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CONTENTS

TIMOTHY HAMLEY, PAUL FLOWER, and GEOFFREY C. SMITH Present and past distribution of the Black-breasted Button-quail <i>Turnix melanogaster</i> (Gould) in Queensland.....	1
STEPHEN GARNETT and GABRIEL CROWLEY Range extension of the White-streaked Honeyeater <i>Trichodere cockerelli</i>	22
BRIAN MACKNESS and RORY O'BRIEN Group defence strategy by White-winged Choughs <i>Corcorax melanorhamphos</i>	24
A.S. KUTT and J.E. KEMP Common Myna <i>Acridotheres tristis</i> preys on Two-lined Dragons <i>Diporiphora australis</i>	26

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THE SUNBIRD

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PRESENT AND PAST DISTRIBUTION OF THE BLACK-BREASTED BUTTON-QUAIL *TURNIX MELANOGASTER* (GOULD) IN QUEENSLAND

TIMOTHY HAMLEY, PAUL FLOWER and GEOFFREY C. SMITH

ABSTRACT

In southern Queensland the Black-breasted Button-quail is presently found in 14 groups of sites between Marlborough in the north and the Border Ranges in the south. Populations within sites may be isolated from one another. The sites extend as far west as Palm Grove in the north and the Bunya Mountains in the south of their range. This range extends that last reported in 1985 (which located populations only as far north as Gympie in the east and Nanango in the west, post-1970), and is different to the pre-1970 estimated range. Populations have become locally extinct near Duaringa. However they have now been recorded further west than before, in isolates of former bottle-tree scrubs associated with Brigalow. The distribution at the time of European occupation is not known; it is possible the species was once distributed through the Brigalow belt. We estimate that available habitat within the Black-breasted Button-quail's range has been reduced by as much as 90% and the remaining habitat is fragmented and often disturbed. Known populations are poorly conserved in protected areas, occurring in only eight National Parks and seven other areas (e.g. council or army reserves) where environmental impact is controlled under legislation. Most recorded populations occur in State Forests. A large proportion of these populations reside in scrub breaks and larger remnant patches of vine forest adjacent to hoop pine plantations.

INTRODUCTION

The Black-breasted Button-quail *Turnix melanogaster* is one of Australia's most infrequently seen and least studied birds. First described from Moreton Bay in the 1830's (Gould 1837, 1865), the recorded sightings of *T. melanogaster* prior to 1970 (summarised in Bennett 1985) indicate an historical range for the species covering the area from Rockhampton in the north, south to around the

Grafton district of northern New South Wales, and west at least to the Great Dividing Range. A number of sightings of *T. melanogaster* have also been recorded from northern Queensland, although Bennett (1985) considers these to be unreliable. LeSouef (1897) sighted a pair of Black-breasted Button-quails about 40km south of Cooktown in 1896 and R. Grant collected a specimen of *T. melanogaster* from Cairns in 1887. However, Bennett (1985) points out that a number of specimens from Grant's collection are of doubtful provenance. Bravery (1970) reported seeing *T. melanogaster* many times either singly or in pairs over a three-year period, on his property 2 km north-east of Atherton in the 1960's.

Bennett (1985) noted that post-1970, as a result of habitat loss and disruption, the Black-breasted Button-quail had contracted its range into an area one half to one third of its former distribution. In the northern part of their range the distribution was perhaps no further than Gympie, and in the west to Nanango and the Bunya Mountains, with a population of unknown status inhabiting the northern part of Fraser Island. However, some unreported sightings of Black-breasted Button-quail from the Gin Gin area near Bundaberg in the mid 1980's (E. Zillman pers. comm.) suggest a slightly wider distribution at that time. Prior to the current survey, available data (Bennett 1985) indicated that as a result of habitat loss and disruption, the species had contracted its range into an area 35-50% of its former distribution. Human activities and the impact of other species currently pose a distinct threat to the species' survival. *T. melanogaster* was listed until recently as Vulnerable by CITES and IUCN (Garnett 1992), but has since been re-classified as Endangered by Collar *et al.* (1994).

Given the concern over the species' apparent shrinking range and that remaining habitat is often fragmented and disturbed, areas of potential habitat were mapped and surveyed for Black-breasted Button-quail: (1) to delimit their presently existing geographical range within southern Queensland; (2) to assess the status of populations; and (3) to ascertain the tenure of lands where they occurred and therefore the level of protection afforded.

METHODS

Sites surveyed were chosen on the basis of historical (pre-1985) and incidental (post-1985) records and on predicted sites of occurrence based on vegetation type and known habitat preferences. This habitat was identified through air photo interpretation and the DPI Forestry Area Information System. Locations of dry rainforest types recorded by Forster *et al.* (1991) and Werren & Kershaw (1987) were also used to select survey sites.

Intensive surveys for Black-breasted Button-quail were carried out from May

1992 to October 1993, with additional opportunistic surveys conducted up to the present. The surveys covered an area in the north, from Rockhampton west to the Great Dividing Range, and in the south, from the McPherson Ranges west to the headwaters of the Moonie River. No areas of potentially suitable habitat were surveyed west of The Great Dividing Range. Each site was surveyed using methods designed to minimise disturbance to the birds and thereby increase the chances of sightings; i.e. an effort was made to become familiar with the site prior to entry, sites were entered and traversed as quietly as possible, short focal length binoculars were used from positions close to the ground, and any sounds that may have indicated the presence of birds were investigated. However, the extreme shyness of Black-breasted Button-quail meant that failure to sight birds did not necessarily mean they were not present, and at each site visual surveys for birds were supplemented with surveys for platelets (feeding traces).

The presence of platelets in potentially suitable habitat, when considered in conjunction with information such as the distance to a known population, degree of habitat disturbance (e.g. the presence of cattle or macropods) and possibility of presence of Painted Button-quail *T. varia* in the area (see below), was used to assess the likelihood that *T. melanogaster* were present at a site. Platelets in closed forest were not inevitably made by Black-breasted Button-quails. Painted Button-quail are known, on occasion, to occupy closed forest similar to that inhabited by Black-breasted Button-quail, and they also clear platelets (Marchant & Higgins 1993). Painted Button-quail generally occur in a wide variety of habitats, most often associated with lightly wooded country in southern and eastern Australia. Factors influencing their occupation of closed forest are not clear, but from the small number of sightings made, the presence of a disturbed forest canopy and an adjoining area of open forest with developed grassy understorey appear to be important.

RESULTS

Over 400 sites were identified as potential Black-breasted Button-quail habitat, but most were unsuitable. Black-breasted Button-quail were seen or assumed to be present (platelets) at a total of 75 sites (intensive survey to present) or 125 sites if incidental sightings, prior to the intensive survey, are included (see Appendix 1). Sites of occurrence have been ordered, for convenience, into 14 groups. A lack of knowledge of the species' dispersal capability and propensity makes it impossible to determine whether each group represents a single interbreeding population of birds or a number of isolated populations.

TABLE 1. Human tenure of Black-breasted Button-quail sites. Tenure may be State Forests (S.F.), Special Management Area (S.M.A.), National Park (Nat. Park) or Freehold. The size and connectedness of the State Forest and National Park sites is given. Numerals refer to broad geographical groupings defined in the text. Numbers in parentheses refer to State Forest or National Park numbers..

