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SPARROWS AND FINCHES (FAM: FRINGILLIDAE, PASSERIDAE AND PLOCEIDAE) IN THE BRISBANE REGION, 1972-1983: RELATIVE NUMBERS, DISTRIBUTION AND SPECIES INTERACTION.

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ABSTRACT

The relative abundances of eight species of sparrows and finches recorded during 12 years of annual bird counts (1972-1983) by the Queensland Ornithological Society in the Brisbane region were analysed. The most commonly encountered species, in order, were the House Sparrow, Double-barred Finch, Red-browed Firetail Finch, Zebra Finch and Chestnut-breasted Mannikin. Changes in annual numbers of Nutmeg Mannikins and Red-browed Firetails showed significant positive correlations with changes in Moreton region rainfall totals (K-values). No species showed a steady increase or decrease in numbers but the Double-barred Finch had a short-term increase in some areas. Using Cluster Analyses, a western xeric group (Zebra and Plum-headed Finches), an eastern mesic group (House Sparrow, Red-browed Firetail, Double-barred Finch and Chestnut-breasted Mannikin) and two suburban isolated groups (Nutmeg Mannikin and European Goldfinch) were identified. The House Sparrow is the only introduced species which is abundant and widely distributed.

INTRODUCTION

It is important to monitor finch populations since the numbers of some native species are declining and the reasons for this are uncertain. The spread of introduced species, such as the Nutmeg Mannikin *Lonchura punctulata* in northern Queensland, has been suggested as the reason for this decline (Bell 1961, Immelmann 1982), although this has been disputed (Frith 1973). Several native species have also been heavily trapped in the past for the avicultural trade, apparently leading to a reduction in their numbers (Roberts 1979).

There are 18 species of small seedeaters in Queensland (Fringillidae [1]; Passeridae [1]; Ploceidae [16]) (Storr 1973) of which ten occur in south-east Queensland (Roberts 1979). Storr (1984) described their distribution in Queensland prior to European settlement and there have been several accounts of their more recent distribution (Storr 1973; Zann 1976; Roberts 1979; Blakers *et al.* 1984), but there has been little attempt to quantify their relative abundance or to investigate species interactions and changes in numbers.

STUDY AREAS AND METHODS

The data used for this study come from the annual bird counts made by the Queensland Ornithological Society. The first bird count was held in January 1972 but it was disrupted by rain and the results are not included here. All subsequent counts were held in October. The survey area was contained in a circle of 80 km radius centred near Darra, a south-western suburb of Brisbane (Dawson and Perkins, 1973). In October 1972 this circle was divided into 7 areas, in 1973 into 10 areas, and from 1974-1983 into 12 areas (Fig. 1) (Perkins 1975). When analysing species by area (Table 1), the 10-year period 1974-1983 was used. After 1983, there was a major change in emphasis of the counts making them less comparable with earlier ones.

On the designated date, teams of observers spent all day surveying each area, travelling to all the 'best' spots and counting and recording all species seen or heard during the day. For most areas, team leaders have been fairly consistent over the 12-year period and this has meant that a similar route was followed each year but there have been some changes particularly at the beginning and towards the end of the survey period. Nominally, each area had a team of 3-5 members but this has varied from area to area (Table 1) and from year to year. With more members, a team would often split up to cover more ground in the area. Over the 12 years of counts (1972-1983), the total number of sparrows and finches observed each year was highly correlated with the total number of observers ($r = 0.889$, $P < 0.001$). Therefore, in all subsequent analysis, the numbers of sparrows and finches have been corrected by the numbers of observers in the particular year or area as appropriate (i.e. numbers of finches/numbers of observers). The same correction was used in previous analyses of these counts (Woodall 1985, 1986).

When attempting to correlate rainfall data with (corrected) bird numbers, K values have been used:

