Short Communications

The Abundance of Estrildid Finches at Waterholes in the Kimberley (W.A.)

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Habitat changes caused by man's interference with the environment have affected the distribution and abundance of many Australian animals (e.g. see Frith 1979). There are at least six cases in which populations of estrildid finches have suffered from them. It has been suggested by various authors that: (i) cattle grazing near water courses has led to the exclusion of the Crimson Finch *Neochmia phaeton* from southern parts of its original range (Storr 1973); (ii) bird-trapping has resulted in the decline of the Diamond Firetail *Emblema guttata* in Queensland (Lord 1956) and possibly also the Gouldian Finch *Erythrura gouldiae* in northern Australia (see e.g. Evans & Fidler 1986); (iii) deliberate grass burning has contributed to declining numbers of Gouldian Finches and Pictorella Mannikins *Lonchura pectoralis* in northern Australia (Blakers, Davies & Reilly 1984); (iv) dieback of eucalypt woodlands has reduced populations of the Red-browed Firetail *Emblema temporalis*, the Diamond Firetail and the Double-barred Finch *Poephila bichenovii* in New South Wales (Ford & Bell 1981); (v) the clearance of jarrah forest and coastal heathland has been followed by the disappearance of the Red-eared Firetail *E. oculata* in parts of Western Australia (Serventy & Whittell 1976); and (vi) the introduction of the Nutmeg Mannikin *L. punctulata*, and its establishment along the eastern coast, has been at the expense of its indigenous relative the Chestnut-breasted Mannikin *L. castaneothorax* (Immelmann 1982).

Some of man's activities have nevertheless been to the benefit of bird populations. Bore holes, which are sunk in order to provide water for cattle or sheep, are also drinking places for birds and have enabled species, such as the Masked Finch *P. personata* (Immelmann 1982) and the Zebra Finch *P. guttata* (Davies 1977), to extend their ranges into otherwise uninhabitable country. Increases in the numbers of Zebra Finches have also occurred as a result of the conversion of heathland to grassland (Davies, 1977) and local increases in abundance of the Red-browed Firetail and the Double-barred Finch have followed the clearance of areas of sclerophyll forest (Bell 1980).

There is a clear need to monitor populations of these

TABLE 1 The local names of waterholes visited in the Kimberley, and the numbers of recording sessions in 1983 and 1985. The reference numbers are used to identify waterholes in Figure 1 and Table 2.

Reference number	Local name	1983	1985	Reference number	Local name	1983	1985
1	Nelson Yard	2	0	13	Tanami Road Bore	0	1
2	Pumpkin Spring	9	2	14	Campbell Creek	0	2
3	Molly Creek	4	0	15	Plain Creek	0	2
4	Francis Spring	2	5	16	Doongan Station	0	3
5	Stewart Spring	3	0	17	Camp Creek	0	2
6	Wyndham Golf Club	0	2	18	Bloodwood Hole	0	1
7	King River Crossing	2	0	19	Nicholls Yard	0	1
8	Slaty Creek	0	3	20	Station Creek	0	1
9	Mukady Pool	0	1	21	Plover Bore	0	1
10	Black Flag	1	1	22	Lennard River	0	1
11	Six-mile Bore	0	1	23	Telegraph Bore	0	1
12	Martin Rock Hole	2	0	24	May River	0	1

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birds but, although Blakers *et al.* (1984) have produced detailed atlases describing their distributions, there are no quantitative measures of abundance for almost any of them. Such measures are important because abundance can change independently of distribution. The Gouldian Finch, for example, still occupies most of the range traditionally attributed to it but appears to have suffered a dramatic, and probably serious, decline in numbers within that range (Evans & Fidler 1986). The object of the present study was to assess the abundance of six estrildid finches in the Kimberley region: the Double-barred Finch, the Gouldian Finch, the Long-tailed Finch *Poephila neuticauda*, the Masked Finch, the Pictorella Mannikin and the Zebra Finch.

A standardised technique was used to estimate abundance so that it could be repeated precisely in the future and hence provide reliable comparative data. Traditional census methods, such as those of counting nests, making line transects or taking point counts (e.g. see Campbell & Lack 1985) are impracticable in such enormous and inaccessible areas as the Kimberley, where travel is always difficult and, during the wet season, virtually impossible. In the present study advantage was taken of the fact that water becomes scarce during the dry season and estrildids aggregate at waterholes in order to drink (Davies 1972; Evans, Collins, Evans & Miller 1985). Counts were made of the numbers of individuals that drank at 24 waterholes (consisting of springs, small pools along otherwise dry creeks and bore holes) throughout the Kimberley (Table 1; Fig. 1). Nine of these places were visited between July and September 1983, and 19 in the equivalent period in 1985. Observers positioned themselves about 20 m from the water in semi-concealment and counted the number of birds at the water's edge, and within their fields of vision, at one-minute intervals. Records were kept between 0600 and 0800 WST, which is the busiest time at the water (Evans *et al.* 1985). Overall, therefore, there were 121 counts of birds per session. Comparisons were made of the total number of individuals of each species visiting water-

