positive sex identification has been made. Also how sex was established eg: visually for a kangaroo, probing for a reptile or DNA feather sexing for a bird.
5. **SEASONAL CHANGES** eg: bird moult.
6. **WEIGHTS AND MEASUREMENTS**. All weights and measurements should be recorded in a systematic manner. This includes both live animals and eggs. See Appendix III for information on standard measurements.
7. **REPRODUCTIVE**. All reproductive behaviour and female oestrous cycles
8. **BEHAVIOURAL**. There is always something to report in this area! For eg: a new animal arrives, or is mixed for the first time. Aggression, group behaviour, grooming etc. These records will be referred to in the future and should always go onto the Daily Report to be recorded on ARKS.
9. **MEDICAL**. When the animal is sick or off-colour. Follow up information on treatment, procedures, improvements etc. Basic information is recorded on ARKS such as type of treatment and length etc, (detailed information is recorded by the Vets onto the animal’s medical record and MedARKS – such as dosage etc.).

WHERE THE INFORMATION GOES

The data recorded on the daily report is entered onto the ARKS system by the Records Officer. The network version of ARKS, which is available to each section, is updated weekly. Inventory data is sent to ISIS on a weekly basis. This includes transactions (births deaths, arrivals), Identification and weight data. None of the enclosure or comments data is sent. This type of information is returned to each participating Zoo in the form of DVD, or via the Internet. This information contains data from each zoo and allows us to trace animals from other zoos, look up animals which have been offered to us etc. The records are referred to all the time, both in-house and by other zoos, particularly by regional studbook keepers. What you record will stay on the specimen’s individual record, and should that animal be transferred out of the zoo, a copy of that record accompanies the animal to its new location. Keepers at other zoos will refer to this information to help them manage the animal.

ATTACHMENT 2: Checklist for Clinical Examination of Captive Birds

Checklist for Clinical Examination of Captive Birds

Species: _____ Age _____ Sex _____ Weight: _____

History	Physical Examination (continued)
<p>Aviary</p> <p><input type="checkbox"/> Gravel floor <input type="checkbox"/> Dowel perches <input type="checkbox"/> Chicken wire</p> <p><input type="checkbox"/> Dirt Floor <input type="checkbox"/> Natural perches <input type="checkbox"/> Wild bird contact</p> <p><input type="checkbox"/> Suspended cage <input type="checkbox"/> SS Wire <input type="checkbox"/> Gal wire</p> <p>Roof and run-off? _____</p> <p>Social</p> <p><input type="checkbox"/> Wild caught? <input type="checkbox"/> Captive bred? <input type="checkbox"/> Repro status</p> <p><input type="checkbox"/> Time in captivity <input type="checkbox"/> No in aviary <input type="checkbox"/> Hand reared?</p> <p><input type="checkbox"/> Intro. new birds</p> <p>Nutritional</p> <p><input type="checkbox"/> Eating? <input type="checkbox"/> Food & water dishes cleaned daily?</p> <p><input type="checkbox"/> Food & water changed & cleaned up regularly?</p> <p><input type="checkbox"/> Diet changed recently? <input type="checkbox"/> Fat <input type="checkbox"/> Thin</p> <p><input type="checkbox"/> Seed diet <input type="checkbox"/> Natural diet <input type="checkbox"/> Prepared diet</p> <p>Food storage? _____</p> <p>Food preparation? _____</p> <p>Water source: <input type="checkbox"/> Rain <input type="checkbox"/> Tank <input type="checkbox"/> Chlorinated</p> <p style="padding-left: 40px;"><input type="checkbox"/> Dam <input type="checkbox"/> Is bird drinking?</p> <p style="text-align: center;">Visual Examination in Aviary</p> <p>Posture? _____</p> <p><input type="checkbox"/> Normal feathers <input type="checkbox"/> Missing feathers <input type="checkbox"/> Fluffed up</p> <p><input type="checkbox"/> Coughing <input type="checkbox"/> Sneezing <input type="checkbox"/> Vomiting</p> <p><input type="checkbox"/> Respiratory effort?</p> <p>Droppings</p> <p><input type="checkbox"/> Blood <input type="checkbox"/> Undigested food <input type="checkbox"/> Watery</p> <p style="text-align: center;">Physical Examination</p> <p>Pectoral muscles _____</p> <p><input type="checkbox"/> Dehydrated <input type="checkbox"/> Tail-bobbing <input type="checkbox"/> Deformed feathers</p> <p><input type="checkbox"/> Mites <input type="checkbox"/> Lice <input type="checkbox"/> Powder down</p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Cloaca _____</p> <p>Feet _____</p>	<p>Head and Neck</p> <p>Beak _____</p> <p>_____</p> <p>Eye</p> <p><input type="checkbox"/> Ocular discharge? <input type="checkbox"/> Nasal discharge?</p> <p>Crop _____</p> <p>Abdomen</p> <p>_____</p> <p>_____</p> <p>Wings and Legs, Joints</p> <p><input type="checkbox"/> Bumblefoot? <input type="checkbox"/> Leg band _____</p> <p><input type="checkbox"/> Wings <input type="checkbox"/> Joints</p> <p style="text-align: center;">Samples</p> <p>Swabs</p> <p><input type="checkbox"/> Eye <input type="checkbox"/> Choanal slit <input type="checkbox"/> Food dish</p> <p><input type="checkbox"/> Water dish <input type="checkbox"/> Cloaca <input type="checkbox"/></p> <p>Other: _____</p> <p>Blood</p> <p><input type="checkbox"/> PCV <input type="checkbox"/> CBC <input type="checkbox"/> BFDV PCR</p> <p><input type="checkbox"/> BFDV HI <input type="checkbox"/> Parasites <input type="checkbox"/> Genetic</p> <p><input type="checkbox"/></p> <p>Faeces</p> <p><input type="checkbox"/> Parasitology <input type="checkbox"/> Microbiology <input type="checkbox"/></p> <p>Skin/feather</p> <p><input type="checkbox"/> Parasitology <input type="checkbox"/> Microbiology <input type="checkbox"/> BFDV PCR</p> <p><input type="checkbox"/> BFDV HA <input type="checkbox"/> <input type="checkbox"/></p>

