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SURVIVAL OF BROWN AND STRIATED THORNBILLS IN THE BRINDABELLA RANGE, AUSTRALIAN CAPITAL TERRITORY

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Brown and Striated Thornbills were banded at New Chums Road in the Brindabella Range, Australian Capital Territory from 1961 to 1982. Both species appeared to be sedentary once they established territories although there is some indication that the territories of Striated Thornbills were held by small groups. The mean annual survival rate of adult Brown Thornbills was 59 per cent and Striated Thornbills 68 per cent. The oldest Brown Thornbill recaptured was 13 years and 7 months and the oldest Striated Thornbill was 15 years and 7 months.

INTRODUCTION

Compared with birds of north temperate regions, Australian passerines appear to have very different life histories. The limited data available to date indicate that Australian passerines produce small clutches (Woinarski 1985) and typically have low reproductive success (Robinson 1990). Compensating for this low productivity, they appear to be long-lived and exhibit high

annual survival (Rowley and Russell 1991). However, there are relatively few published data on survival of Australian birds.

A banding study of the birds of the Brindabella Range, Australian Capital Territory, was conducted between April 1961 and 1982, initially to contribute to an understanding of movements of passerines (Lamm and Wilson 1966; Horey and Wilson 1971; Tidemann *et al.* 1988). The work commenced

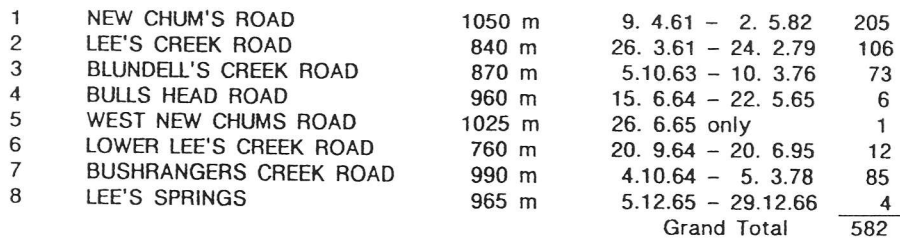


Figure 1. *Portion of the Brindabella Range showing the location of the banding places.*

movement of birds through the site, band loss (probably minimal in such small species), net shyness, movement of territorial boundaries and, with the Striated Thornbill, the difficulty of catching this species which mostly forages above the height at which mist nets were set, may also be responsible for the apparent disappearance of some birds. Therefore, the estimates of survival are minimum figures.

To ensure that all birds were given a good chance of being retrapped, only data from birds banded up to 1975/76 were used. Because the study finished in 1981/82 this gave each bird the opportunity of being retrapped during a period of at least six years.

The method of analysis is based on Lack (1954) and is similar to that used in other papers e.g. Boehm (1974), Morris (1975) and (Wilson 1994).

Ageing birds

Brown Thornbills were aged by the scalloping on the crown and eye colour. Juveniles had indistinct scalloping and brown

eyes, whereas adults had distinct scalloping and red eyes. Striated Thornbills were aged by the streaking on the throat and breast, and eye colour. Juveniles had indistinct streaking and dull brown eyes; whereas adults had distinct streaking and clear but pale mid-grey to brown eyes (see also Rogers *et al.* 1986).

RESULTS

Brown Thornbill

The Brown Thornbill was a common bird of the area and new birds were banded on every visit. A total of 1 532 Brown Thornbills was banded during the study of which 263 (17%) were known to be alive in the year following banding. The number of new birds banded each year varied from a minimum of 29 in 1977/78 to a maximum of 125 in 1969/70 (Table 1). Annual survival was estimated at 59 per cent ranging from 42 per cent in 1965/66 to 79 per cent in 1973/74. (Table 1).

The percentage of birds from the total banded population known to be alive (KTBA) one or more years after banding is given in Table 2. Survival curves prepared from these data on (a) a linear scale, and (b) a logarithmic scale indicate a fairly constant survival rate (Fig. 2). The 'step' in the logarithmic scale between years