GROUP	Total Sites	TENURE					DESCRIPTION (State Forests & National Parks only)					
		S.F.	SMA	Nat. Park	Freehold	Other	<25ha	25-100ha	>100ha	Strip Plot	Isolated	Connected
I. Lower Fitzroy	3	1(55) 1(96) 1(46)					3			3	1	2
II. Palm Grove	1			1(25)				1		1	1	
III. Kalpower	5	1(95) 1(506) 1(391) 1(215)			1		2	1	1	1	3	4
IV. Bundaberg	2				1	1						
V. Maryborough/ Wide Bay	10	1(960)		1(16) 1(1238)	3	4	3			3	2	1
VI. Auburn River	7	2(132) 2(302/70)			2	1	1	1	2		4	2
VII. Goomeri Lowlands	6	1(355) 1(74) 2(67)	1(254)	1(792)			2	4		2	4	4
VIII. Conondale Ranges	13	2(82) 2(207) 1(220) 1(242) 1(274) 2(298) 2(639)	1		1		7	3	2	10	2	?12

TABLE 1 cont.

GROUP	Total Sites	S.F.	SMA	Nat. Park	Freehold	Other	<25ha	25-100ha	>100ha	Strip Plot	Isolated	Connected
IX. Yarraman	31	1(117) 2(316) 1(118) 2(618) 2(466) 7(257) 6(289) 1(379) 4(329) 4(283) 1(258)		1(586)			16	7	8	25	6	?31
X. Bunya Mountains	6	4(151)		2(603)			3	1	2	3	3	?6
XI. D'Aguillar	4	1(637)			1	2	1			1	1	
XII. Toowoomba	2		1	1(492)			1		1	1	1	2
XIII. Boonah/ Mt. French	3			1(835) 1(933)	1		1	1		1	1	2
XIV. Border Ranges	7	1(200) 1(359)		1(9451)	4		2		1	2	1	?3
TOTAL	100	64	3	11	14	8	42	19	17	52	26	19

PRESENT DISTRIBUTION

Group I : Lower Fitzroy Group

The sites in this group represent the most northerly recorded sightings of Black-breasted Button-quail since the mid-1960's. The sightings of birds and platelets were made in Araucarian notophyll vine forest in Timber Reserves around Marlborough and Rockhampton (M. Schulz, pers. comm.). The vine forest in Timber Reserves 55 and 96 were continuous and it is likely that Black-breasted Button-quail would occur throughout this area.

Group II : Palm Grove Group.

This sighting (one only) extends the range of the Black-breasted Button-quail to the headwaters of the Dawson River and represents the most westerly recorded sighting of the species since the mid-1960's. The sighting was made in a small area of Semi-Evergreen Vine Thicket (SEVT) along the north-easterly edge of the closed forest at Palm Grove National Park (NP 25). Due to habitat clearance and degradation, the Black-breasted Button-quail in this area may be the last population in the Dawson and Fitzroy River catchments, areas in which they were widespread and apparently common prior to 1970 (Bennett 1985; H. Nix pers. comm.).

Group III : Kalpower Group

Black-breasted Button-quails were unknown from this area prior to the survey, apart from some unreported sightings from Bulburin State Forest (SF 391) by Eric Zillman (pers. comm.) in the early 1980's. Four sightings (3 birds, 1 platelet) were made at Kalpower State Forest (SF 95), Pine Mountain State Forest (SF 506), Yarrol Scrub (private property) and Yarrol State Forest (SF 215). A Black-breasted Button-quail collected by George Masters in 1865 and incompletely labelled as "obtained from Rockhampton and Pine Mountain" may have come from the Pine Mountain in this area, although it could also have come from either "Shoalwater Bay (Pine Mountain)" or "Pine Mountain near Ipswich," as previously suggested by Bennett (1985). The sighting locations at Kalpower and Pine Mountain are approximately 12km apart, in small patches of remnant Notophyll Vine Forest (NVF). Yarrol Scrub is a large area of NVF (more than 100 ha), separated from Yarrol State Forest by about 2-3km of agricultural land. The NVF at Yarrol State Forest occurs in small remnant patches of less than 15ha, all of which show evidence of disturbance by wallabies. Large areas of wetter NVF fringed with drier Simple NVF occur at Bania State Forest and Bulburin State Forest within the Kalpower grouping. No evidence of *T. melanogaster* was found at either site, although the habitat is potentially suitable.

Group IV: Bundaberg Region Group

Eric Zillman (pers. comm.) reported seeing Black-breasted Button-quail at a

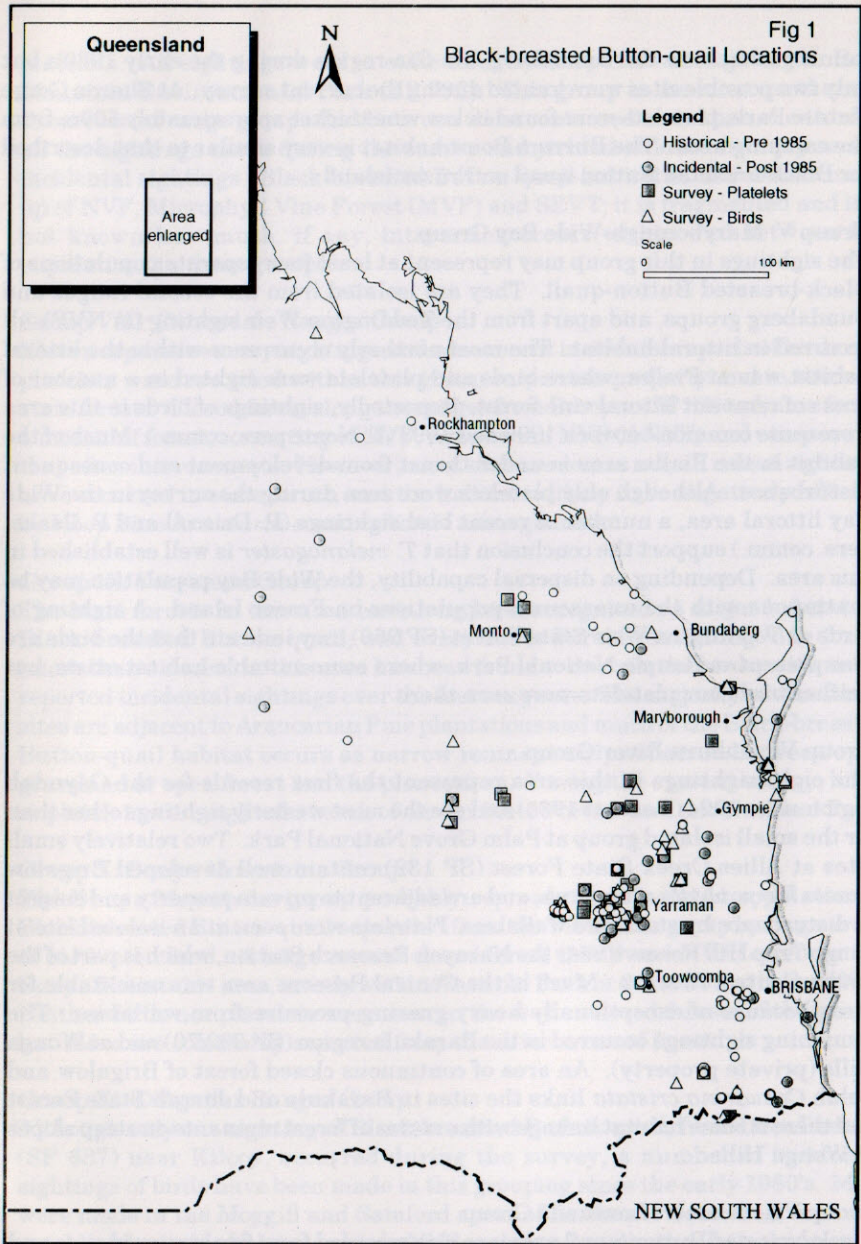


Fig. 1 - Map of south-eastern Queensland showing the location of historic, incidental and current Black-breasted Button-quail sites.

number of sites in the Bundaberg-Gin Gin region during the early 1980's but only two possible sites were located during the current survey. At Sharon Gorge Nature Park, platelets were found in low vine thicket approximately 500m from the camping area. The Burrum Point habitat is very similar to that described for Black-breasted Button-quail on Fraser Island.