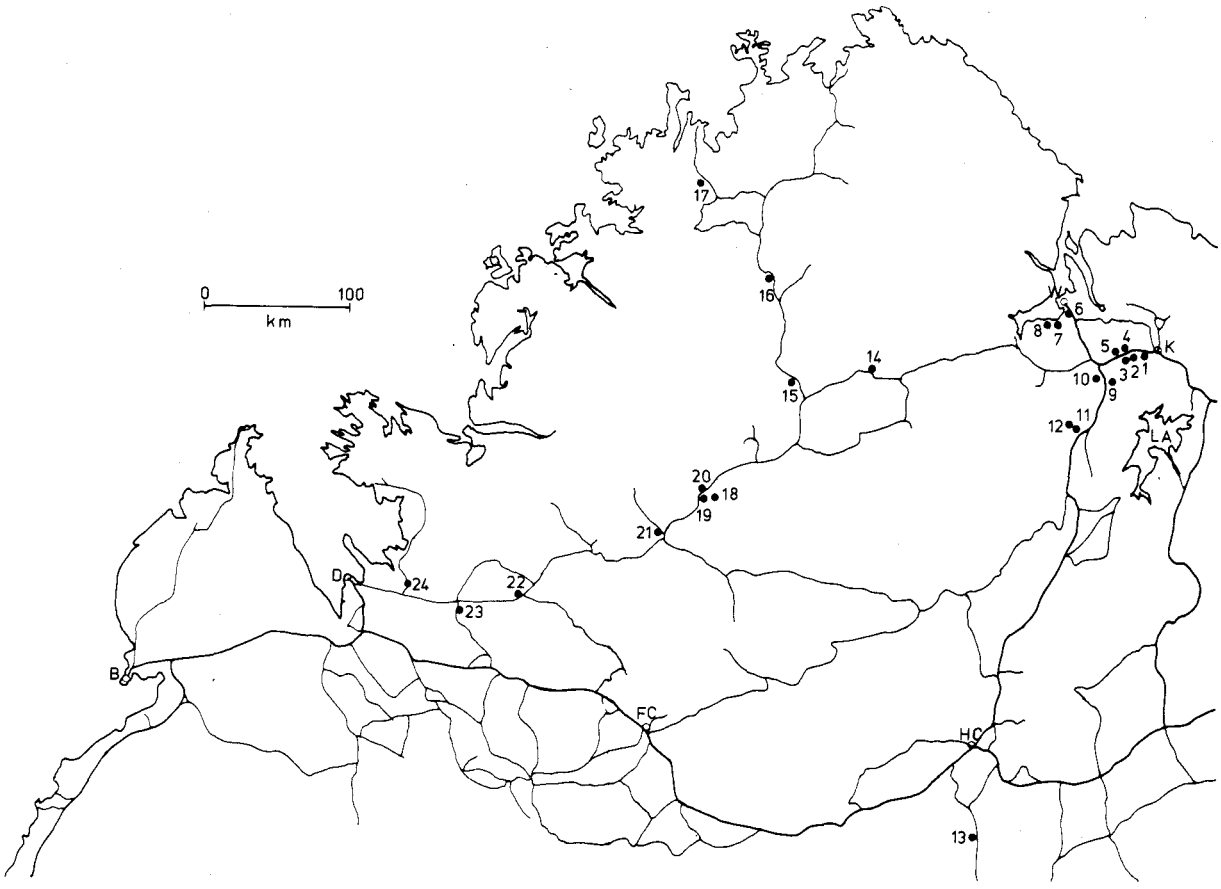

FIGURE 1 Map of the Kimberley showing major roads, tracks and townships: B, Broome; D, Derby; FC, Fitzroy Crossing; HC, Halls Creek; W, Wyndham; K, Kununurra; LA, Lake Argyle. The waterholes visited are numbered; their local names are included in Table 1.

ing places per session (see Table 1). Because the mean time spent on the ground while drinking was less than one minute in all seven estrildids for which recordings were made by Evans *et al.* (1985), it is unlikely that many birds will have been recorded on successive counts. The extent to which individual birds made more than one visit to the water is, however, unknown.

Additional notes were kept during the study of the occurrence of the Chestnut-breasted Mannikin, the Crimson Finch and the Star Finch *Neochmia ruficauda*, wherever they were encountered. These species tend to remain near large bodies of standing water, such as lakes, and therefore do not aggregate at waterholes in the same way as the other species studied.

TABLE 2 The numbers of finches visiting 24 waterholes in the Kimberley in 1983 and 1985. Counts of birds were made at one-minute intervals during recording sessions lasting from 0600-0800 WST (n = 121 counts per session). Each number presented is the total number of birds visiting the waterhole during the session. Means are presented when several recordings were made at the same place (see Table 1). Not all waterholes were visited in 1983 and 1985; - indicates that no recording was made; 0 indicates that no members of that species visited the waterhole during the recording session.