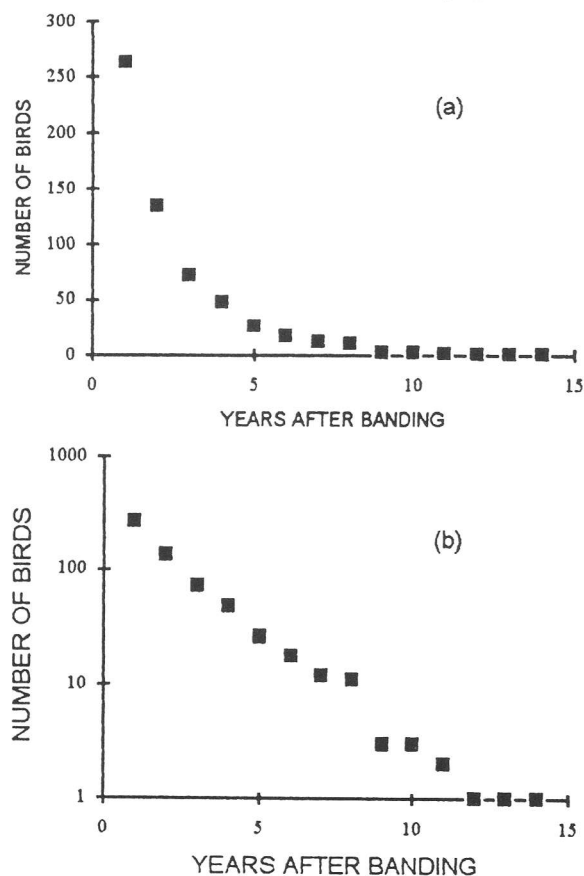


Figure 2. Survival curves for Brown Thornbills known to be alive at least one year after banding: (a) linear scale; (b) logarithmic scale.

TABLE 2

The number of Brown Thornbills from the banded population known to be alive (KTBA) each year after banding.

Years after banding	KTBA	Total banded population possible for age group	%KTBA
1	263	1 476	17.83
2	134	1 422	9.42
3	72	1 332	5.4
4	48	1 273	3.77
5	26	1 240	2.1
6	18	1 150	1.57
7	12	1 066	1.13
8	11	999	1.1
9	3	937	.32
10	3	871	.34
11	2	822	.24
12	1	731	.14
13	1	606	.17
14	1	554	.18
15		472	
16		425	
17		365	
18		270	
19		170	
20		106	

7 and 10 is probably of little importance and results from the small sample size of birds known to be alive beyond six years after banding.

Some birds were long-lived and Table 3 shows the banding encounters of the three longest-lived examples. Other individuals lived 7 years and 9 months (2 birds) and 8 years and 7 months (1 bird). One of these moved about 200 m in six retrappings over 7 years and 9 months, while the others were retrapped on two and four occasions in the same net. These birds travelled a maximum of 200 m and one moved at least 200 m between two retrappings on one day. Despite regular banding visits and fixed net sites, years passed between some retrappings of individuals.

Ten Brown Thornbills were banded at one place in the Brindabella Range and retrapped at another. Most of these were banded as juveniles which appeared in the population early in October. Changes from juvenile to adult plumage take 4 to 5 months in the Brindabella Range (unpubl. data; see also Rogers *et al.* 1986). These movements indicate a dispersal of young birds early in the first year of life.

TABLE 3

Dates on which long-lived Brown Thornbills were banded and retrapped. All were adults when banded.

Date	Net	Date	Net	Date	Net
011-02893		010-93133		011-31919	
10.02.63	—	9.05.64	9	25.01.68	13
17.11.63	16	7.06.64	9	28.07.73	13A
19.09.64	19&17	17.06.65	9	4.12.77	14
16.01.65	19	10.12.66	8		
29.12.68	17	8.03.70	8		
26.09.70	18	21.03.70	6		
23.11.75	18	16.03.75	6		
15.09.76	18				
13y 7m 5d*		10y 10m 6d*		9y 10m 9d*	
200 m†		100 m†		100 m†	

*Time elapsed between banding and last retrap in years, months and days.

†The distance between the net sites at which the bird was caught.

Four other birds, all captured between early October and mid-April and presumed to be juveniles, were banded at one site, retrapped at a second, then again at the original site (Table 4).

TABLE 4

Brown Thornbills banded at one site, retrapped at another, then retrapped back at the banding site.

Band No.	Location	Date
010-61297	Lees Creek Road	6.10.63*
	Blundells Creek Road	11.04.64
	Lees Creek Road	25.04.64
010-61806	New Chums Road (1)†	8.03.64
	New Chums Road (1)	18.10.64
	Lees Creek Road	1.05.65
	New Chums Road (9)	31.05.65
011-07009	Blundells Creek Road	7.03.65
	Lees Creek Road	28.08.65
	Blundells Creek Road	3.02.68
011-16366	New Chums Road (1)	25.02.67
	Lees Creek Road	24.03.67
	New Chums Road (1)	27.03.67
	New Chums Road (3)	9.03.68
	New Chums Road (3)	21.04.68

*The first date in each set of records is the date of banding, the remaining dates are those on which the birds were retrapped.