$$K_t = \log N_t - \log N_{t+1}$$

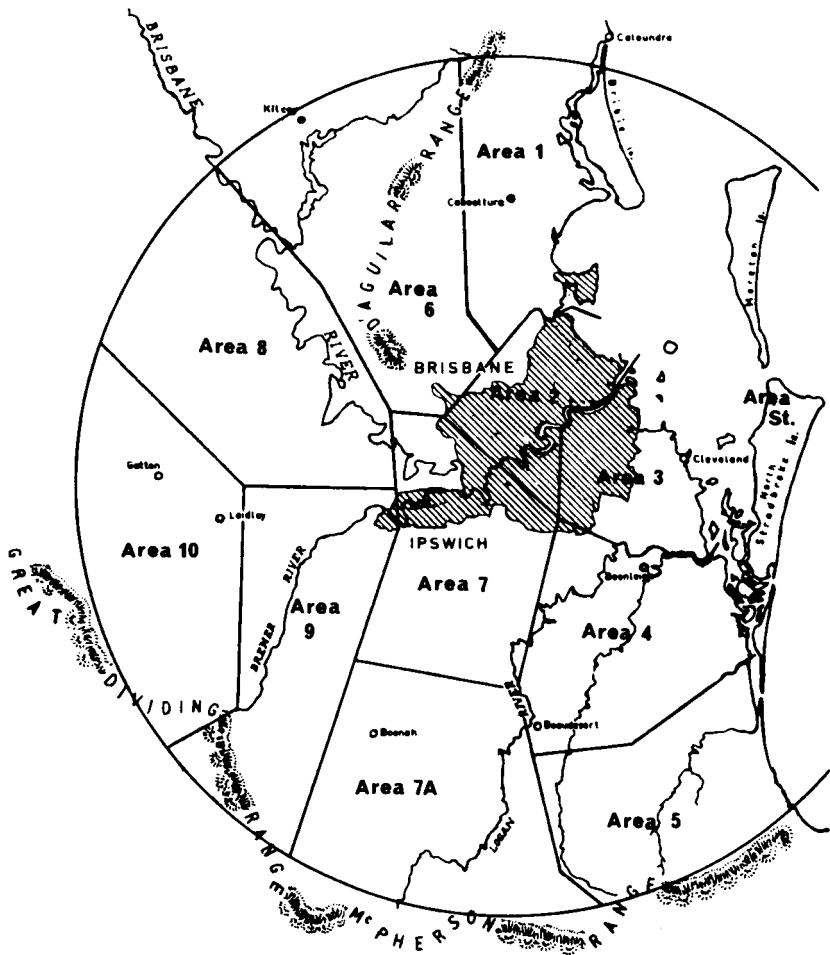


Fig. 1 The survey area, contained within an 80 km radius centred on a south-western suburb of Brisbane. The boundaries of the 12 areas are indicated and urban/suburban areas are shaded. (From Perkins 1975)

where N_t is the corrected number of birds counted in year t (or rainfall in year t) and N_{t+1} is the corrected number of birds (or rainfall) in the following year $t+1$.

These represent the difference in log values of bird numbers (or rainfall levels) in successive years and indicate the magnitude and direction of changes in these in terms of relative increases or decreases rather than absolute numbers. Rainfall data for the Moreton and East Darling Downs regions were obtained from the Bureau of Meteorology (Anon. 1972-1983). Annual rainfall totals were calculated for the period October-September prior to the count.

To investigate the distribution of each species, calculations of "range breadth" and "range overlap" were made, based on the formulae of Colwell & Futuyama (1971) for niche breadth (B):

$$B = 1/\sum (p_{ij})^2, \text{ where } p_{ij} \text{ is the proportion of individuals of species } i \text{ counted in area } j;$$

and for niche overlap (C) of pairs of species:

$$C = 1 - 0.5 \sum |p_{ij} - p_{hj}| \text{ where } p_{ij} \text{ is as above and } p_{hj} \text{ is for another species, } h.$$

Range breadth gives a measure of how widely and evenly a species is distributed and range overlap indicates the extent of range overlap with other species.

The cluster analyses were performed with the CLUSTER program (Andrews 1977) using a Bray-Curtis measure of dissimilarity and a weighted average sorting routine. Calculations of correlation and co-efficient of variation (CV) follow the methods of Sokal and Rohlf (1981).

TABLE 1

Numbers and Range Widths of Sparrows and Finches in the Brisbane Region.

EG: European Goldfinch; HS: House Sparrow; RF: Red-browed Firetail; ZF: Zebra Finch;
 DF: Double-barred Finch; PF: Plum-headed Finch; CM: Chestnut-breasted Mannikin;
 NM: Nutmeg Mannikin.

