Editorial

Safring News has been expanded to *Afring News*! The idea was conceived last year while I was preparing a visit to some ringers in Kenya and the SAFRING steering committee approved the idea in June 2001. *Safring News* was first published 29 years ago in 1972 (see below). The cover changed in 1981, the year after Terry Oatley started working at SAFRING. *Safring News* has been the medium for SAFRING's ringing and recovery reports (previously published in *Ostrich*) as well as wide ranging articles about trapping birds, ageing and sexing, ringing expeditions, reports on studies using ringing, etc. written by ringers.

SAFRING has for many years provided ringing services to neighbouring African countries, and with the name change to *Afring News* greater links are established with countries further than neighbours. There is no other ringing journal in Africa – East African ringers publish their ringing reports in journals like *Scopus*. This issue has two articles that reflect the wider coverage of *Afring News*: although one is about ringing in Lebanon, it covers migrants to Africa and is written by Colin Jackson, an active ringer in Kenya; the other is about ringing forest birds in Tanzania. There are also two notices from Tanzania taken from the African Birding list server. Other articles cover ringing in Zimbabwe and Botswana, lovebirds in Zambia, flamingoes in Namibia, and various subjects from South Africa. The change of name affects only the newsletter. SAFRING, the South African Bird Ringing Unit, continues unaltered.

In May I was invited to visit Israel for a conference for African delegates on bird migration, flight safety (bird strikes) and education (using birds in education). Yossi Leshem organised sponsorship for the conference.

In August a group from the ADU attended the European Ornithologists' Union and Wader Study Group meetings in the Netherlands. Both conferences were successful and a wide variety of ornithological research was presented. In addition, I attended the EURING General Assembly meeting where I was able to meet many European ringing coordinators.

All these developments and activities are helping to put SAFRING and ringing in Africa onto the world ringing stage. In return, SAFRING and all the ringers it represents benefit from the exchanges of ideas and information.

Dieter Oschadleus

Examples of the *Safring News* covers from the periods 1972–1980 and 1981–2000.

Papers

Nine years in the Eastern Highlands of Zimbabwe

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Introduction

In the Eastern Highlands of Zimbabwe many birds survived the 'worst drought in living memory' (1991/2–1996): some in what was apparently a haven where they were recaptured or resighted regularly and others elsewhere, as they reappeared at trapping sites after the drought. Birds which were adult at the start of the drought survived better than those hatched in 1991 or during the drought, perhaps due to adults having a better knowledge of places suitable for sitting out the annual 'drought' (May to October), which places should also be a haven during a summer drought (Hanmer 1997).

I wondered what capture/recapture figures would show after another two years if El Nino did not mess things up, but La Nina provided more rain than was really wanted during 1997/8 and 1998/9.

Sites

Mitsasa (Mit) 19°03'S, 32°39'E; altitude 1200 m: Little trapping between October 1994 and April 1997 but colour-ringed birds noted. Fairly regular weekly trapping thereafter.

La Rochelle Botanical Gardens (LaR) 18°54'S, 32°42'E; altitude c. 1200 m: Trapping once a month throughout.

Mountain Home (MtH) 18°50'S, 32°41'E; altitude 1460 m: Trapping once a month since July 1992.

Vumba Botanical Gardens (VBG) 19°07'S, 32°41'E; altitude 1550 m: Trapping once a month throughout.

For a description of the sites see Hanmer (1997).

Methods

Mist netting between July 1990 and June 1999, using 8–12 nets (11–12 in 1994–97), set in roughly the same place each month for nine hours. Numbered rings were placed on all birds and some were colour-ringed.

Rainfall and temperature

The four sites differ in both temperature and rainfall, due to altitude and geographical position relative to the border mountains and the rain bearing winds from the south-east. Mitsasa (mean annual temperature 21.7°C over nine years) and La Rochelle are fairly hot; the other sites are cooler. Mitsasa is in a rain shadow; La Rochelle receives more rain and the montane sites considerably more, but proportionately the annual rainfall at the four sites is similar. Fig. 1 shows the rainfall received at Mitsasa (where the drought had the greatest impact), superimposed on recapture figures for all sites combined and shows general congruence.