Group V: Maryborough-Wide Bay Group

The sightings in this group may represent at least four separate populations of Black-breasted Button-quail. They are isolated from the coastal ranges and Bundaberg groups, and apart from the Teddington Weir sighting (in NVF), all occurred in littoral habitat. The most northerly occurrence within the littoral habitat was at Pialba, where birds and platelets were sighted in a number of areas of remnant littoral vine forest. Reportedly, sightings of birds in this area were quite common between 1990 and 1993 (E. Neate pers. comm.). Much of the habitat in the Pialba area is under threat from development and consequent disturbance. Although only platelets were seen during the survey in the Wide Bay littoral area, a number of recent bird sightings (P. Driscoll and P. Peake, pers. comm.) support the conclusion that *T. melanogaster* is well established in this area. Depending on dispersal capability, the Wide Bay population may be continuous with the unassessed populations on Fraser Island. A sighting of birds at Teddington Weir State Forest (SF 960) may indicate that the birds are also present in Bauple National Park, where some suitable habitat exists, but neither birds nor platelets were seen there.

Group VI: Auburn River Group

The eight sightings in this area represent the first records for the Gayndah region since 1924 (Bennett 1985) and are the most westerly sightings other than for the small isolated group at Palm Grove National Park. Two relatively small sites at Allies Creek State Forest (SF 132) contain well developed Brigalow *Acacia harpophylla* vine scrub, and are adjacent to private property and subject to disturbance by stock and wallabies. Platelets were seen at an isolated site at Dingo Trap Hill Reserve near the Narayen Research Station, which is part of the 450ha Central Reserve. Much of the Central Reserve area was unsuitable for birds because of exceptionally heavy grazing pressure from wallabies. The remaining sightings occurred in the Barakula region (SF 302/70) and at Wonga Hills (private property). An area of continuous closed forest of Brigalow and Belah *Casuarina cristata* links the sites in Barakula and Jarrah State Forest and there is some habitat linkage with a series of forest remnants on steep slopes at Wonga Hills.

Group VII: Goomeri Lowlands Group

Black-breasted Button-quail presence was recorded from five surveyed sites and one recent incidental record (P. Patterson and D Ferriday, pers. comm.) in this area. Four of the sightings were of birds and two of a relatively high density of

platelets. All sightings were in state forests, except for one sighting in Boat Mountain Environmental Park (EP 792). This group is the most northern of three coastal range groups that between them contained more than one-third of all the sightings made during the survey and yielded at least as many recent incidental sightings. Black-breasted Button-quail habitat in this area is made up of NVF, Microphyll Vine Forest (MVF) and SEVT; it is fragmented and it is not known how much, if any, interaction occurs within and between the populations in these groups.

Group VIII: Conondale Ranges Group

Eleven separate survey sightings and nine recent incidental reports of birds and platelets were recorded within this group on private property and in thirteen state forests. Closed forest along the ranges from Brooyar (SF 82) to Jimna forms a mosaic of forest, consisting of NVF, Araucarian NVF (ANVF) and vine scrubs, that often interconnects. However, most sites are remnants, all recent sightings have occurred in state forest, and the habitat is likely to be negatively affected by Hoop Pine *Araucaria cunninghamii* management.

Group IX: Yarraman Group

The state forests in this area have long been recognised as major habitat for Black-breasted Button-quail, and every State Forest containing vine forest (more than a dozen) in this area has been found to contain the birds, with many reported incidental sightings over the last ten years. The majority of vine forest sites are adjacent to Araucarian Pine plantations and much of the Black-breasted Button-quail habitat occurs as narrow remnant strips of scrub between open grassland or open forest and the plantations. During the current survey, birds or platelets were sighted at each of eleven State Forests and one National Park.

Group X: Bunya Mountains Group

The Bunya Mountains group probably represents an isolated population of Black-breasted Button-quail separated from the Yarraman group by large areas of cultivated land. A large area of closed forest (MVF and NVF) exists in the Bunya Mountains area, mostly within National Park or State Forest boundaries. Neither birds nor platelets were seen in the wetter closed forests of the peaks, but these are commonly reported from the drier areas of forest.

Group XI: D'Aguilar Ranges Group

Although only one sighting of Black-breasted Button-quail, from Deer Reserve (SF 637) near Kilcoy, occurred during the survey, a number of incidental sightings of birds have been made in this grouping since the early 1980's. Most were made in the Moggill and Samford areas of Brisbane. Scattered, remnant patches of suitable habitat (mainly NVF and vine forest) are relatively common in the D'Aguilar Ranges and some populations may remain unrecorded. There is a distinct lack of platelets in the Brisbane Forest region even though birds

have been regularly sighted in this area. It is thought that Black-breasted Button-quail may be more transient in this area (G. Beruldsen pers. comm.). This implies that resources are more scattered in this region and that Black-breasted Button-quails must forage more widely than elsewhere; therefore feeding platelets are expected to be more dispersed through the forests of this area and thus less easy to locate.

Group XII: Toowoomba/Lockyer Valley Group

Recent records from Redwood Park, Toowoomba City Council Reserve (P. McConnell pers. comm.; McConnell & Hobson 1995) and Ravensbourne National Park (NP 492, A. Smyth pers. comm.) suggest that a number of populations of Black-breasted Button-quail are extant in this area. A series of patches of remnant Brigalow scrub/vine forest remain along ridges of the Lockyer Valley between Toowoomba and Fernvale. Some are thought to have populations of Black-breasted Button-quail (G. Beruldsen pers. comm.) but all sites are on private property and difficult to reach; most of the patches are relatively small.

Group XIII: Boonah/ Mt French Group.

Black-breasted Button-quail are still resident in this area, for platelets were seen at Mt French National Park (NP 835) and at Spicers Gap National Park (NP 933) in NVF and vine forest. Recent sightings of Black-breasted Button-quail have been made around Mt Maroon (I. Gynther pers. comm.) and at Cameron Scrub, near Ipswich. Habitat in this area is extremely fragmented and most seems greatly disturbed by grazing.

Group XIV: Border Ranges Group

Platelets were seen near Tamrookum Creek, birds and platelets at two sites near Palen Creek (SF 200, SF 359), and platelets at a small patch of dense NVF at Browns Creek near Killarney. A number of recent incidental records also exist for sites around Back Creek, Beechmont; Cainbale Creek, Duck Creek Road; and Green Mountains, Lamington National Park (NP 9541). The Palen Creek sites appear to be significant, for habitat similar to that at Palen Creek occurs over the State border, continuing in a series of closed forests down the Richmond Range. The drier areas of closed forest bordering the wetter closed forest of the Border Ranges represent considerable potential habitat for Black-breasted Button-quail.