Area	No. of Observers (n = 10 years)	Mean Numbers per Observer (1974 - 1983) (Standard Error of Mean)							
		EG	HS	RF	ZF	DF	PF	CM	NM
1	47	0	6.03 (1.99)	3.41 (0.89)	0	1.74 (0.90)	0	1.90 (1.29)	0
2	62	0	9.89 (2.93)	1.59 (0.60)	0	0.63 (.027)	0	0.48 (0.38)	0.69 (0.37)
3	50	0.41 (0.19)	13.62 (3.19)	1.76 (0.42)	0	2.95 (1.19)	0	0.08 (0.06)	0.93 (0.36)
4	53	0	4.66 (1.04)	4.16 (1.35)	0	2.37 (0.54)	0	0.45 (0.21)	0.40 (0.40)
5	193	0	12.91 (1.71)	1.91 (0.37)	0	0.82 (0.18)	0	1.96 (0.94)	0.17 (0.17)
6	48	0	2.22 (0.62)	6.78 (1.99)	0	1.17 (0.33)	0	1.44 (0.69)	0
7	53	0	8.44 (2.11)	4.34 (1.64)	0.18 (0.16)	1.21 (0.26)	0	0.57 (0.45)	0
7A	52	0	13.86 (2.52)	5.35 (2.23)	13.65 (3.81)	18.79 (4.30)	0	9.54 (4.49)	0.03 (0.03)
8	40	0	3.18 (0.85)	1.55 (0.60)	8.12 (3.74)	6.14 (2.07)	1.00 (1.00)	4.44 (3.05)	0.33 (0.22)
9	57	0	3.08 (0.70)	2.71 (1.13)	2.44 (1.01)	4.32 (1.37)	0.15 (0.15)	2.41 (1.76)	0.17 (0.13)
10	110	0	8.45 (1.40)	2.16 (0.05)	7.26 (1.63)	7.51 (1.35)	0.24 (0.13)	1.68 (0.79)	0.07 (0.07)
St	23	0	4.96 (1.71)	0.02 (0.02)	0	0	0	0	0
Range Width		1.0	9.4	8.9	3.4	5.3	2.2	5.7	4.1
All areas (1972-1983)									
Mean No./Obs. (S.E. of Mean)		0.02 (0.01)	9.65 (0.83)	2.56 (0.30)	2.43 (0.27)	3.66 (0.33)	0.12 (0.05)	2.20 (0.57)	0.23 (0.05)
Co-efficient of Variation %		-	30	41	39	31	-	-	77

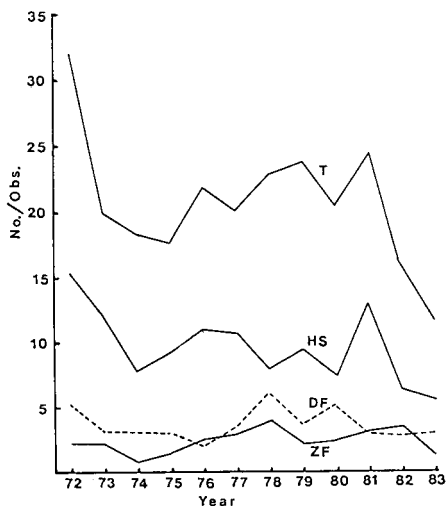


Fig. 2 Annual variation in the corrected numbers of sparrows and finches in the Brisbane region, 1972-1983. T = Total numbers; HS = House Sparrow; DF = Double-barred Finch; ZF = Zebra Finch. [No./Obs. = Number per Observer].

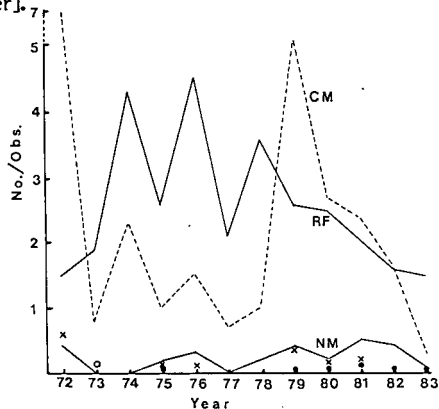


Fig. 3 Annual variation in corrected numbers of finches in the Brisbane region, 1972-1983. RF = Red-browed Firetail; CM = Chestnut-breasted Mannikin; NM = Nutmeg Mannikin; X = Plum-headed Finch; o = European Goldfinch; o = Diamond Firetail. [No. Obs. = Number per Observer].

RESULTS

Species Summary

The abundance and distribution of each species, based largely on the data contained in Table 1, are summarised below.

The House Sparrow *Passer domesticus* was very common and widespread in the survey area. The Red-browed Firetail *Emblema temporalis* was common in coastal and central areas but uncommon in suburban areas. Zebra Finches *Poephila quattata* were only recorded from western areas where they were common. The Double-barred Finch *Poephila bichenovii* and the Chestnut-breasted Mannikin *Lonchura castaneothorax* were both common and widespread, but most abundant in western areas. The Nutmeg Mannikin *Lonchura punctulata* was widespread but generally uncommon and most numerous in suburban areas. The Plum-headed Finch *Aidemoyzne modesta* was uncommon, only being recorded from western areas and only in some years. The European Goldfinch *Carduelis carduelis* was rare, being only recorded from area 3 and not found there in some years. The Diamond Firetail *Emblema quattata* was very rare, with only one record of 4 in 1973 from area 8. It is not included in subsequent analyses.

Relative Numbers

The corrected numbers of sparrows and finches (Figs. 2 & 3, Table 1) show that the House Sparrow was the most commonly encountered species, followed by the Double-barred Finch, Red-browed Firetail, Zebra Finch and Chestnut-breasted Mannikin.