Results

Table 1 gives the number of birds ringed each year from July 1990 to June 1999, with the number (and percentage) recaught for the last time in a later year, at all sites combined. For 1991/2 the 15 birds ringed at Hillcrest College are excluded as no further trapping was done there and the figure for birds ringed in 1995/6 was given incorrectly by Hanmer (1997).

Table 1. Number ringed and number and percentage recaught for the last time in each succeeding year (July to June), at four sites (combined) in the Eastern Highlands, between July 1990 and June 1999. Underlined figures relate to 1996/7 after rain started in January 1996.

Year	Number	Recaught after (years)								Total
ringed	ringed	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	8 (%)	>1 yr (%)
90/1	1049	76 (7.2)	28 (2.7)	21 (2.0)	7 (0.7)	11 (1.0)	6 (0.6)	4 (0.4)	6 (0.6)	159 (15.2)
91/2	1349	35 (2.6)	26 (1.9)	17 (1.3)	6 (0.4)	7 (0.5)	2 (0.1)	5 (0.4)		98 (7.3)
92/3	1171	43 (3.7)	26 (2.2)	24 (2.0)	18 (1.5)	15 (1.3)	8 (0.7)			134 (11.4)
93/4	1019	31 (3.0)	19 (1.9)	10 (1.0)	11 (1.1)	8 (0.8)				79 (7.8)
94/5	885	20 (2.3)	11 (1.2)	9 (1.0)	12 (1.4)					52 (5.9)
95/6	781	29 (3.7)	11 (1.4)	5 (0.6)						45 (5.8)
96/7	1028	64 (6.2)	20 (1.9)							84 (8.2)
97/8	1024	27 (2.6)								27 (2.6)

The number ringed increased in 1991/2 (the start of the drought), despite the same trapping effort as in the previous year. Thereafter numbers declined, even though trapping started at Mountain Home in 1992 and more nets were used from 1994. The number ringed did not increase immediately after the drought broke in January 1996 but the following year showed a return to 1990/1 levels and this was maintained in 1997/89 although numbers at Mountain Home had begun to decrease and fewer nets were used from 1998. In 1998/9 the number ringed at Mountain Home and Vumba Gardens decreased, but Mitsasa and La Rochelle were back to pre-drought levels.

Recapture figures for birds ringed in 1990/1 probably were almost normal in the first year, but thereafter declined, only becoming fairly normal again after the rains returned; that six (0.6%) were recaught after eight years is reasonable. Recapture percentages for 1996/7 are underlined. To the left, generally low percentage recaptures presumably were caused by drought, with some variations due to increased rainfall in 1992/3 and 1993/4. The heavy rain during January–March 1996 did not increase recapture figures much; it is only from 1996/7 or 1997/8 that there is any real improvement. However, by 1998/9 recapture percentage of birds ringed in 1995/6 and later had slumped. In the first year after ringing, under reasonable conditions to begin with, followed by an exceptionally dry summer, at least 7.2% of birds ringed in 1990/1 were recaught. The actual number recaught after a year was far more than 76, since birds recaught in subsequent years are not included in that figure, whereas for 1997/8, 27 (2.6%) is the total number which was recaught in 1998/9.

Fig. 1 was drawn up using the total number of birds ringed each year which have been recaught at least one year later (from Total in Table 1), as a percentage of the number ringed each year. The annual rainfall for Mitsasa is superimposed. There seems to be a relationship between rainfall and percentage recapture, with few of the birds ringed in 1991/2 (which was very dry) being seen again and an increased recapture of birds ringed in 1992/3 (which was wetter). However, a similar rainfall in 1993/4 did not produce similar results and the heavy rain in January–March 1996 also did not increase the percentage recaught. It is only among birds ringed in 1996/7 that percentage recapture over the following two wet years shows an increase, but this is not maintained among birds ringed the following year, despite good rains. This suggests that while rainfall had some bearing on recapture figures, it is not the sole cause of the recapture pattern found.