Reference no. of waterhole (see Fig. 1)	Double-barred Finch		Gouldian Finch		Long-tailed Finch		Masked Finch		Pictorella Mannikin		Zebra Finch	
	1983	1985	1983	1985	1983	1985	1983	1985	1983	1985	1983	1985
					East Kimberley							
1	0	-	3	-	70	-	0	-	0	-	0	-
2	15	12	3	1	89	120	93	42	126	183	0	0
3	6	-	58	-	204	-	175	-	54	-	7	-
4	13	26	0	41	10	84	0	56	0	11	0	0
5	0	-	0	-	57	-	12	-	3	-	4	-
6	-	34	-	48	-	20	-	31	-	0	-	23
7	208	-	58	-	15	-	26	-	0	-	114	-
8	-	31	-	0	-	0	-	12	-	77	-	50
9	-	0	-	0	-	2	-	6	-	129	-	0
10	0	0	0	0	6	0	0	20	0	161	14	20
11	-	10	-	0	-	132	-	62	-	0	-	15
12	2	-	1	0	142	-	30	-	6	-	0	-
					South Kimberley							
13	-	0	-	0	-	0	-	0	-	0	-	181
					Central Kimberley							
14	-	4	-	0	-	90	-	47	-	13	-	0
15	-	0	-	0	-	33	-	3	-	0	-	0
16	-	1	-	34	-	80	-	2	-	0	-	0
17	-	0	-	0	-	1	-	0	-	0	-	0
					West Kimberley							
18	-	0	-	1	-	120	-	0	-	0	-	0
19	-	0	-	0	-	79	-	3	-	0	-	0
20	-	0	-	0	-	112	-	0	-	0	-	0
21	-	0	-	0	-	100	-	0	-	0	-	74
22	-	228	-	0	-	344	-	0	-	0	-	72
23	-	0	-	0	-	55	-	0	-	0	-	64
24	1	12	-	0	-	299	-	0	-	0	-	32
Number of waterholes visited by birds	6	9	5	5	8	16	5	11	4	6	4	9
Total numbers of birds	245	358	123	125	593	1671	336	284	189	574	139	531
Mean numbers per waterhole	41	40	25	25	74	104	67	26	47	96	35	59

The Kimberley area as a whole is rich in estrildid finches (Table 2). Overall, 10 species were recorded; these were the nine species mentioned above and the Painted Firetail *Emblema picta*. They were particularly common in the eastern part of the region, where the mean number of species recorded per waterhole was 4.2 (n = 13). This compares with means of 2.8 (n = 4) and 2.1 (n = 7) in the central and western parts respectively. The drier and more arid southern Kimberley was poor in finches, although the only species recorded there, the Zebra Finch, was abundant. The Painted Firetail also occurs in this area (Slater 1979) but it was not seen there during the present study. Two individuals were nevertheless recorded at Pumpkin Spring in 1985. This is farther north than any of the sightings shown on its distribution map in Blakers *et al.* (1984).

The Long-tailed Finch was abundant and widespread throughout the eastern, central and western Kimberley; it was recorded at 22 (92 per cent) of the waterholes and often in large numbers. Other species were more patchy in their distribution and abundance. Recordings of Masked Finches and Pictorella Mannikins, for instance, were mostly confined to the eastern Kimberley (extending as far as Campbell Creek; number 14), but even there they were common at some waterholes and infrequent or absent at others. Data for the Double-barred Finch show a similar trend except that it was also abundant at some waterholes in the eastern and western Kimberley, where it was more common than the data suggest. Unlike the other species studied, the Zebra Finch visits water in its largest numbers in the middle of the day (Davies 1972; Evans *et al.* 1985) so that early morning counts will have underestimated their relative abundance. This species does not extend into the central and more northerly parts of the Kimberley (see also Blakers *et al.* 1984).

The Gouldian Finch was locally common but was recorded at fewer waterholes and in smaller numbers than any of the other five species for which recordings were made. The largest flocks were of about 50-100 birds, which compares unfavourably with flocks of several thousand individuals said to have occurred in the region at one time (R. Birch pers. comm.). Licensed bird-trapping for the cage bird trade is sometimes suggested as a cause of the decline but this was prohibited in 1981 (e.g. see Evans & Fidler 1986). There is no evidence of a recovery in populations in the short period between 1983 and 1985 (Table 2) because similar numbers of birds were recorded in these two years.

Chestnut-breasted Mannikins, Crimson Finches and Star Finches have evidently exploited the new habitat created by the man-made Lake Argyle. They are abundant in both the reed-beds along the shores of the lake and nearby agricultural land. Chestnut-breasted Mannikins were also recorded on the Mitchell Plateau (near Camp Creek; number 17). Crimson Finches occurred where groups of palms *Pandanus odorissima* were associated with standing water. Star Finches were recorded in large numbers both at Moochalabra in 1983 and drinking water provided for them in a private garden in Wyndham in 1986; small numbers of this species drank at Slaty Creek in 1985.

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