DISCUSSION

Current Distribution

The results of the survey show that range reduction of the Black-breasted Button-quail is not as extensive as the post-1970 records of bird sightings (Bennett 1985) suggest. However, considerable habitat reduction and disturbance

within that range indicates that what once may have been a widespread population of Black-breasted Button-quail may now consist of a number of fragmented and isolated populations. The total amount by which habitat has been reduced is hard to estimate. Clearance of Bottletree (*Brachychiton* spp.) Scrubs in parts of the species' identified range, at least since the start of the Fitzroy Development Scheme in the late 1950's and early 1960's, could amount to more than 95%, leaving only a few thousand hectares (Webb & Tracey 1981) of potentially suitable habitat. Unfortunately little fine scale information exists as to the extent and degree of fragmentation of remnant areas of Bottletree Scrubs. In general, much of the remaining habitat is fragmented and isolated, often occurring on steep slopes and gullies, and perhaps poor quality for Black-breasted Button-quail. Clearance of natural bushland is documented more fully in the South Moreton region of south-east Queensland (Catterall & Kingston 1993a). In that area some 92% of bushland below 20m elevation (951 km²), 82% of bushland between 20m and 60m elevation (2027 km²), and 71% of bushland between 60m and 160m elevation (2107 km²) has been cleared since white settlement.

Site Tenure and Size

Land ownership is a major factor contributing to patterns of bushland clearance (Catterall & Kingston 1993b), and the size of habitat patches and degree of connectivity between remnants are both presumably critical to the survival of Black-breasted Button-quail within an area. Thus, it is important to investigate the relationship that exists between land tenure, habitat patch size and connectivity at sites where birds were found. Table 1 summarises the tenure of the sites where Black-breasted Button-quail were in evidence, and provides estimates of patch size and connectivity where tenure is held by either DPI Forestry or DoE National Parks.

In total, 73% (61) of known Black-breasted Button-quail sites recorded during the intensive survey and up to the present time are in State Forests (34 separate forests), 10% (8) are in National Parks (7 different parks), and 17% (14) are either freehold or under some alternate form of tenure (e.g. council reserve or army reserve). Within the forests and parks, 35 sites of suitable habitat were less than 25ha in extent, 18 were between 25 and 100ha and 16 were greater than 100ha; 45 of the sites were on areas of habitat that existed as remnant strips, often less than 200m wide, and 18 of the sites appeared to be totally isolated from any other site within the site group. These figures do not necessarily represent the total available habitat, and such an estimate would require a much finer scale survey within each site group. Rather, the figures indicate the general trend towards fragmentation and small patch size that exists within the identified range of the Black-breasted Button-quail.

The overall importance of State Forest tenured lands as a repository of suitable habitat for Black-breasted Button-quail is evident from the preceding figures; it is even more noticeable when land tenure is considered within each separate site group. For example, in Group III (Kalpower), three of the four known sites are in State Forest while the fourth is on a freehold property. Because decisions on land use within private property are largely unregulated, persistence of habitat on freehold sites is at best unpredictable and relies on the goodwill of the landowner. Thus the responsibility for maintenance of Black-breasted Button-quail populations in the Kalpower group lies solely with DPI Forestry. A similar situation exists in Group VI (Auburn River), where four of the seven sites are in State Forest and only one other, Dingo Trap Hill Reserve, is subject to regulation. Perhaps the area where DPI Forestry's responsibility is most obvious is in the four groups of the coastal ranges (Group VII, Goomeri Lowlands; Group VIII, Conondale Ranges; Group IX, Yarraman; Group XI, D'Aguilar Ranges), where all but two of 32 surveyed sites occur in State Forests. At the Bunya Mountains (Group X), Toowoomba (Group XII) and the Border Ranges (Group XIV) the responsibility is shared with the Department of Environment. Within the five remaining groups, ie. Lower Fitzroy (Group I), Palm Grove (Group II), the Bundaberg region (Group IV), Maryborough/Wide Bay (Group V) and Boonah/Mt French (Group XIII), DPI Forestry currently has responsibility for timber reserves in the Lower Fitzroy and at Teddington Weir, south of Maryborough.

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- TIMOTHY HAMLEY, Queensland Forest Research Institute, DPI Forestry, 80 Meiers Rd, Indooroopilly, Q 4068. Present Address: Vertebrate Palaeontology Laboratory, Department of Zoology, University of Queensland, St Lucia, Q 4067.
- PAUL FLOWER, Queensland Forest Research Institute, DPI Forestry, 80 Meiers Rd, Indooroopilly, Q 4068. Present Address: P.O. Box 117, Kyogle, NSW 2474.
- GEOFFREY C. SMITH, Queensland Forest Research Institute, DPI Forestry, 80 Meiers Rd, Indooroopilly, Q 4068. Present address: Resource Sciences Centre, DNR, P.O. Box 631, Indooroopilly, Q 4068 (Correspondence)
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APPENDIX 1. Survey records for Black-breasted Button-quails in Queensland. LA = Logging Area; SFP = State Forest Park; NP = National Park.

Site No.	Site	Site Group	Record		Survey			1993 Survey	Sighting	Date
			Histo- rical	Incid- ental	Zero	Plate- lets	Birds			
1	Rockhampton	I Lower Fitzroy	H	-	-	-	-	Unchecked	Bird	1859
2	Black Mountain	I Lower Fitzroy	H	-	-	-	-	Unchecked	Platelets	1954-64
3	Coomboolaroo	I Lower Fitzroy	H	-	-	-	-	Unchecked (persist- ence unlikely)	Birds	c. 1900
4	Raglan	I Lower Fitzroy	H	-	Z	-	-	Presumed Extinct	Platelets	1954-64
5	Mt Ramsay	I Lower Fitzroy	H	-	Z	-	-	Extinct	Platelets	1954-64
6	Kiddell Plains	I Lower Fitzroy	H	-	Z	-	-	Extinct	Platelets	1954-64
7	Timber Reserve 55	I Lower Fitzroy	-	-	-	P	B	Present	Birds	1996
8	Timber Reserve 96	I Lower Fitzroy	-	-	-	P	-	Possible	Platelets	1996
9	Timber Reserve 46	I Lower Fitzroy	-	-	-	P	-	Possible	Platelets	1996
10	Palm Grove	II Palm Grove	-	-	-	-	B	Present	Birds	1993
11	Robinson Creek	II Palm Grove	H	-	Z	-	-	Extinct	Birds	1954-64
12	Cockatoo Creek	II Palm Grove	H	-	Z	-	-	Extinct	Birds	1954-64
13	Kalpower	III Kalpower	-	-	-	-	B	Present	Birds	1993
14	Pine Mountain SF	III Kalpower	-	-	-	-	B	Present	Birds	1993
15	Yarrol Scrub	III Kalpower	-	-	-	-	B	Present	Birds	1993
16	Yarrol State Forrest	III Kalpower	-	-	-	P	-	Possible	Platelets	1993
17	Granite Creek	III Kalpower	H	-	Z	-	-	Persistence uncertain	Birds	1982
18	Pine Creek 1	III Kalpower	H	-	Z	-	-	Presumed Extinct	Birds	c. 1980
19	Bellbooth	IV Bundaberg	H	-	-	-	-	Extinct	Birds	1930s
20	Bucca	IV Bundaberg	H	-	Z	-	-	Persistence inconclusive	Birds	1970s
21	Sharon Gorge Nature Park	IV Bundaberg	-	-	-	P	-	Possible	Platelets	1993

SUNBIRD 27(1)

APPENDIX 1 cont.