Most species showed high numbers in 1972, fluctuating numbers from 1973 to 1981 and then general declines in 1982 and 1983 (Figs. 2 & 3). The annual fluctuations in numbers of many species were quite marked (Figs. 2 & 3) and the co-efficient of variation (CV) given in Table 1 was used to indicate the overall degree of variation in corrected numbers for some species. The Nutmeg Mannikin had a high CV (77%) while the House Sparrow, Red-browed Firetail, Zebra and Double-barred Finches all had lower CVs (30-41%). The CVs for the European Goldfinch, Plum-headed Finch and Chestnut-breasted Mannikin were omitted from Table 1 because their numbers were not normally distributed, showing significant ($P < 0.05$) skewness. The annual fluctuations of numbers for each species were not significantly correlated, positively or negatively, with the fluctuations of any other species.

An attempt was made to explain some of the annual fluctuation in sparrow and finch numbers by correlating them with rainfall data for the Moreton and East Darling Downs regions using K-values for both bird

numbers and rainfall. Significant correlations were obtained between Moreton rainfall and numbers of Nutmeg Mannikins ($r = 0.72$, $P < 0.01$) and Red-browed Firetails ($r = 0.67$, $P < 0.02$). No significant correlations were obtained between rainfall in the East Darling Downs Region and any species.

No species showed a steady increase or decrease in numbers but the Double-barred Finch had local, short-term increases. Following a large increase in numbers in 1978 in its western areas of abundance (8A, 8, 9, 10), this species more than doubled its numbers in the coastal areas from 1979 to 1981 and then declined to lower numbers again (Fig. 4).



Fig. 4 Corrected numbers of Double-barred finch in all areas (—) and in areas 1, 2, 5 (----). [No./Obs. = Number per Observer]

Distribution

A cluster analysis of survey areas on the basis of their species compositions (Fig. 5) provides information on the species distribution. Group A consists of areas immediately to the north and west of the city and is characterised by relatively high numbers of Red-browed Firetails, lower numbers of House Sparrows and the absence of the Nutmeg Mannikin. Group B, including the city and areas to the south, is characterised by high numbers of House Sparrows and Nutmeg Mannikins and lower numbers of Red-browed Firetails. Group C, containing a single area to the south-east of the city, is the only area to have the European Goldfinch and also has high numbers of House Sparrows and Nutmeg Mannikins. Group D contains four areas to the west of Brisbane and is characterised by the presence of Plum-headed and Zebra Finches and, to a lesser extent, by high numbers of Double-barred Finches. Finally Group E contains a single area, North Stradbroke Island, with a paucity of species, mainly House Sparrows and a few Red-browed Firetails.

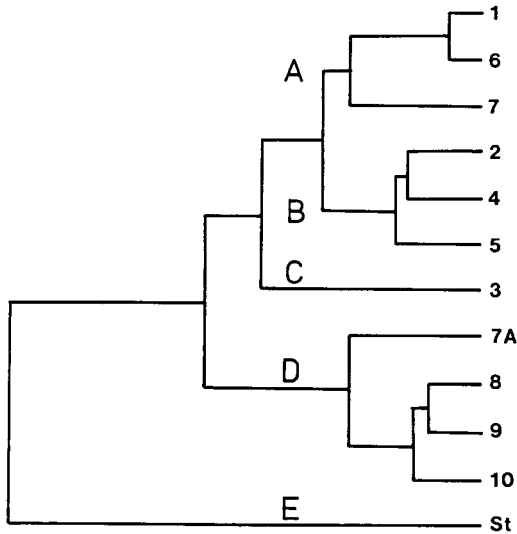


Fig. 5 A dendrogram from cluster analysis of the 12 areas in the Brisbane Region using the mean numbers of sparrows and finches recorded from them. Five groups, A-E, were recognised. See text for explanation.

The House Sparrow and Red-browed Firetail have the highest range widths, 9.4 and 8.9 respectively (Table 1), reflecting their wide and fairly uniform distribution over all areas. Although the Chestnut-breasted Mannikin and Double-barred Finch were recorded from all areas except Stradbroke Island, their corrected numbers in different areas varied considerably (Table 1) and this is reflected in lower range widths (5.7 & 5.3 respectively). Finally, the Nutmeg Mannikin (4.1), Zebra Finch (3.4), Plum-headed Finch (2.1), and European Goldfinch (1.0) show increasingly lower range widths, indicating more restricted distributions.

Species Interactions

The cluster analysis of species on the basis of their numbers in the 12 areas is presented in Fig. 6. Four species, (House Sparrows, Red-browed Firetails, Double-barred Finches and Chestnut-breasted Mannikins) form a distinct group **A**. A second group, **B**, contains species which

usually occur in more arid habitats, the Zebra and Plum-headed Finches. Finally the Nutmeg Mannikin is associated with group A and the European Goldfinch is very distinct from all other species on the basis of its distribution.

