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STUDIES OF ROOSTING COMMON STARLINGS *Sturnus vulgaris* IN SOUTH AUSTRALIA

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This study commenced when Common Starlings *Sturnus vulgaris* started to roost regularly in a barn, where they could be trapped easily in large numbers in the winter months, and 95 per cent of them could be banded. This was done annually (1–5 times) in all but two years from 1969 to 1994 and also in 2000 and 2001.

Of 15583 birds banded, only 34.6 per cent were recaptured, and only about a half of them were recaptured more than once. Many were recaptured up to nine years from when banded, several up to 17 years, and one after 29 years, the sole occasion it was retrapped. The few dead recoveries showed a probable rapid and widespread spring dispersal westwards.

The population structures of the roosting birds were variable in numbers and individuals present, even when captured at weekly intervals for five weeks in one year. It appeared that other birds, probably of winter influxes, were using opportunistically the roosting site of local birds, resulting in a complex turnover.

INTRODUCTION

The northern Adelaide plains include a large area of market gardening, centred on Virginia, and an even larger area of mixed farming. These changes to the native vegetation, which commenced with early settlement in the 1880s, have favoured the introduced Common Starling *Sturnus vulgaris*. Cultivation has led to a reduction in the tree coverage as land for pastures and crops developed, and, as a consequence, suitable roosting sites are well dispersed. There were many derelict barns in the area but none provided roosting sites. A local bird bander, Tom Irish, whose property had become a centre for a quail study, noted that numerous starlings were roosting, during the colder months, in a barn that was his pigeon loft. The barn was roofed and rat numbers within were controlled. In this region, starlings roost usually in trees such as pine trees or mangroves but this barn was the sole accessible site where they could be trapped and banded in large numbers. This paper reports the changing population structure on different nights of the roosting starlings, and their dispersal from the site.

METHOD

The main banding site was at 'Buckfastleigh Downs' (34°27'S, 138°30'E), three kilometres south-west of Mallala, which lies 53 kilometres north of Adelaide, South Australia (Figs. 1 & 2). On the eastern side of the farm buildings was a gable-roofed iron shed 9.3 metres long, 6 metres wide and 3.6 metres high (Fig. 2). Normally, this housed 2000 – 4000 Rock Doves *Columba livia* for which the inside walls were lined with wooden packing cases to provide nesting boxes. Horizontal poles placed above the boxes and the roof rafters provided roosting sites, which were also used by starlings. Ladders gave access to the top boxes and the poles and rafters.

The starlings used the roost mainly on cold or wet nights. The presence of Rock Doves, starlings and composting dung, which covered the floor, were the likely reasons for an increased temperature within the barn. The study commenced on 17 June 1969, and one visit was made annually in the winter months until 1981. Visits were then made in July and August from 1982 until 1986, and from 1986 endeavours were made to

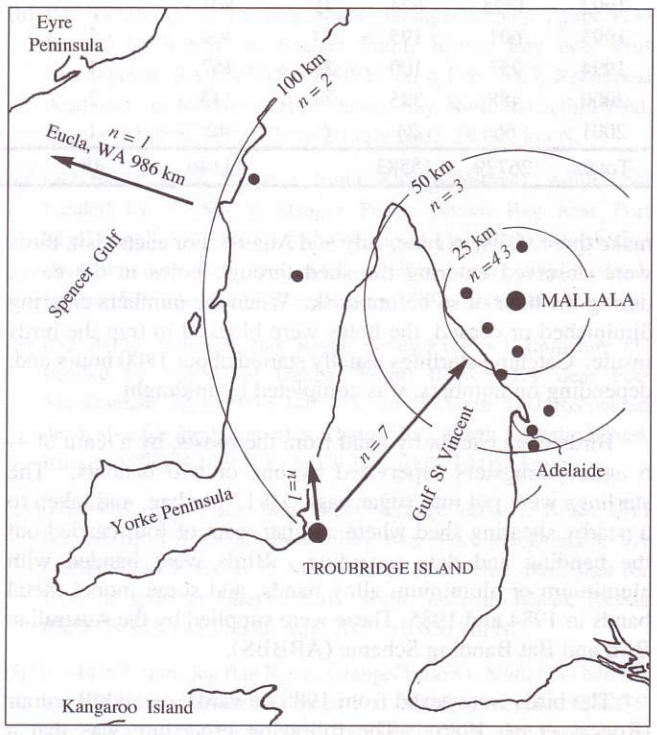

Figure 1. *The localities to which Common Starlings dispersed, from roosting sites at Mallala and Troubridge Island.*