Site No.	Site	Site Group	Record		Survey			1993 Survey	Sighting	Date
			Histo- rical	Incid- ental	Zero	Plate- lets	Birds			
22	Bungadoo	IV Bundaberg	H	-	-	-	-	Unchecked	Birds	1980
23	Walkers Scrub	IV Bundaberg	H	-	Z	-	-	Extinct	Birds	1980
24	Cabbage Tree Creek	IV Bundaberg	H	-	Z	-	-	Persistence not probable	Birds	1980
25	Pine Creek 2	IV Bundaberg	-	I	-	-	-	Present	Birds	1990
26	Duingal Creek	IV Bundaberg	-	I	Z	-	-	Extinct	Birds	1980
27	St Agnes Creek	IV Bundaberg	H	-	Z	-	-	Extinct	Birds	1980
28	Norvell Park	IV Bundaberg	H	-	Z	-	-	Persistence uncertain	Platelets	1980s
29	Eli Creek	V M'borough/Wide Bay	-	I	-	-	B	Present	Birds	1992
30	Grimstead	V M'borough/Wide Bay	-	I	-	-	-	Extinct	Birds	1990
31	Ansons Road	V M'borough/Wide Bay	-	I	-	P	-	Possible	Platelets	1992
32	Sempfs Road	V M'borough/Wide Bay	-	I	-	-	-	Present	Birds	1992
33	Sandy Cape	V M'borough/Wide Bay	H	-	-	-	-	Unchecked	Birds	1970
34	Cathedrals	V M'borough/Wide Bay	H	-	-	-	-	Unchecked	Birds	?
35	Coomboo Lake	V M'borough/Wide Bay	H	-	-	-	-	Unchecked	Birds	1972
36	Eurong	V M'borough/Wide Bay	-	I	-	-	-	Present	Birds	1990
37	Ungowa	V M'borough/Wide Bay	H	-	-	-	-	Unchecked	Birds	1962
38	Rainbow Beach	V M'borough/Wide Bay	H	-	-	-	-	Uncheckable	Birds	1867
39	Inskip Point	V M'borough/Wide Bay	-	I	-	P	-	Possible	Platelets	1993
40	Bullock Jetty Rd	V M'borough/Wide Bay	-	I	-	P	-	Possible	Platelets	1993
41	Tin Can Bay	V M'borough/Wide Bay	-	I	-	-	-	Present	Birds	1992
42	Teebah Creek	V M'borough/Wide Bay	-	I	-	-	-	Possible	Platelets	1992
43	Double Island Point	V M'borough/Wide Bay	-	-	-	P	B	Present	Birds	1993
44	Thannaes Scrub	V M'borough/Wide Bay	-	-	-	P	-	Possible	Platelets	1993
45	Teddington Weir	V M'borough/Wide Bay	-	-	-	-	B	Present	Birds	1992

March 1997

APPENDIX 1 cont.

Site No.	Site	Site Group	Record		Survey		1993 Survey	Sighting	Date	
			Histo- rical	Incid- ental	Zero	Plate- lets				Birds
46	Dingo Trap Hill Res.	VI Auburn River	-	-	-	P	-	Possible	Birds?	1993
47	Crystal Springs	VI Auburn River	H	-	-	Z	-	Presumed Extinct	Birds	1924
48	Allies Creek	VI Auburn River	-	-	-	-	B	Present	Birds	1992
49	Oaky Creek	VI Auburn River	-	-	-	-	B	Present	Birds	1992
50	Wonga Hills	VI Auburn River	-	I	-	-	B	Still present	Birds	1993
51	Southern Wonga Hills	VI Auburn River	-	-	-	P	-	Possible	Platelets	1992
52	North Athlone	VI Auburn River	-	-	-	-	B	Present	Birds	1993
53	East Athlone	VI Auburn River	-	-	-	P	-	Possible	Platelets	1993
54	Cinnabar	VII Goomeri Lowlands	-	-	-	-	B	Present	Birds	1993
55	Nangur	VII Goomeri Lowlands	-	I	-	P	B	Present	Feathers	1993
56	Boat Mountain	VII Goomeri Lowlands	-	I	-	-	-	Present	Birds	1993
57	Wooroon	VII Goomeri Lowlands	-	-	-	P	-	Possible	Platelets	1993
58	Planted Hill Creek	VII Goomeri Lowlands	-	-	-	-	B	Present	Birds	1993
59	Marodian	VII Goomeri Lowlands	-	-	-	P	-	Possible	Platelets	1993
60	Brooyar	VIII Conondale Ranges	-	-	-	P	-	Possible	Platelets	1993
61	Oakview	VIII Conondale Ranges	-	-	-	-	B	Present	Birds	1993
62	Upper Widgee	VIII Conondale Ranges	H	I	-	-	-	Probably present	Call	1992
63	Myravale LA	VIII Conondale Ranges	-	-	-	P	-	Possible	Platelets	1993
64	Gallangowan/Yabba	VIII Conondale Ranges	-	I	-	-	-	Possible	Birds	1993
65	Elganvale-Kandanga Rd	VIII Conondale R.	-	I	-	-	-	Possible	Platelets	?
66	Gallangowan For. Stn.	VIII Conondale Ranges	-	-	-	P	-	Possible	Platelets	1993
67	Gallangowan	VIII Conondale Ranges	-	-	-	P	B	Present	Birds	1996
68	Banambah R.S Centre	VIII Conondale Ranges	-	-	-	P	-	Possible	Platelets	1993
69	Wratten	VIII Conondale Ranges	-	-	-	P	-	Possible	Platelets	?
70	Amamoor	VIII Conondale Ranges	-	I	-	-	-	Possible	Platelets	?

APPENDIX 1 cont.

Site No.	Site	Site Group	Record		Survey		1993 Survey	Sighting	Date	
			Histo- rical	Incid- ental	Zero	Plate- lets				Birds
71	Imbil	VIII Conondale Ranges	-	I	-	-	-	Possible	Platelets	?
72	Booloumba Ck. SF274	VIII Conondale Ranges	-	I	-	-	-	Present	Birds	c.1987
73	Jimna	VIII Conondale Ranges	-	I	-	-	P	Possible	Platelets/Call	1992
74	Peachtrees SFP	VIII Conondale Ranges	-	-	-	-	B	Present	Birds	1993
75	Exchange Jimna	VIII Conondale Ranges	-	-	-	P	-	Possible	Platelets	1993
76	Brooloo	VIII Conondale Ranges	-	I	-	-	-	Possible	Platelets	1993
77	Manumbar Station	VIII Conondale Ranges	H	-	-	-	-	Possible	Birds	1926
78	Charlie Moreland	VIII Conondale Ranges	H	-	-	-	-	Possible	Birds	1984
79	Mt Allan SF274	VIII Conondale Ranges	-	I	-	-	-	Possible	Platelets	?
80	Gympie	VIII Conondale Ranges	H	-	-	-	-	Unchecked (probably extinct)	Birds	?
81	Archookoorra	IX Yarraman	-	I	-	-	B	Still present	Birds	1993
82	Gibson 1	IX Yarraman	-	-	-	-	B	Present	Birds	1993
83	Gibson 2	IX Yarraman	-	-	-	P	B	Present	Birds	1996
84	Tarong	IX Yarraman	-	I	-	-	-	Possible	Platelets	1970-80
85	East Nanango 1	IX Yarraman	H	-	-	-	-	Unchecked	Birds	1953
86	East Nanango 2	IX Yarraman	-	I	-	-	-	Possible	Platelets	1990
87	East Nanango 3	IX Yarraman	-	-	-	-	B	Present	Bird	1993
88	Din Din SF 466 No.1	IX Yarraman	-	-	-	P	-	Possible	Platelets	1993
89	Din Din SF 466 No.2	IX Yarraman	-	-	-	-	B	Present	Bird	1993
90	Yarraman 1	IX Yarraman	H	-	-	-	-	Unchecked	Birds	1984
91	Yarraman 2	IX Yarraman	-	I	-	-	-	Present	Birds	1988
92	Yarraman 3 (Din Din LA)	IX Yarraman	H	-	-	-	-	Unchecked	Platelets	1979
93	Yarraman 4 (Peach LA)	IX Yarraman	H	-	-	-	-	Unchecked	Platelets	1979
94	Yarraman 5	IX Yarraman	H	-	-	-	-	Unchecked	Birds	1981
95	Yarraman 6	IX Yarraman	H	-	-	-	-	Unchecked	Birds	1970s

APPENDIX 1 cont.