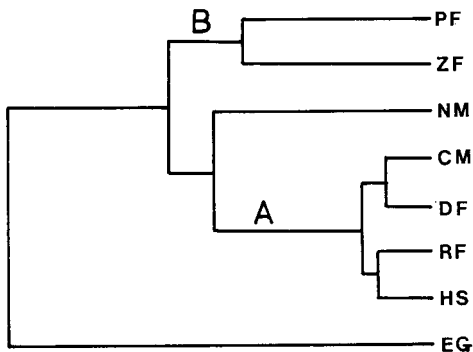


Fig. 6 A dendrogram from cluster analysis of eight species of sparrows and finches in the Brisbane region based on their mean numbers in 12 areas. (Species: PF = Plum-headed finch; ZF = Zebra Finch; NM = Nutmeg Mannikin; CM = Chestnut-breasted Mannikin; DF = Double-barred Finch; RF = Red-browed Firetail; HS = House Sparrow; EG = European Goldfinch)

The range overlap of each pair of species is presented in Table 2. As expected the species in Group A (Fig. 6 : House Sparrow; Red-browed Firetail; Double-barred Finch; Chestnut-breasted Mannikin) all had a high range overlap with the Double-barred Finch (0.74) and the Chestnut-breasted Mannikin (0.65). This results from all three species having high numbers in areas 7A, 8, 10 although the Double-barred Finch and Chestnut-breasted Mannikin have a much wider overall distribution than the Zebra Finch. The Nutmeg Mannikin had low range overlap values except with the House Sparrow (0.458), similarly the Plum-headed Finch had low range overlap values except with the Zebra Finch. The European Goldfinch had very low range overlap with all species.

TABLE 2

The range overlap of sparrows and finches in the Brisbane region.
A value of 1 indicates identical ranges and a value of 0 indicates
exclusive ranges, between two species.

Species	EG	HS	RF	ZF	DF	PF	CM	NM
European Goldfinch	-	.132	.048	.000	.066	.000	.003	.318
House Sparrow		-	.650	.319	.555	.171	.510	.458
Red-browed Firetail			-	.287	.508	.168	.570	.383
Zebra Finch				-	.743	.478	.655	.166
Double-barred Finch					-	.334	.771	.320
Plum-headed Finch						-	.363	.152
Chestnut-breasted Mannikin							-	.250
Nutmeg Mannikin								-

DISCUSSION

Annual variation in the numbers of observers and the exact areas covered severely restrict the comparability of these counts, even after correction. No attempt was made to sample the areas evenly nor to correct for differences in conspicuousness between species and these limitations must be considered when comparing the relative abundance of species. The counts were all made at the same time of year and give no information on seasonal changes in numbers but there is no evidence of regular seasonal movement for any of these species (Blakers *et al.* 1984). Despite these limitations, the counts provide valuable information on the distribution and changing abundance of the species because they cover a wide area and extend over a relatively long period of time, providing a quantitative baseline for future studies on the status of this group.

Apart from generally high numbers at the start of the survey (1972) and low numbers at the end (1983) (which may be artifacts) there has been no clear increase or decrease in abundance of any species during the survey period, unlike the situation found in various waterbirds (Woodall 1985, 1986).

There was some indication that annual changes in numbers were associated with changes in annual rainfall for the Moreton Region. These correlations were significant in the case of the Nutmeg Mannikin and Red-browed Firetail, both species found mainly in eastern coastal areas which might be poorly adapted to surviving/breeding in dry years. Following a year of high numbers in western areas, the Double-barred Finch apparently moved into coastal areas it did not previously occupy.

Several native species have shown major reductions in numbers this century. Lord (1956) noted the decline of the Diamond Firetail, "once plentiful all year ... only occasionally a pair or small flock is now seen". This survey indicates that they have declined even further : none were recorded in the area where Lord made his observations. Lord (1956) also records the decline of Plum-headed Finches from "large flocks" to "small parties only occasionally being seen", a condition which still pertains. The Black-throated Finch *Poephila cincta* has been extinct in this region since the 1930s (Lord 1956, Roberts 1979).

Lord (1956) commented on the variable numbers of the Chestnut-breasted Mannikin, as was noted in this study. He also stated that the Zebra Finch "although generally resident, is irregular in occurrence". However, this study showed that it had a comparatively low co-efficient of variation and thus may support Keast's (1958) suggestion that the provision of artificial water supplies has reduced the movement of this species.

The House Sparrow has been accused of displacing native species (Long 1981) and it is very well established, with a wide distribution and high numbers throughout the region. At present it seems largely restricted to the vicinity of human habitation where few native species are found but is also often encountered in adjacent fields.