†The number in brackets is the net site.

All the double movements (except 010-61806) could have been accomplished in the first year of life; 011-07009 may have been older before its return journey; 010-61806 was over 13 months old before it returned and this is the only proof of movement of an adult bird — a distance of 2 km.

Striated Thornbill

The Striated Thornbill was a common bird of the area but perhaps because of its arboreal habits, no new birds were banded on 86 of the 287 visits. A total of 650 Striated Thornbills was banded during the study of which 182 (28%) were known to be alive in the following banding year. The number of new birds banded each year varied from a minimum of 16 in 1968/69 to a maximum of 54 in 1963/64 (Table 5). Annual survival was estimated at 68 per cent ranging from 48 per cent in 1969/70 to 92 per cent in 1974/75 (Table 5).

The percentage of birds from the total banded population known to be alive (KTBA) one or more years after banding is given in Table 6. Survival curves prepared from these data on (a) a linear scale, and (b) a logarithmic scale indicate a fairly constant survival rate (Fig. 3).

Some birds were long-lived and Table 7 shows the known life history of the three longest-lived

TABLE 5

Calculation of survival rates. Number of Striated Thornbills surviving according to banding year.

Year Banded	Number Banded	Number surviving:																				
		62/3	63/4	64/5	65/6	66/7	67/8	68/9	69/0	70/1	71/2	72/3	73/4	74/5	75/6	76/7	77/8	78/9	79/0	80/1	81/2	
1961/62	49	18	12	8	6	2	1															
1962/63	28		16	10	8	6	5	3	1													
1963/64	54			14	9	3	2	2	1													
1964/65	41				13	8	6	5	3	3	2											
1965/66	29					7	6	3	3	3	2	2	2									
1966/67	20							3	3	2												
1967/68	39								10	7	2	2	2	1								
1968/69	16									6	3	2										
1969/70	37										12	8	6	6	6	6	4	4	2	2	1	
1970/71	26											8	4	3	3	3	2	1				
1971/72	44												15	13	10	8	6	4	2	1		
1972/73	22													4	2	2	1					
1973/74	18														4	4	1	1	1	1		
1974/75	19															6	1	1	1			
1975/76	33																14	10	5	4	1	
1976/77	19																	6	1			
1977/78	29																		5	4		
1978/79	24																			9	5	2
1979/80	38																				7	4
1980/81	22																					5
1981/82	43																					
Total	650																					

Total number of birds present:

18 28 32 36 26 23 26 23 23 24 29 29 25 29 32 Total = 403

Total number of these birds present one year later:

12 18 23 19 20 16 17 11 16 14 25 21 23 18 22 Total = 275

Annual survival (%):

67 64 72 53 77 70 65 48 70 58 86 72 92 62 69

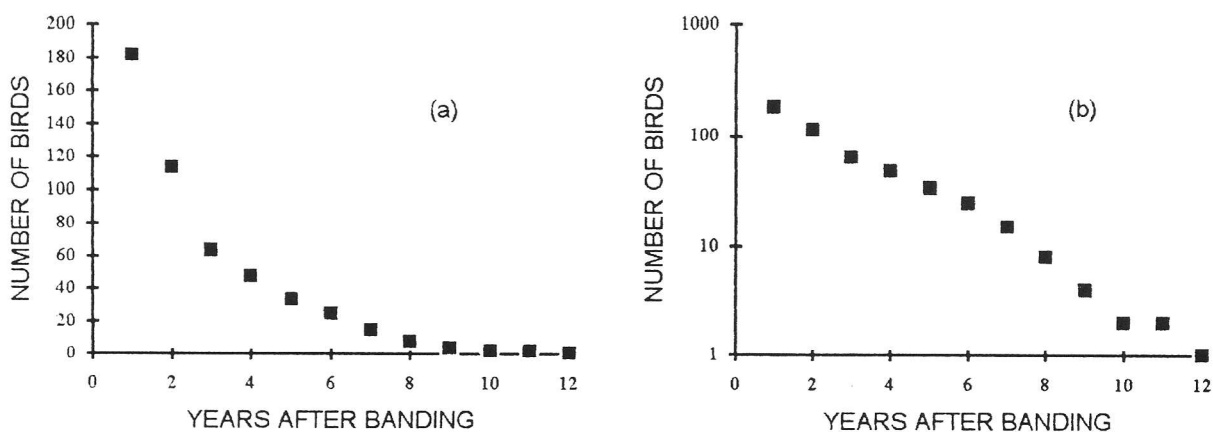
Average annual survival = $275/403 = 0.682$ (68%)

Figure 3. Survival curves for Striated Thornbills known to be alive at least one year after banding: (a) linear scale; (b) logarithmic scale.