Site No.	Site	Site Group	Record Survey					1993 Survey	Sighting	Date
			Histo- rical	Incid- ental	Zero	Plate- lets	Birds			
96	Yarraman 7	IX Yarraman	H	-	-	-	-	Unchecked	Birds	1970s
97	Yarraman 8	IX Yarraman	H	-	-	-	-	Unchecked	Birds	1970s
98	Yarraman 9	IX Yarraman	H	-	-	-	-	Unchecked	Birds	1970s
99	Yarraman 10	IX Yarraman	H	-	-	-	-	Unchecked	Birds	1970s
100	Yarraman 11	IX Yarraman	H	-	-	-	-	Unchecked	Birds	1970s
101	Yarraman 12	IX Yarraman	H	-	-	-	-	Unchecked	Birds	1970s
102	Yarraman 13	IX Yarraman	H	-	-	-	-	Unchecked	Birds	1970s
103	Yarraman 14	IX Yarraman	H	-	-	-	-	Unchecked	Birds	1970s
104	Yarraman 15	IX Yarraman	-	-	-	-	B	Present	Birds	1992
105	Yarraman 16	IX Yarraman	H	-	-	-	-	Unchecked	Birds	1980s
106	Yarraman 17	IX Yarraman	-	-	-	P	B	Present	Birds	1996
107	Yarraman 18 (Stables)	IX Yarraman	-	-	-	P	B	Present	Birds	1996
108	Yarraman 19 (Tower)	IX Yarraman	-	-	-	P	B	Present	Birds	1996
109	Googa 1	IX Yarraman	-	-	-	P	-	Possible	Platelets	1993
110	Googa 2 (Eliza LA)	IX Yarraman	-	I	-	P	-	Possible	Platelets	1993
111	Googa 3	IX Yarraman	-	I	-	-	-	Present	Birds	1989
112	Googa 4	IX Yarraman	-	I	-	-	-	Possible	Platelets	1989
113	Googa 5	IX Yarraman	-	I	-	-	-	Possible	Platelets	1989
114	Googa 6	IX Yarraman	-	I	-	-	-	Possible	Platelets	1989
115	Googa 7	IX Yarraman	-	-	-	P	B	Present	Birds	1996
116	Googa 8	IX Yarraman	-	-	-	P	B	Present	Birds	1996
117	Googa 9	IX Yarraman	-	-	-	P	B	Present	Birds	1996
118	Googa 10	IX Yarraman	-	-	-	P	B	Present	Birds	1996
119	Elgin Vale	IX Yarraman	-	-	-	P	-	Possible	Platelets	1993
120	Pidna 1	IX Yarraman	H	-	-	-	-	Unchecked	Birds	1970s

APPENDIX 1 cont.

Site No.	Site	Site Group	Record Survey					1993 Survey	Sighting	Date
			Histo- rical	Incid- ental	Zero	Plate- lets	Birds			
121	Pidna 2	IX Yarraman	-	-	-	P	B	Present	Birds	1996
122	The Palms NP	IX Yarraman	-	I	-	P	-	Possible	Platelets	1993
123	Benarkin 1	IX Yarraman	H	-	-	-	-	Unchecked	Birds	1981
124	Benarkin 2	IX Yarraman	-	I	-	-	-	Present	Birds	1989
125	Benarkin 3	IX Yarraman	-	I	-	-	-	Present	Birds	1989
126	Benarkin 4	IX Yarraman	-	I	-	-	-	Present	Birds	1989
127	Benarkin 5	IX Yarraman	-	I	-	-	-	Possible	Platelets	1989
128	Benarkin 6	IX Yarraman	-	I	-	-	-	Possible	Platelets	1989
129	Benarkin 7	IX Yarraman	-	I	-	-	-	Possible	Platelets	1989
130	Benarkin 8	IX Yarraman	-	I	-	-	-	Possible	Platelets	1989
131	Benarkin 9	IX Yarraman	-	I	-	-	-	Possible	Platelets	1989
132	Benarkin 10	IX Yarraman	-	-	-	P	B	Present	Birds	1996
133	Mt Binga 1	IX Yarraman	-	I	-	-	-	Present	Birds	1989
134	Mt Binga 2	IX Yarraman	-	I	-	-	-	Possible	Platelets	1989
135	Mt Binga 3	IX Yarraman	-	I	-	-	-	Possible	Platelets	1989
136	Mt Binga 4	IX Yarraman	-	I	-	-	-	Possible	Platelets	1989
137	Bunya Mountains	X Bunya Mtns	H	-	-	P	-	Possible	Platelets	1992
138	Munroes Camp	X Bunya Mtns	-	I	-	-	-	Possible	Bird	1970-80
139	Westcliff	X Bunya Mtns	-	I	-	P	-	Possible	Birds	1993
140	Cherry Plain	X Bunya Mtns	H	-	-	-	-	Possible	Bird	1970-80
141	Pimpinbudgee Creek	X Bunya Mtns	H	-	-	-	-	Possible	Platelets	1970-80
142	Saddletree Creek	X Bunya Mtns	H	-	-	-	-	Possible	Platelets	1970-80
143	Bunya Mtns Highway	X Bunya Mtns	-	-	-	P	-	Possible	Platelets	1993
144	Barkers Creek 1	X Bunya Mtns	-	-	-	-	B	Present	Birds	1993

APPENDIX 1 cont.

Site No.	Site	Site Group	Record		Survey			1993 Survey	Sighting	Date
			Histo- rical	Incid- ental	Zero	Plate- lets	Birds			
145	Barkers Creek 2	X Bunya Mtns	-	-	-	P	-	Possible	Platelets	1993
146	Tim Shea Creek	X Bunya Mtns	-	-	-	P	-	Possible	Platelets	1992
147	Deer Reserve	XI D'Aguilar	-	-	-	-	B	Present	Birds	1993
148	Peacheater	XI D'Aguilar	-	I	-	-	-	Present	Birds	1992
149	Bellbird Grove	XI D'Aguilar	H	-	-	-	-	Unchecked (assumed transient)	Birds	1980
150	Boombana	XI D'Aguilar	H	-	-	-	-	Unchecked	Birds	1980
151	Enoggera SF No. 1	XI D'Aguilar	H	-	-	-	-	Unchecked (possible)	Birds	1980
152	Enoggera SF No. 2	XI D'Aguilar	H	-	-	-	-	Unchecked (possible)	Birds	1980
153	Ugly Gully	XI D'Aguilar	H	-	Z	-	-	Persistence inconclusive	Birds	1977
154	Gold Creek Road 1	XI D'Aguilar	H	-	-	-	-	Unchecked (assumed transient)	Birds	1980s
155	Gold Creek Road 2	XI D'Aguilar	H	-	-	-	-	Unchecked (assumed transient)	Birds	1980s
156	Ithaca Ck, Mt. Cootha	XI D'Aguilar	-	I	-	-	-	Present, possibly transient	Birds	1993
157	Gap Creek Road, Mt. Cootha	XI D'Aguilar	-	I	-	-	-	Present	Birds	1991
158	Enoggera Reservoir	XI D'Aguilar	H	-	-	-	-	Unchecked	Birds	1980s
159	Gowrie Scrub	XII Toowoomba	H	-	-	-	-	Unchecked (persistence not probable)	Birds	1889
160	Redwood Park	XII Toowoomba	H	I	-	-	B	Present	Birds	1993
161	Murphy Creek	XII Toowoomba	H	-	-	-	-	Unchecked	Birds	1927
162	Ravensbourne	XII Toowoomba	H	-	-	-	B	Present	Birds	1993
163	Deongwar	XII Toowoomba	-	I	-	-	-	Possible	Platelets	?