The Nutmeg Mannikin is also widely distributed in the region but is much less common being mainly found in suburban areas 2 and 3. It seems to have declined in numbers because earlier reports indicate that it was more abundant, e.g. Zann (1976) "the most common bird along the Brisbane River", and Lavery (1974) "abundant in Brisbane River basin". Unlike the situation in north-eastern Queensland (Bell 1961), it appears to pose little threat to native species in the Brisbane region at present. The European Goldfinch was recorded in low numbers from one area in Brisbane, as earlier noted by Tarr (1950), Jack (1952) and

Roberts (1979). Lavery's (1974) comment that it is "common in Brisbane" is not supported.

The cluster analysis separated the finches into two main groups : a "mesic group" (A) of species which have distributions generally near the coast and a "xeric group" (B) of species with more inland distributions (Blakers *et al.* 1984), but these divisions are by no means absolute and there are high values of range overlap between species in both groups. The House Sparrow, while classified as a "mesic" species, is also common in inland areas, although its association with human habitation will ameliorate the drier conditions it experiences there.

Only two species, House Sparrow and Red-browed Firetail, were recorded from Stradbroke Island. Vernon and Martin (1975) also recorded European Goldfinch, Nutmeg and Chestnut-breasted Mannikins there but described these as uncommon or rare. They also described the House Sparrow as uncommon and, although not then quantified, it seems likely that it has increased in numbers since then.

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BIRDS OF BUSHY ISLAND
(WITH A SUMMARY OF THE NESTING STATUS OF
BIRD SPECIES ON SOUTHERN GREAT BARRIER REEF CAYS)

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Bushy Island is important biogeographically because it is the only wooded coral cay along 900 km of the Great Barrier Reef between Green Island (near Cairns) and the Capricorn Bunker Islands (near Gladstone). Seven other vegetated cays occur in the Swain Reefs area but these support only grasses and herbs. Seabird colonies are known to occur on all coral islands on the southern Great Barrier Reef (Kikkawa 1976, Walker and Domm 1986, Walker and Jones 1986) with the exception of Bushy Island. There are no reports in the literature of the bird life of Bushy Island though it has extensive *Pisonia grandis* forest and phosphate rock deposits (Hopley 1981) both of which are normally associated with large seabird colonies.

DESCRIPTION OF ISLAND

Bushy Island is situated 90 km east of Mackay on Redbill Reef at 150° 05'E, 20° 57'S. It is a 4.5 ha sand cay on an ovate reef 4.5 km long by 3 km wide. Also on the reef is a 1 ha granite outcrop, Redbill Island, rising to a height of 23 m. The whole formation is remarkable in its geomorphology (Wallace and Lovell 1977, Hopley *et al.* 1981). The vegetation of Bushy Island consists of a well developed *Pisonia grandis* forest with strand trees consisting of *Casuarina equisetifolia*, *Pandanus*, *Argusia argentea*, and *Scaevola sericea*. It is the only cay that is floristically similar to the Capricorn Bunker Islands where over a million seabirds nest during summer.

METHODS

Bird surveys were carried out on 24 January 1984, 13 January 1986, 10 November 1986 and 19 January 1987. Additional bird observations were made available by P. Ogilvie (20 September 1982), B. King (24 January 1984) and S. Domm (14 September 1985). G. Allen resided on the island intermittently throughout 1986 and made notes on the attendance of oystercatchers and some other birds.

RESULTS

Birds recorded during the surveys are described in the annotated species list in Appendix 1. A total of 23 species were observed. The avifauna was dominated by thousands of nocturnally roosting Black Noddies. Silvereyes and Orange-footed Scrub-fowl were the only breeding species but disused White-bellied Sea-Eagle nests were present and there may be some nesting by Eastern Reef Egrets. Migratory waders were uncommon and only four species were seen.

DISCUSSION

The most notable feature of the avifauna is the absence of breeding seabird colonies. The presence of phosphate guano rock suggests a long period of previous seabird occupation. Bushy Island appears to be one of the few coral islands on the Great Barrier Reef that does not support seabird nesting. This is illustrated for the southern Great Barrier Reef in Table 1 where breeding bird populations on cays are listed. All known coral islands south of Cairns are included except for an unnamed, sparsely vegetated cay in the north-east of the Swain Reefs (GBRMPA reef no. 21-206) which has not been surveyed. Comparative data for continental (rocky or high) islands in the vicinity of Bushy Island are also included in Table 1.