TABLE 6

The number of Striated Thornbills from the banded population known to be alive (KTBA) each year after banding.

Years after banding	KTBA	Total banded population possible for age group	%KTBA
1	182	607	29.98
2	114	585	19.49
3	64	547	11.7
4	48	523	9.18
5	34	494	7.02
6	25	475	5.26
7	15	442	3.39
8	8	423	1.89
9	4	405	.99
10	2	383	.52
11	2	339	.59
12	1	313	.32
13		276	
14		260	
15		221	
16		201	
17		172	
18		131	
19		77	
20		49	

examples. In the case of 012-31911 which lived for over 15 years it was retrapped on 2 May 1982, the last day of the survey, and again on 14 July 1985 by S. Davey who continued to work in the area occasionally. Several other birds were known to be alive six, seven and eight years after banding. Despite regular banding visits and fixed net sites, years passed between retrappings of some individuals.

TABLE 7

Dates on which long-lived Striated Thornbills were banded and retrapped. All were adults when banded.

Date	Net	Date	Net	Date	Net
010-93796		012-31911		012-38028	
12.03.66	2	22.11.69	11	4.04.70	2
17.09.66	1	3.01.76	13A	7.06.75	1
20.12.69	1	2.05.82	14	16.05.79	1
26.09.70	1	14.07.85	—	11.04.81	1
7.05.72	1			4.04.82	2
1.06.74	1				
8y 2m 20d*		15y 7m 23d*		12y 0m 1d*	
30 m†		150 m†		30 m†	

*Time elapsed between banding and last retrap in years, months and days.

†The distance between the net sites at which the bird was caught.

In all the work done in the Brindabella Range, only two Striated Thornbills were retrapped away from the banding place (010-75137 banded at Blundells Creek Road 9 September 1963 retrapped at Lees Creek Road 10 December 1967, and 010-94502 banded at Lees Creek Road 2 January 1965 retrapped at Blundells Creek Road 12 March 1966 (Fig. 1).

One hundred and ninety birds were taken at least twice in numbered nets, a few within the same banding year. Of these, 176 (93%) had moved no more than 150 m. Fourteen birds (7%) were retrapped on two or three occasions at distances of 150 m to 1 km of the banding place.

DISCUSSION

The Brown Thornbill is a bird of the lower to middle levels of the forests of the Brindabella Range (pers. obs.; Recher *et al.* 1987). At New Chums Road it was frequently observed higher in the scrub foliage than the top of the mist nets. It was usual to catch single birds and, unlike species such as the Superb Fairy-wren *Malurus cyaneus*, Striated Thornbill, Silvereye *Zosterops lateralis* and White-naped Honeyeater *Melithreptus lunatus*, one Brown Thornbill in a mist net did not result in others of that species being caught (pers. obs.).

The Striated Thornbill is described by Recher *et al.* (1987) as a eucalypt foliage specialist and observations during this study support this, although the birds did descend to the scrub level chiefly during the cooler months. Catches at New Chums Road, analysed by Tidemann *et al.* (1988), showed that in the period 1961 to 1979, 150 were handled in summer, 267 in autumn, 241 in winter and 264 in spring. Of all the species caught in this study a higher percentage of Striated Thornbills was taken in winter than any other species. Another factor influencing the catches of this species is their flocking habit and one Striated Thornbill in a net attracted others to the vicinity usually resulting in the capture of several others (pers. obs.).

The variation in numbers banded in different years (Tables 1 and 5) may have been influenced by local events. A bushfire burned out more than half of the net sites in December 1972 (Stokes 1975) and other factors such as prolonged drought, periods of heavy rainfall, and snow

which fell in various amounts every winter and remained on the ground for weeks, may have affected numbers caught.

The dispersal of young birds would account for many of the 1 269 Brown Thornbills and 468 Striated Thornbills banded but not retrapped. Suitable habitat for these species extends in all directions throughout the whole of the Brindabella Range and beyond. It is probable that some of these young birds originated elsewhere and were caught as they passed through the banding place.