APPENDIX 1 cont.

Site No.	Site	Site Group	Record		Survey			1993 Survey	Sighting	Date
			Histo- rical	Incid- ental	Zero	Plate- lets	Birds			
164	Pine Mtn., Ipswich	XIII Boonah/Mt. French	H	-	-	-	-	Unchecked	Birds	1952
165	Cameron Scrub	XIII Boonah/Mt. French	H	-	-	P	B	Present	Birds	1996
166	Flinton Hill	XIII Boonah/Mt. French	H	-	-	-	-	Unchecked	Birds	c. 1980
167	Mt Elliot	XIII Boonah/Mt. French	H	-	-	-	-	Unchecked	Birds	c. 1980
168	Mt Joyce	XIII Boonah/Mt. French	H	-	-	-	-	Unchecked (presumed extinct)	Platelets	1961
169	Woogaroo/Goodna Scrub	XIII Boonah/Mt. French	H	-	-	-	-	Unchecked (extinct)	Birds	1950s
170	Mt French NP	XIII Boonah/Mt. French	-	I	-	-	-	Possible	Platelets	?
171	Southern Mt French	XIII Boonah/Mt. French	H	-	-	-	B	Persistence probable	Birds	1992
172	French's Creek	XIII Boonah/Mt. French	-	I	Z	-	-	Absent	Birds	1992
173	Cotswald Scrub	XIII Boonah/Mt. French	H	I	-	-	-	Unchecked/Incidental (present)	Birds	1993
174	Spicers Gap	XIII Boonah/Mt. French	-	-	-	P	-	Possible	Platelets	1993
175	Prouts Hill	XIV Border Ranges	H	-	-	P	-	Possible	Platelets	1992
176	Tamrookum Creek	XIV Border Ranges	-	-	-	P	-	Possible	Platelets	1992
177	Back Ck. Beechmont	XIV Border Ranges	-	I	-	-	-	Present	Birds	1992
178	Green Mountains	XIV Border Ranges	-	I	-	-	-	Present	Birds	?
179	Cainbale Creek	XIV Border Ranges	H	I	-	-	-	Unchecked (persistence probable)	Birds	1993
180	Palen Creek SF 200	XIV Border Ranges	-	-	-	-	B	Present	Birds	1993
181	Palen Creek SF 359	XIV Border Ranges	-	-	-	P	-	Possible	Platelets	1992
182	Browns Falls	XIV Border Ranges	-	-	-	P	-	Possible	Platelets	1992
183	Buderim	Ungrouped	H	-	-	-	-	Unchecked	Specimen	1972
184	Macleay Island	Ungrouped	-	I	Z	-	-	Persistence unlikely	Bird	c.1990

RANGE EXTENSION OF THE WHITE-STREAKED HONEYEATER
TRICHODERE COCKERELLI

STEPHEN GARNETT and GABRIEL CROWLEY

The White-streaked Honeyeater *Trichodere cockerelli* occurs only on Cape York Peninsula, and belongs in the monotypic genus *Trichodere*, the only genus of birds indigenous to the region. Apart from an apparently isolated resident population in the Cooktown region (Blakers *et al.* 1984, McLean 1995), all other records have been north of 14°S (Blakers *et al.* 1984). This note reports further sightings between the two populations.

The first sighting was at Jowalbinna, west of Laura, at 15°46'S, 144°15'E. On 23-24 May 1994 White-streaked Honeyeaters were seen feeding in flowering Scarlet Gum *Eucalyptus phoenicea* which grows in woodland among the sandstone escarpments. The White-streaked Honeyeaters were calling loudly and aggressively pursuing other honeyeaters. The second sighting was on 20 March 1995 on Mount Jack Station, north-east of Laura (15°14'S, 144°47'E). The birds at this site were feeding in Tropical Banksia *Banksia ornata* in a low tea-tree woodland, but only 100 m away from *E. phoenicea* woodland. Again they were calling vigorously and appeared numerous. Subsequently, on 4 July 1995, the honeyeaters were found to be abundant in *E. phoenicea* woodland on Melsonby Station, 15 km to the east of Mount Jack (15°15'S, 144°56'E).

These three recent sightings indicate that the southern population of White-streaked Honeyeater occurs over a larger area than had previously been thought, and we believe they are probably resident wherever there is Scarlet Gum. In association with Darwin Stringybark *Eucalyptus tetradonta* and Variable-barked Bloodwood *E. hylandii*, Scarlet Gum is widespread on the footslopes of sandstone ranges and on sandy ridges in the eastern Laura Basin, being the dominant vegetation type over about 450 km² and subdominant over about 200 km² (J. Neldner & J. Clarkson pers. comm.).

These sightings reduce the gap between northern and southern populations to about 100 km. Though not resident in the intervening habitat they may also occur there occasionally. In mid-June 1995 at least two were reported from Dixie Station 15°03'S, 143°27'E feeding in flowering *Melaleuca viridiflora* (C. Barnes, B. Russell and E. Zillmann pers. comm.). These last birds were apparently itinerant and thorough searching over the subsequent week by the first author failed to find them. Nevertheless this observation suggests that the northern and southern populations are unlikely to be genetically isolated.

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STEPHEN GARNETT & GABRIEL CROWLEY, *Department of Environment and Heritage, P.O. Box 2066, Cairns, Q 4870.*
Present address: PO Box 117, Parndana, SA 5220.

**GROUP DEFENCE STRATEGY BY WHITE-WINGED CHOUGHS
*CORCORAX MELANORHAMPHOS***

BRIAN MACKNESS and RORY O'BRIEN

The White-winged Chough *Corcorax melanorhamphos* is known to live in groups comprising two to twenty birds (Rowley 1965, 1978; Heinsohn *et al.* 1988, Cantor 1988) and engage in a number of communal activities including nesting (North 1901), brooding (Baldwin 1972), foraging (Heinsohn *et al.* 1988) and defence (Rowley 1978, Cantor 1988). The foraging activity of White-winged Choughs brings them into almost daily conflict with the aggressive Australian Magpie *Gymnorhina tibicen* (Rowley 1978) where they co-exist. Magpies defend their territories all year around (Carrick 1972) with a series of swooping attacks. There have been distinctive defence displays recorded for the White-winged Chough in response to these magpie attacks.

Rowley (1974) described a co-operative display called the 'plum-pudding', where choughs "... are transformed into a screaming piebald mass of black and white with a dozen or more crimson eyes, gaping bills and flashing white wing patches". Rowley (1978) characterised the individual display within the so-called 'plum-pudding' as the wing-wave, tail-wag (or WWTW). The key features of the defensive display are the exposure of the white wing flashes, the gaping of the bill and the engorgement of the eyes. Rowley (1974) stated that "magpies never attack a group of choughs in plum-pudding display". This was further clarified by Rowley (1978) to "no magpie was ever seen to press home the attack on such a large and noisy clump of choughs", i.e. in plum-pudding display. Rowley (1978) further added that this display has only been seen in conjunction with Australian Magpies.