The four sites differ geographically and

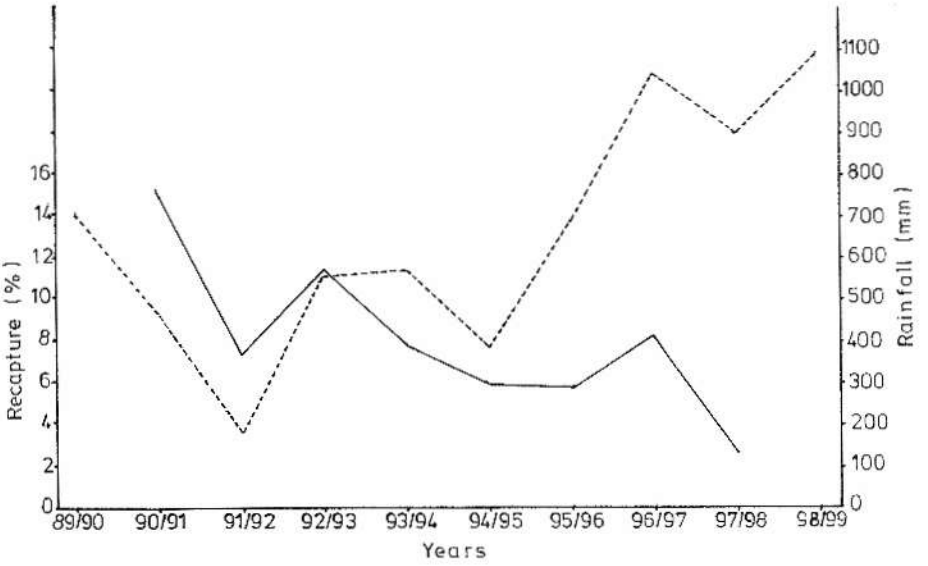

Fig. 1. The percentage of birds ringed in each year (from July to June) at all sites combined, which were recaptured at least one year later = solid line. Annual rainfall at Mitsasa = dotted line.

climatically, Mitsasa and La Rochelle being mid altitude and relatively hot and dry. At Mitsasa bird baths are kept full, but the garden is not watered, whereas at La Rochelle bird baths are usually dry, but the garden is watered. The dam was dry in 1994–7, but much water leaked from borehole pipes. Mountain Home and Vumba Gardens are high, cool and relatively wet and at both there is permanent water. One would therefore expect to find a difference in 'survival' and this is shown in Table 2.

Percentage recapture (adult and immature-ringed combined) at each year level is similar for Mountain Home and Vumba Gardens and fairly similar for La Rochelle and Mitsasa, although Mitsasa figures suffered from little trapping between October 1994 and April 1997, while high first and second year figures are due to seed-eaters being resident during the drought. At La Rochelle only first and second year figures are higher than at the two montane sites, but overall (Total, Table 2), the montane sites have a lower percentage recapture than found at the other two sites.

Table 2 also shows the difference in percentage recapture of birds ringed when adult and those ringed when immature; site differences are considerable.

Table 3 shows the number of adults and immatures ringed each year at each site and the percentage recaught after at least one year. In general, before and during the drought, fewer immatures than adults were ringed each year, except at La Rochelle in 1992/3 and 1993/4 (wettish years) and at Mountain Home in 1993/4 and 1994/5, but there was an increase in the number of immatures ringed in 1996/7 and 1997/8, probably as a result of increased breeding after the drought. Table 3 was used to construct Fig. 2, where recapture percentages are graphed against year ringed. The drought (roughly early summer 1991 to December 1995) is shown between dotted lines although the rainfall in the summer of 1990/1 was also low.

Table 2. Number of birds ringed at each site (those ringed when adult and those ringed when immature, combined and separate) between July 1990 and June 1998 and number and percentage recaught in each succeeding year. Immature percentage given below each site.