Differences between species breeding at Bushy Island and at other cays are a result both of biogeographical patterns and of factors specific to the island. Regarding the former, species such as Black-naped Terns (Walker 1986a), Roseate Terns, Masked Boobies, Lesser Crested Terns, Common Noddies and Sooty Terns appear to be completely absent from the Mackay-Bushy Island region. Bushy Island is also the only cay lying within the distribution range of the Orange-footed Scrubfowl. It is possible that Buff-banded Rails, Bar-shouldered Doves or even Wedge-tailed Shearwaters do not occur on Bushy Island because of interference from Orange-footed Scrub-fowls since these three ground-oriented species nest on most other southern forested cays. Buff-banded Rails and Bar-shouldered Doves also occur on some continental islands in the Mackay-Bushy Island region.

The most likely reason that Bushy Island does not support nesting Bridled Terns, Crested Terns, Silver Gulls, oystercatchers and possibly Eastern Reef Egrets and White-breasted Sea-Eagles is past or present interference from human activities. All of these species nest on nearby continental islands. The early history of Bushy Island is obscure but trochus shell collectors are known to have used it as a base and source of wood for boiling their catch. A shed was built in the forest in 1967 and has been

inhabited intermittently to the present. The resident is reported to have had a dog at one time. From 1984 to 1986 a tourist vessel from Mackay brought 30 to 130 passengers ashore each week. This operation moved elsewhere in 1987 but seaplanes continue to bring tourists from Mackay and Airlie Beach on a regular basis. Such activities are probably responsible for frightening shy species from breeding on the cay. The low numbers of migratory waders observed may also be due to frequent human visitation.

The fact that Black Noddies roost in thousands but do not nest on Bushy Island has no obvious explanation. This species co-exists with people and breeds readily on Capricorn Bunker Islands. It is the only species present at Bushy Island that does not occur on the continental islands.

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APPENDIX 1

ANNOTATED SPECIES LIST FOR BUSHY ISLAND

- Little Black Cormorant** *Phalacrocorax sulcirostris*. One dead specimen on 19 January, 1987.
- Frigatebird** *Fregata* sp. Up to 50 occasionally present soaring above the cay. They are possibly Least Frigatebirds *F. ariel* that have come north from their colony at Bell Cay (Walker and Jones 1986).
- White-faced Heron** *Ardea novaehollandiae*. Up to 25 were observed during most visits. They seem to be resident.
- Eastern Reef Egret** *Egretta sacra*. Almost 200 feed on Redbill Reef. They roost and nest mainly on Redbill Island but at least 50 have been counted on Bushy Island.
- Osprey** *Pandion haliaetus*. One or two are usually present between Bushy and Redbill Islands.
- Brahminy Kite** *Haliastur indus*. Two in November 1986.
- White-bellied Sea-Eagle** *Haliaeetus leucogaster*. A pair are frequently present but they fly to Redbill Island when people arrive. There are two large nests in pisonia trees which appear to belong to Sea Eagles but which have not been used for some time. The eagles may nest to the north on Tern Island (two nests are present there). An immature was seen in January 1984 and December 1986.

- Peregrine Falcon** *Falco peregrinus*. In January 1987 a Peregrine Falcon was present in a pisonia tree. It is possibly a frequent visitor as an unidentified falcon was observed in January 1984 and January 1986.
- Orange-footed Scrubfowl** *Megapodius reinwardt*. Three pairs appear to inhabit the cay. There are seven sand nesting mounds up to 2.5 m high.
- Pied Oystercatcher** *Haematopus longirostris*. Three to five were present throughout 1986 with the exception of February to April when 11 were present.
- Sooty Oystercatcher** *Haematopus fuliginosus*. One or two were sometimes present, particularly in summer.
- Mongolian Plover** *Charadrius mongolus*. Nine in January 1984.
- Ruddy Turnstone** *Arenaria interpres*. One or two were seen on occasions.
- Whimbrel** *Numenius phaeopus*. Thirty-two in January 1987.
- Tattler** *Tringa* sp. One or two were seen on occasions.
- Silver Gull** *Larus novaehollandiae*. Up to 60 in 1984 and 1986 but only six in January 1987 after the tourist vessel stopped visiting. Food-scrap from tourists may have attracted gulls to the cay.
- Crested Tern** *Sterna bergii*. Often present with a maximum of 80 counted in January 1984. Numbers are lower in winter.
- Black Noddy** *Anous minutus*. A roosting population possibly as high as 15000 in the trees at night throughout the year. They arrive after dark and depart before light. When the weather is overcast and windy they occasionally return to the island in mid-afternoon. No evidence of nesting.
- Sacred Kingfisher** *Halcyon sancta*. Kingfishers visit from time to time. A pair of this species were identified in January 1984.
- Black-faced Cuckoo-shrike** *Coracina novaehollandiae*. Four were present in September 1985.
- Silvereye** *Zosterops lateralis*. The only resident passerines on the cay. Probably fewer than 100.
- Australian Magpie-lark** *Grallina cyanoleuca*. A few have visited on occasions.