On 9 September 1995 at 16 00 h, two Australian Magpies were seen attacking a circle of seven White-winged Choughs on the side of the highway 40 km south of Goondiwindi (28°32'S, 150°18'E), Queensland. The choughs had formed a loose circle with their beaks facing in and their tails fanned over their heads to form an umbrella of feathers. One magpie would dive-bomb the choughs, clicking its beak and repeatedly swooping for a period of approximately 15 seconds at a time. As one magpie retired to a nearby tree, the other would fly down and repeat the manoeuvres. During these attacks the choughs stayed in the circle, moving their tails in a flicking motion to keep the 'umbrella' of feathers in formation as well as constantly calling. After several minutes of harassment, the magpies ceased their attacks and the choughs dispersed across the road.

The defensive display described above appears to differ in several details from that first reported by Rowley (1974, 1978). The choughs' white wing patches were not exposed to any great extent and the 'umbrella' of feathers also

precluded any involvement of the eyes in the defensive display. The birds formed a distinct circle, not a clump, and the birds' tails were held above their heads and used as a shield. Rowley (1978) stated that the display was carried out "facing the direction of attack". As the attack was from above, the circle formation could be interpreted as the birds orienting themselves towards the direction of the attack.

The variations observed to Rowley's 'plum-pudding' display may be the result of factors such as the structure of the group being attacked, the intensity of the attack or the circumstances of the interaction.

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BRIAN MACKNESS, *School of Biological Sciences, University of New South Wales, NSW 2052.*

RORY O'BRIEN, *3 Valentine Avenue, Kew, Vic. 3101.*

COMMON MYNA *ACRIDOTHERES TRISTRIS* PREYS ON
TWO-LINED DRAGONS *DIPORIPHORA AUSTRALIS*

A. S. KUTT and J. E. KEMP

Unlike most vertebrate pests introduced to Australia, exotic bird species are generally restricted to urban environments. Commensalism with humans and occupation of disturbed environments that match the primary habitat of their country of origin have been identified as the most important characteristics in determining their distribution patterns (Newsome & Noble 1986). In addition, urban areas often lack abundant local native vegetation, thus becoming poor habitat for native birds and allowing introduced species to successfully compete and dominate the avifauna (Newsome & Noble 1986). The role of introduced bird species as predators of native vertebrate fauna in urban environments has not been widely considered and this note reports such an observation.

In spring 1995 the authors constructed a trellis out of large wooden pallets for a vegetable garden in their backyard at West End, Townsville (19° 15' S, 146° 48' E). A number of Two-lined Dragons *Diporiphora australis* that were resident in the garden began to use this trellis and the associated climbing vegetation as basking sites. A total of two males and at least three females regularly utilised the area, with the two males, both in breeding colouration, regularly using the top level of the trellis (up to 2 m above the ground). One morning in November, a Common Myna *Acridotheres tristis* was observed to fly and take one of the male dragons from the top of this trellis, landing on a nearby pergola. It then proceeded to shake and strike the dragon on the wooden cross-beam, before flying off out of sight. This bird was accompanied by three others. The Common Myna was not observed to eat the dragon, but we are assuming that it did. A few days later, the same behaviour was again observed, but it was not certain whether a male or female dragon was taken this time. No more predatory events were seen, although we noted that the population of dragons that existed in this small area was reduced to only a single female within a month of the first described encounter. It is uncertain whether this was a result of continued predation, avoidance of the 'danger' area learnt subsequent to the initial attacks, post-mating dispersal or another unidentified factor.

A brief review of Barker & Vestjens (1989, 1991) for bird species recorded to have taken lizards as a food item is presented in Table 1. As may have been expected, species typically preying on lizards include large omnivorous birds such as herons, ibis, raptors, kingfishers, owls, crows, ravens and butcherbirds. Less predictable species include small passerines such as Eastern Yellow Robin *Eopsaltria australis*, Hooded Robin *Melanodryas cucullata*, Grey Fantail *Rhipidura fuliginosa* and White-plumed Honeyeater *Lichenostomus penicillatus*. The introduced Common Starling *Sturnus vulgaris* and Common Blackbird *Turdus merula* are also reported as having preyed upon lizards, dragons and skinks.

TABLE 1. Bird species recorded as taking lizards as prey items in Barker & Vestjens (1989, 1991). # indicates additional record from Faithful (1991). * indicates introduced species. Numbers indicate total records. L='Lizards', G=Gekkonidae, P=Pygopodidae, A=Agamidae, V=Varanidae, S=Scincidae.

Species	L	Reptile family or group					S
		G	P	A	V		
Brown Quail		1					
White-faced Heron						1	
Black Bittern	1						
Australian White Ibis	1						
Straw-necked Ibis	1					1	
Osprey						1	
Black-shouldered Kite						1	
Square-tailed Kite						1	
Black Kite	1			1		1	
Whistling Kite	1					1	
Spotted Harrier	1						
Brown Goshawk				2			
Wedge-tailed Eagle				2	2	3	
Little Eagle				1	1		
Brown Falcon				3		2	
Grey Falcon	1						
Nankeen Kestrel	1	1	1	2		5	
Australian Bustard	1	1					
Bush Stone-curlew	1						
Gull-billed Tern	1						
White-winged Black Tern						1	
Barking Owl	1						
Southern Boobook		1					
Barn Owl	1			1		1	
Laughing Kookaburra	1						
Blue-winged Kookaburra				1	1		
Yellow-billed Kingfisher	1						
Red-backed Kingfisher	1			1			
Sacred Kingfisher	1	1		1		3	
Collared Kingfisher	1						
Rainbow Pitta						1	
Little Wattlebird						1	
Helmeted Friarbird						1	
Blue-faced Honeyeater						1	
White-plumed Honeyeater						1	
Hooded Robin #						1	
Eastern Yellow Robin						1	
Grey-crowned Babbler	1						
Sandstone Shrike-thrush					1		
Grey Shrike-thrush	1						
Grey Fantail	1						
Figbird						1	
Grey Butcherbird						1	
Pied Butcherbird						1	

Australian Magpie	1	1
Little Raven	1	
Little Crow	1	
Torresian Crow	1	
Common Blackbird *	1	
Common Starling *	1	2

It is likely that introduced bird species may prey on small reptiles more frequently than has been reported. For example, during lawn mowing of the same property in West End, a number of skinks of the species *Carlia vivax*, *Glaphyromorphus punctulatus* and *Lampropholis delicata* are frequently disturbed. Common Mynas regularly patrol the garden during and after lawn mowing, searching for and feeding on disturbed invertebrates. Though not observed, one could predict that if the opportunity arose, these birds would also prey on these skink species in this situation. It is possible that the behavioural characteristics of the reptile species mentioned result in a different susceptibility to predation by introduced birds. Though dragons in general rely on speed and observation to avoid predators (Greer 1989), the Two-lined Dragons in this case were in a period of breeding. Mating-display and colouration, coupled with arboreal basking, may have at least made the male individuals a more conspicuous or less wary target. In comparison, the small skink species are cryptic and fossorial (burrowing in leaf litter and soil), exhibit thigmothermy (energy gain from radiant heat), and have clear predator-avoidance strategies such as the ability to autotomise or drop their tails (Greer 1989). These traits may render these skink species better adapted to an urban garden and associated potential predators, unless their sheltering habitat is disturbed.

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A.S. KUTT, Australian Centre for Tropical Freshwater Research, James Cook University, Townsville, Q 4811.

J.E. KEMP, Queensland Department of Environment and Heritage, PO Box 5391, Townsville, Q 4810.

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