Site	Age	Number	Recaught after (years)														Total	
		ringed	1	(%)	2	(%)	3	(%)	4	(%)	5	(%)	6	(%)	7	(%)	8	(%)	>1 year	(%)
Mit	A+I	1403	65	(4.6)	29	(2.1)	6	(0.4)	10	(0.7)	7	(0.5)	1	(0.1)	3	(0.2)	2	(0.1)	123	(8.8)
	A	820	49	(6.0)	25	(3.0)	6	(0.7)	9	(1.1)	7	(0.9)	0		2	(0.2)	1	(0.1)	99	(12.1)
	I	583	16	(2.7)	4	(0.7)	0		1	(0.2)	0		1	(0.2)	1	(0.2)	1	(0.2)	24	(4.1)
	I	41.6%																	19.5%	
LaR	A+I	3077	130	(4.2)	56	(1.8)	30	(1.0)	18	(0.6)	13	(0.4)	4	(0.1)	3	(0.1)	3	(0.1)	257	(8.4)
	A	1580	78	(4.9)	40	(2.5)	25	(1.6)	14	(0.9)	11	(0.7)	4	(0.3)	2	(0.1)	2	(0.1)	176	(11.1)
	I	1497	52	(3.5)	16	(1.1)	5	(0.3)	4	(0.3)	2	(0.1)	0		1	(0.1)	1	(0.1)	81	(5.4)
	I	48.7%																	31.5%	
MtH	A+I	1898	64	(3.4)	32	(1.7)	21	(1.1)	13	(0.7)	10	(0.5)	5	(0.3)					145	(7.6)
	A	998	37	(3.7)	20	(2.0)	12	(1.3)	10	(1.0)	7	(0.7)	4	(0.4)					90	(9.0)
	I	900	27	(3.0)	12	(1.3)	9	(1.0)	3	(0.3)	3	(0.3)	1	(0.1)					55	(6.1)
	I	47.4%																	37.9%	
VBG	A+I	1928	60	(3.1)	28	(1.5)	26	(1.3)	13	(0.7)	10	(0.5)	6	(0.3)	3	(0.2)	1	(0.2)	147	(7.6)
	A	1082	50	(4.6)	21	(1.9)	19	(1.9)	13	(1.2)	9	(0.8)	5	(0.5)	3	(0.3)	1	(0.1)	121	(11.2)
	I	846	10	(1.2)	7	(0.8)	7	(0.8)	0		1	(0.1)	1	(0.1)	0		0		26	(3.1)
	I	43.9%																	17.7%	
Total	A+I	8306	319	(3.8)	145	(1.7)	83	(1.0)	54	(0.7)	40	(0.5)	16	(0.2)	9	(0.1)	6	(0.1)	672	(8.1)
	A	4480	214	(4.8)	106	(2.4)	62	(1.4)	46	(1.0)	34	(0.8)	13	(0.3)	7	(0.2)	4	(0.1)	486	(10.8)
	I	3826	105	(2.7)	39	(1.0)	21	(0.5)	8	(0.2)	6	(0.2)	3	(0.1)	2	(0.1)	2	(0.1)	186	(4.9)
	I	46.1%																	27.7%	

Table 3. Number of birds ringed each year between July 1990 and June 1998 at four sites and number and percentage recaught at least one year later. Those ringed when adult and those ringed when immature are separated. Data used to construct Fig. 2.

Year	Age	Mitsasa			La Rochelle			Mountain Home			Vumba		
ringed		n	Retrap >1 year	(%)	n	Retrap >1 year	(%)	n	Retrap >1 year	(%)	n	Retrap >1 year	(%)
90/1	A	177	28	(15.8)	351	67	(19.1)				158	34	(21.5)
	I	103	5	(4.9)	170	18	(10.6)				90	3	(3.3)
91/2	A	299	20	(6.7)	357	37	(10.4)				145	22	(15.2)
	I	171	2	(1.2)	254	13	(5.1)				123	6	(4.9)
92/3	A	65	14	(21.5)	192	23	(12.0)	259	46	(17.8)	140	14	(10.0)
	I	67	2	(3.0)	208	10	(4.8)	143	21	(14.7)	97	3	(3.1)
93/4	A	126	9	(7.1)	74	5	(6.8)	147	16	(10.9)	138	13	(9.4)
	I	93	5	(5.4)	149	9	(6.0)	169	16	(9.5)	123	7	(5.7)
94/5	A	49	5	(10.2)	102	7	(6.9)	186	12	(6.5)	68	11	(16.2)
	I	74	1	(1.4)	105	8	(7.6)	224	6	(2.7)	77	1	(1.3)
95/6	A	2	0		161	17	(10.6)	165	8	(4.8)	128	10	(7.8)
	I	0			133	4	(3.0)	102	5	(4.9)	90	1	(1.1)
96/7	A	43	19	(44.2)	197	17	(8.6)	138	5	(3.6)	154	13	(8.4)
	I	26	6	(23.1)	241	15	(6.2)	144	5	(4.4)	115	3	(2.6)
97/8	A	59	4	(6.8)	146	3	(2.1)	103	3	(2.9)	151	4	(2.6)
	I	49	3	(6.1)	237	4	(1.7)	148	2	(1.4)	131	2	(1.5)

Recaptures

Mitsasa: Few birds (of many species) ringed in 1991/2 were seen again, whereas most of those ringed between 1992/3 and 1996/7 were resident small seed-eaters, doves, weavers and canaries, of which a high proportion were recaught, mainly over one to three years. Of non-seed-eaters ringed in 1990/1 and 1992/3, most were only recaught after 1996. Few birds (of many genera) ringed in 1997/8 have been recaught. Overall (Table 2), although adult recapture is highest, due to the presence of resident seed-eaters, percentage recapture of immature-ringed birds is almost the lowest.