Torresian Crow *Corvus orru*. Two nesting in September 1982. Up to six were resident around this time but they were not seen from 1984 until October 1986 when a few visited for several days.

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SPECIMEN RECORD OF WHITE-HEADED PETREL FROM SOUTH STRADBROKE ISLAND

D.C. LAKE

On the 11th May, 1986 a specimen of the White-headed Petrel *Pterodroma lessonii* (Garnot) was found at high water mark of the ocean beach of South Stradbroke Island (27° 50'S, 153° 26'E). During the preceding week South-East Queensland had received heavy rains causing floods in many areas.

The eyes showed no sign of glazing indicating the bird had died recently, although rigor mortis had already worn off. The skin and base of the feathers contained no sand, suggesting the animal had died on shore and not been carried through the surf. The gizzard was filled with a black oily mass and cephalopod beaks. Ten complete upper beaks, the largest of which measured 3 mm in length, five lower beaks and a number already partially decomposed were identified. The rest of the gut also contained semi-digested material so it seems unlikely that the animal died of starvation. Muscle condition was good but only a minimal amount of subcutaneous fat was present beneath the feather tracts. No sign of disease was noted. Exhaustion seems a probable cause of death.

Details of the specimen, an adult female, using the methods of Disney (1974), are as follows. Plumage in good condition without signs of moult. Length 390 mm, wing span 1010 mm, tail 130 mm, wing 310 mm, tarsus 43 mm, middle toe and claw 67 mm, culmen 40 mm, bill width 13 mm. Bill black. Leg upper flesh coloured, lower half of webbing and toes black. Iris dark brown. A faint, incomplete collar of grey observed in this specimen is not inconsistent with the identification.

This is well north of the normal range of this species which breeds on islands south of New Zealand. Serventy *et al.* (1971) record beach washed specimens as far north as Cronulla, N.S.W. There have been three records of the species in Queensland. These were beach washed specimens from North Stradbroke Island (Vernon & Martin 1975) and Moreton Island (Palliser 1985) and a sight record off Fraser Island (Niland 1986).

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BOOK REVIEW

A THREATENED SPECIES CONSERVATION STRATEGY FOR AUSTRALIA Edited by Michael Kennedy and Ross Burton. *Ecofund Australia, Manly, 1986. \$7.95. 68 pp, soft cover, references, bibliography, appendices.*

Which species of Australian bird is in most urgent need of special conservation measures? This book attempts an answer for birds and other Australian animals and plants.

What are endangered species and how are they selected? Here species status is measured by the degree of threat to each species, by its taxonomic standing based on genetic individuality and a mathematical formulation combining such components. Thereby species are listed showing their species status rating and endangered priority rating score. Approximately 3,000 Australian species are listed in the book and are grouped as mammals, birds, reptiles, amphibians, fish, nemertines, molluscs, annelids, arthropods and a huge list of plant species. Yes, many invertebrates are included. This vast assemblage of animals has not been overlooked and attention is drawn to their important roles in the food webs.

The current problems of species conservation are not just for the affluent Australian but are global and need to be tackled through international co-operation. This book looks at the practical problems of introducing necessary legislation on the State, Federal and international levels, including the 'developing countries'.

The text is very concise and easy to read. Six contributors with backgrounds in scientific, industrial, academic and legislative aspects of society make the reading informative without any feeling of bias, especially political. Only black and white photographs are used and, while colour photographs would have enhanced the book's appearance, an air of lightness is introduced through appropriate cartoons by Peter Fairlie.

'Correlating Habitats with High Priority Threatened Species' is the title of Chapter VI. This shows Queensland to have much responsibility in this field as the highest priority Terrestrial Province is the Townsville-Cooktown Rainforest area with 31 high priority species, and the Great Barrier Reef, with 16 high priority species, is the top Marine Province.

Well, to return to my original question, what are our higher priority birds? According to this book the top five with their priority ratings are: Plains-wanderer (60), Double-eyed Fig-parrot (60), Noisy Scrub-bird (54), Abbot's Booby (54) and Rufous Scrub-bird (45). Two of these species occur in south-eastern Queensland which is included in the fourth most important Biogeographic Province. Ornithologists could query the proposed status of species according to this book. Plains-wanderers are insufficiently known and should be designated as such ('K) instead of 'R' for rare; likewise the Chestnut-breasted Whiteface. Some could say that their own experience indicates that the Western Bristlebird, Noisy Scrub-bird, White-winged Fairy-wren, Turquoise Parrot and (from the QOS survey) Marbled Frogmouth are not as endangered as the book suggests. On the other hand it could be argued that the Green-backed Honeyeater and Gouldian Finch are more endangered than stated. Nevertheless, this book has taken on the mammoth task of assembling information on many aspects of species' conservation and achieved this in a concise, scholarly and readable manner.

BARRY JAHNKE