TABLE 1

The number of Common Starlings captured each year in a barn at Mallala, South Australia. The total number of birds trapped each year, the number of these that had been banded previously, and the number banded each year are given. Also are shown the number and dates of collections made each year, the number of birds in each collection, and the number of dead recoveries from the birds banded each year.

Year Banded	Total captured (B plus R)	Number banded (B)	*% banded*	Number previously banded (R)	Number of collections in year	Date of collections (number of birds in collection)	Dead recoveries
1969	388	388	*100*	0	1	17 July	
1970	528	404	*76*	124	1	13 June	
1971	961	801	*83*	160	2	28 Feb. (477); 28 Aug. (484)	5
1972	0				0	0	
1973	247	221	*89*	26	2	21 July (213): 1 Sept (8)	
1974	577	523	*91*	54	1	25 July	1
1975	1144	933	*82*	211	1	6 July	4
1976	1175	997	*85*	178	1	17 July	4
1977	672	500	*74*	172	1	16 July	3
1978	1512	1231	*81*	281	1	15 July	6
1979	688	367	*53*	321	1	14 July	
1980	763	400	*52*	363	1	26 July	2
1981	721	449	*62*	272	1	18 July	
1982	2152	1583	*74*	569	2	24 July (1193); 21 Aug. (959)	6
1983	1786	967	*54*	819	2	16 July (1096); 20 Aug. (690)	4
1984	1297	445	*34*	852	2	9 June (1069); 4 Aug. (228)	2
1985	1968	756	*38*	1212	2	22 June (1142); 21 July (826)	2
1986	2253	1164	*52*	1089	3	21 June (1643); 19 July (457); 23 Aug. (153)	5
1987	1016	380	*37*	636	2	4 July (776); 29 Aug. (240)	2
1988	653	320	*49*	333	1	2 July	
1989	1024	0		1024	5	4 June (3); 10 June (308); 17 June (394); 24 June (218); 1 July (101)	
1990	950	550	*58*	400	2	14 July (451); 8 Sept (499)	
1991	1417	886	*63*	531	3	1 June (680); 6 July (716); 3 Aug. (21)	1
1992	1425	624	*45*	801	4	20 June (680); 25 July (408); 30 July (43); 22 Aug. (294)	1
1993	601	195	*33*	406	2	10 July (378); 14 Aug. (223)	1
1994	257	100	*39*	157	1	15 July	
2000	488	375	*74*	113	2	30 May (339); 15 July (149)	
2001	66	24	*0*	42	1	4 Aug.	
Totals	26729	15583		11146	48		49

make three visits, in June, July and August. For each visit, birds were observed entering the shed through holes in the eaves during the hour or so before dusk. When the numbers entering diminished or ceased, the holes were blocked to trap the birds inside. Catching starlings usually started about 1800 hours and, depending on numbers, was completed by midnight.

Birds were caught by hand from the roosts, by a team of 4-6 agile youngsters supervised by one or two banders. The starlings were put into sugar bags, 10-12 per bag, and taken to a nearby shearing shed where another team of four carried out the banding and data recording. Birds were banded with aluminium or aluminium alloy bands, and some monel metal bands in 1984 and 1985. These were supplied by the Australian Bird and Bat Banding Scheme (ABBBS).

The birds were sexed from 1988 onwards, using bill colour (Rogers *et al.* 1986). The following procedure was that a member of the team took a bird from the bag and, after checking its status, passed it to whoever was banding males, banding females, or reading and recording band numbers. A master chart of all the bands, that had been used previously, enabled a quick check as to when the bird had been banded. After banding or checking, the bird was released within the shearing shed where they congregated along the roof rafters. A check of the birds remaining in the barn enabled an appraisal of the percentage of the birds that were caught to be determined. Teams were catching 95–100 per cent of the birds roosting in the barn.