ATTACHMENT 3: Guidelines for quarantine of birds, Department of Agriculture, Fisheries and Forestry, Government of Australia.

Steps to help prevent disease outbreaks in your birds

Whether you are a commercial producer or just have a few birds in your backyard, **all bird owners** have a vital role in preventing disease outbreaks, whether it be bird flu or other bird diseases. The following eight simple steps will help prevent disease outbreaks in your birds.

1. Keep your equipment and poultry yard or aviary clean

- remove litter, sand and grit from the aviary between batches of birds, and every few months for resident birds
- thoroughly clean concrete floors, walls and aviary wire with soapy water, and disinfect as needed
- clean and disinfect feed and water containers regularly
- don't share equipment with other bird keepers, unless it has been thoroughly cleaned and disinfected

2. Avoid contact between your birds and wild birds

- prevent contact with wild birds by restricting access to open ponds, lakes and creeks - protective netting can also help prevent wild birds from entering domestic bird areas
- clean up surrounding areas to reduce shelter and hiding places for wild birds

3. Don't let feed and water become contaminated by faeces or other animal waste

- ensure water supplied to poultry is from a chlorinated mains water supply, a microbiologically clean bore, or treated with chlorine if these sources aren't available
- don't allow wild birds or pest animals to contaminate your birds' feed - store it in a container with a secure lid

4. If you go to shows practice good hygiene

5. Limit visitors to your birds

- **restrict access to bird areas**
- ask visitors to put on clean protective clothing and use foot-baths containing appropriate disinfectants at the entrance to bird areas or sheds
- keep a record of visitors

6. Quarantine new birds

- separate and monitor new birds for at least 30 days before introducing them to your existing flock
- always source your birds from a reputable producer or breeder whose bird health status is known
- always buy healthy looking birds and avoid buying them from markets
- feed and clean quarantined birds **after** you have tended to other birds

7. Know the signs of disease

- swollen heads
- dullness
- drop in egg production
- respiratory distress
- diarrhoea
- loss of appetite
- sudden death of several or more birds

Other potential signs include:

- reluctance to move, eat or drink
- droopy appearance
- inability to walk or stand
- unusual head and neck posture.

8. Immediately report any sick or dead birds

- If you see any unusual symptoms in your birds or find that a number of them have died within a short period of time, be on the safe side and report it immediately to your local veterinarian, Department of Primary Industries or the **Emergency Animal Disease Hotline on 1800 675 888**.

It is essential that any suspected disease outbreak be reported immediately!

For further biosecurity information contact your local vet, or Department of Primary Industries or Agriculture in your state or territory.