Individual Brown Thornbills and Striated Thornbills were not captured as frequently as White-browed Scrubwrens *Sericornis frontalis* which forage in the lower strata of the forest. This increases the chances of White-browed Scrubwrens being captured and one was caught 26 times (Wilson 1994). Because they forage at a greater range of levels in the forest, often above the height of mist nets, the most frequently captured Brown Thornbill was caught eight times and the most frequently captured Striated Thornbill was caught six times.

The retrap data for the Brown Thornbill indicate that they were sedentary once they acquired territory but moved boundaries slightly between breeding seasons. Some of the dates of retrapping were outside the breeding season, suggesting that birds maintained territories throughout the year.

There is some evidence to indicate that territories of Striated Thornbills are held by groups rather than by pairs or families. Two examples have been reported of groups of Striated Thornbills being banded together and retrapped together much later. In the first case five birds which were banded together were in a group of twelve retrapped 26 months later at Lees Creek Road (Wilson 1965). In the second case four birds which were banded together were in a group of eight retrapped just over five years after banding (Morris 1971). This long-term constancy in the make-up of groups of this species was not shown in the retrappings at New Chums Road even though the retrapped birds had not moved far. Birds banded together were never retrapped together in groups even though most were banded in the immediate vicinity.

Thirteen White-browed Scrubwrens (2.9% of those retrapped) (Wilson 1994) and ten Brown Thornbills (3.8% of retraps) were banded at one

place in the Brindabella Range and retrapped at another. This contrasted with the two Striated Thornbills (1.1% of retraps) detailed above. The greater site-fidelity of Striated Thornbills partially explains the higher annual survival rate (68%) compared with Brown Thornbills (59%). Trappability differences between the species also undoubtedly influence the estimates of annual survival, but even so, this study suggests that Striated Thornbills have higher annual survival. Further comparative studies on other solitary and co-operative species may show that this high survival is correlated with group-living. Both species certainly exhibit the high annual survival which appears to be typical of Australian passerines (Rowley and Russell 1991).

When handled, most Brown Thornbills began a virtually continuous sub-song audible up to 50 cm. The most frequent sub-song was mimicry of the chatter of a flock of Crimson Rosellas *Platycercus elegans*, a common species in the range but it could also consist of the songs of other species present in the forest.

This study shows the importance of long-term banding projects in providing survival and longevity data which are unknown for most Australian passerines.

ACKNOWLEDGMENTS

The project at New Chums Road and other sites in the Brindabella Range was remarkable and carried out by a dedicated group of amateur ornithologists. The total number of people involved over the 21 years was very large and it would be invidious to mention names. Thanks to all who were involved.

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SIZE DIFFERENCES IN MALE AND FEMALE 'GREEN' SATIN BOWERBIRDS *Ptilonorhynchus violaceus*

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Satin Bowerbirds were trapped, measured and surgically sexed. Sexing criteria were established using tarsus length and wing length. Males are considered to have a tarsus length greater than 57.5 mm and a wing length greater than 161 mm. Females had a tarsus length less than 58.0 mm and a wing length less than 162 mm.

INTRODUCTION

The sex of male Satin Bowerbirds *Ptilonorhynchus violaceus* can be readily identified at around seven years of age and at four years plus under closer scrutiny (Disney 1970; Vellenga 1970, 1980; Schodde 1976). Difficulties are encountered when attempting to sex adult females and birds of both sexes less than four years old, as all birds in these groups have a similar green colour. Vellenga (1980) documented slight plumage and soft part colour changes but these characteristics may be difficult to use without experience. Readers' Digest (1976) makes reference to 'young males, slightly larger than females' and Gilliard (1969) describes significant overlap in the measurement of wing length, tail length, exposed culmen and tarsus length.

As part of a study into the sex composition of groups of overwintering Satin Bowerbirds in the

grounds of Healesville Sanctuary, Victoria, it was necessary to establish a quick and reliable technique for sexing birds less than four years of age. To this end birds were trapped, endoscoped and measured to determine whether birds could be reliably sexed using morphometrics.

METHODS

Between June and August 1989, and during July and August 1990, Satin Bowerbirds of random ages and sexes were trapped in the grounds of Healesville Sanctuary. The birds were captured using a raptor drop trap consisting of two swinging walls held apart by a perch that collapses and springs the two walls together entrapping the bird. Apples, bananas, oranges and peaches were used as enticement.

Trapping was conducted once or twice a week, usually at midday. As time for processing was limited we imposed a limit of two birds a day. Following removal from the trap, the birds were transported to the veterinary surgery where I measured head-bill length, wing length, tail length, tarsus with