The number of team members available and the numbers of birds present determined the exact timing of the programme. All visits were in the cooler months, June–August, except for one in February 1971.

Starlings were also banded at Troubridge Island at the south of the Yorke Peninsula (Fig. 1), where flocks of a several thousands would arrive nightly from the mainland to roost in the boxthorns. Mist nets were used to capture birds and 330 were banded in January 1991, and 215 in December 1992. At

TABLE 2

The number of banded Common Starlings captured in the first collection of a year and the number of these birds retrapped in the second collection made 1-2 months later. Also, the number of Common Starlings that were banded in the first collection and the number retrapped in the second collection.

Year	Number of previously banded birds			Number of unbanded birds in Collection 1 that were banded	Number of birds banded in Collection 1 and then retrapped in Collection 2	% *retrapped*
	Collection 1	Collection 2				
	Total number	Total number	Number and percentage (%) also in Collection 1			
1982	142	102	23 (*23*)	1050	189	*18*
1983	369	319	122 (*38*)	727	131	*18*
1984	649	162	132 (*81*)	420	39	*9*
1985	594	475	237 (*50*)	548	143	*26*
1986	629	247	154 (*62*)	1014	105	*10*
1987	476	126	47 (*37*)	300	34	*11*
1990	151	169	74 (*44*)	300	80	*27*
1991	225	211	76 (*36*)	455	85	*19*
1992	241	207	79 (*38*)	439	86	*20*
1993	233	137	70 (*51*)	135	8	*6*

Coorabie on the Eyre Peninsula, 135 kilometres west of Ceduna and 320 kilometres from the border with Western Australia, another 1 000 were banded in April 1994.

An experimental wing tag (Parry 1967; Le Gay Brereton and Pidgeon 1968) that was used on 100 females and 100 males in 1988 was unsuccessful as most plastic tags were lost within the first year.

RESULTS

Live recoveries

Table 1 presents the banding history of the study at Mallala. No birds were trapped in 1972, and in 1989 none were banded, when the Project Officer of the ABBBS did not permit banding while computerised systems were being introduced to the Scheme. All of the birds were of unknown age when banded.

Of 15 583 birds banded, 5 411 (35%) were recaptured. Most birds were only retrapped once, 2 812 (52%); one of these birds was recaptured 29 years 5 months later. The number of birds retrapped twice was 1 125 (21%); 3-4 times, 974 (18%); 5-6 times, 318 (6%); 7-10 times, 131 (2.4%); and 11-13 times, 13 (0.24%).

Twenty-six of the collections were of less than 500 birds, 13 were of 500–1 000, and eight were greater than 1 000. From 1969-1983, over 50 per cent of the captured birds in a year were unbanded, and, even though the percentage dropped from 1983 to 1994, many unbanded birds were still captured on each occasion. The composition of a roosting flock was different on each trapping night.

This is further shown in Table 2 where the identities of the banded birds in the two collections made one to two months apart in the same year are compared. Thus, in Collection 1 of 1982 there were 142 birds, that had been banded previously, and 102 in Collection 2, of which only 23 (23%) had been present in Collection 1. Furthermore, of the 1 050 unbanded birds in Collection 1, that were banded that evening, only 189 (18%) were recaptured in Collection 2, and the data from subsequent years show a similar pattern of less than 27 per cent being retrapped. Clearly, the compositions of the collections made in the same year were different.

Banded birds had also been sexed in 1988, and 228 of the 320 banded were recaptured when five collections were made at weekly intervals from 4 June to 1 July in 1989. The numbers in the collections and the sex ratios (1 male to '*x*' females) were: Collection 1 – none; Collection 2 – 67 (*0.6*); Collection 3 – 76 (*1.1*); Collection 4 – 61 (*0.96*); Collection 5 – 24 (*0.84*). Some birds were only caught in one of the weekly collections (38 males, 41 females), some in two collections (19 males, 17 females), in three (14 males, 9 females) and in four (1 male, 1 female). The male and female captured in four collections were subsequently retrapped 11 and 6 times respectively; of those captured in three collections, 4 males and 3 females were recaptured 9–11 times as were 3 males and 2 females captured in two collections. None of the 38 males and 41 females captured only in one collection, or the 12 males and 6 females never captured, were subsequently retrapped more than 6 times. The pattern of recaptures of the 1988 birds in 1989 was that of different numbers, individuals and sex ratios each week. Some birds were probably 'local' as judged by the frequency of subsequent recaptures (9–11 times), but even they were not caught every week.

TABLE 3

Number of Common Starlings within 3-year groupings calculated from the elapsed time between banding and final retrap.

Banding periods	Years since banding									
	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30
1969 - 2000	4143	1001	221	24	14	7	0	0	0	1*
1969 - 1980	1169	364	90	23	14	5	0	0	0	1*

* 29 years after banded

Birds banded in 15 collections made after 1987 were sexed. The sex ratios of these were calculated for collections greater than 50 birds. The sex ratio for the total of 3039 birds was 0.69 (SD ± 0.4, range 0.28-1.75, number of collections 13). The range of the varying sex ratios before breeding commenced was a further indication of the changing population structures of each collection.

Table 3 shows the elapsed time between banding and the final date on which a bird was retrapped. The large number of birds banded after 1980 has skewed the data towards 1-6 years. The data from 1969–1980 probably gives a more accurate indication of the age distribution up to 21 years. Although most were retrapped within nine years of banding, birds were retrapped up to 17 years later, and one after 29 years. Birds were mostly in adult breeding plumage when banded so, as this plumage takes 1–2 years to develop (Rogers *et al.* 1986), many were at least 12–19 years and one could have been 30–31 years old.

Seven birds, which had been banded on Troubridge Island, were retrapped in the barn at Mallala: four 6–8 months later, and three 18–19 months later. Mallala is 93 kilometres in a straight line across the Gulf St. Vincent (Fig. 1).

Two birds banded at Coorabie were found alive 67 and 79 months later within ten kilometres. Another two banded birds were found in captivity near Condingup, Western Australia, 940 kilometres west. How they reached Western Australia was not discovered.

Dead recoveries

Only 49 birds were recovered dead of the 15 583 that were banded. Nine were recovered at the banding site, 22 within five kilometres of the site, 12 within 6-25 kilometres, and three within 26-50 kilometres. Two were found 61 kilometres and 93 kilometres to the west across the Gulf St. Vincent on the Yorke Peninsula within a month of banding, and one was shot 986 kilometres north-west at Eucla, Western Australia four months later (Fig. 1).

The causes of death of 14 birds were:- six were shot; four were killed by a cat or dog; two were drowned in water troughs; one was taken by a hawk; and one was hit by a car. One Troubridge bird was caught by a cat 22 kilometres away on the Yorke Peninsula a year later.

DISCUSSION

Starlings lived at least 8–10 years after being banded, with many surviving 11–19 years. One bird survived in the wild 30–31 years, which suggests that many may survive longer than 20 years. In the Northern Hemisphere birds have been reported living 16 years –22 years 11 months (Feare 1984; Staav and Fransson 2006).

Of the 49 dead recoveries from Mallala, 43 were within 25 kilometres and three close to Adelaide (within 50 kilometres), were in regions where there are many people to find them. Those from 61 kilometres and 96 kilometres within 1–2 months on the Yorke Peninsula and 950 kilometres within four months at Eucla in Western Australia are impressive for the speed of dispersal westwards and towards Western Australia, where the starling is now established. Deliberate collections of banded birds, such as that shot at Eucla, can be of great value. Unfortunately, wing tags that could have readily identified groups of birds proved unsuccessful, and, other techniques, such as colour bands, were not tested. The distant areas over which the starlings dispersed are sparsely populated by people so data from chance recoveries of dead birds were few and hopelessly inadequate to determine the true nature of such widespread and rapid movements. This is a major problem in studies of the dispersal of small passerines in Australia.

The behaviour of the Rock Doves could have been an indicator of a potential roosting site, which the starlings discovered to be favourable on cold or wet nights probably because of the warmer temperatures within the barn. Birds were captured during the winter months before breeding had commenced (Rogers *et al.* 1986), and a feature of these roosting flocks was their changing composition. Of 15 583 birds banded at Mallala, 65 per cent were never captured again, and of the 5 411 birds retrapped 35 per cent were only retrapped once. Less than three per cent were recaptured more than seven times. The disturbance when banded may have scared some birds away but many birds were recaptured several times. The great variations in the numbers and composition of the roosting flocks appeared to be the consequence of a roost, that was used by 'local' birds, also being used opportunistically by other birds of or visiting the region. Winter influxes of birds have been reported from South Australia and elsewhere in Australia (Higgins *et al.* 2006). Birds banded on Troubridge Island in the

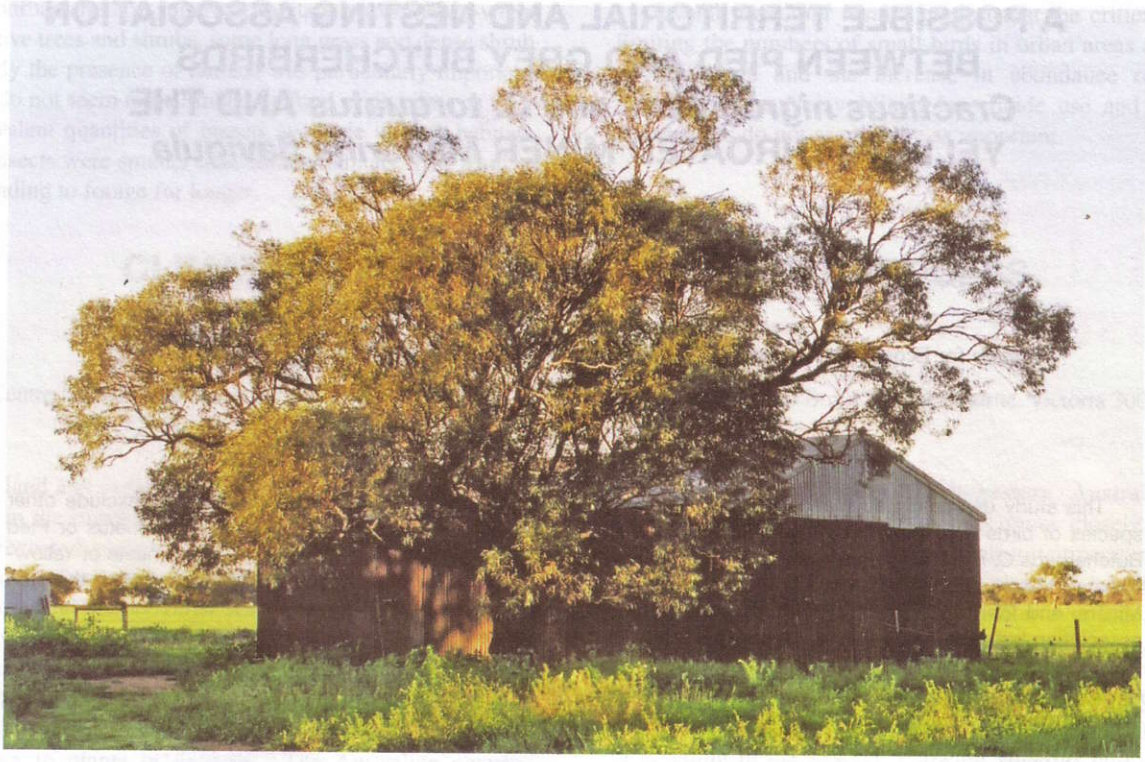

Figure 2. *The barn at Mallala in which the Common Starlings roosted.* Photo: C.O. Fuller

summer were trapped at Mallala 6-8 and 18-19 months later in the winter, which indicates that starlings move throughout the area to the north of Adelaide and the Yorke Peninsula.

Whether the 'visiting' birds were local individuals, local flocks or flocks of winter visitors awaits critical study. The study has shown the value of retrapping at a roosting site, and that there can be great complexity in the changes in the population structure of the birds at a roost. Even 'local' birds were not retrapped consistently at this roost. Suitable roosts for the recapture of birds are few so others may need to be constructed, and the capture of birds at other natural or created sites, where they congregate, may be required to define the complexity. The composition of populations of other species, that apparently come regularly to the same roosting site, may also differ considerably on each occasion.

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