La Rochelle: The range of species ringed (mainly sunbirds, but many other genera) remained much the same until 1994/5, by which time most seed-eaters had disappeared, only being seen again in reasonable numbers in 1997/8; few of these had been ringed previously. Most of the birds ringed before and during the drought and recaught, were sunbirds and many were seen regularly, but some ringed in 1990/1 and 1992/3 (sunbirds and others) were not recaught until 1996/7 or later. Of those ringed in 1997/8 (many genera) few have been seen again. The overall recapture rate is fairly high. Both adult and immature rates are relatively high.

Vumba Gardens: Many sunbirds and other genera were ringed throughout the period, but the number of seed-eaters, especially canaries, decreased during the latter part of the drought, and sunbirds, especially Bronze, reduced in number from 1997. Some sunbirds were recaught regularly during the drought, as were a few bulbuls, robins, thrushes and canaries, especially of those ringed in 1994/5, but many birds ringed in 1990/1 and 1991/2 were only recaught after the drought. Few of those ringed in 1997/8 (including fewer sunbirds) have yet been recaught. Overall percentage recapture is low; the adult figure is fairly high, but immature recapture is the lowest for any site.

Mountain Home: Trapping started in July 1992. Initially many sunbirds and other gen-

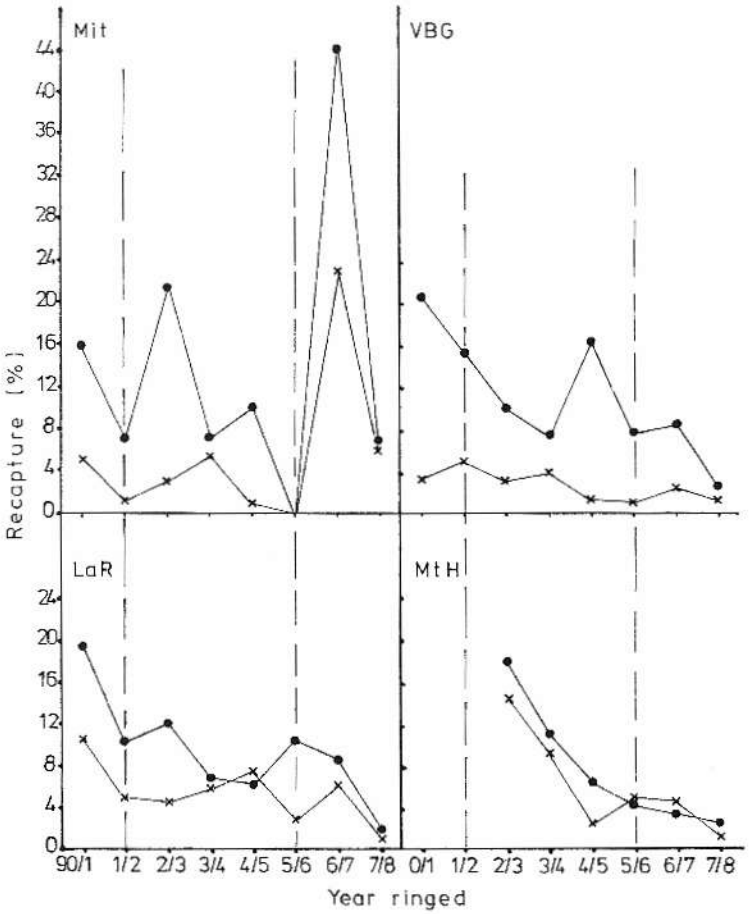

Fig. 2. The percentage of birds ringed in each year (from July to June) at each of four sites, which were recaptured at least one year later. Those ringed when adult = ●, those ringed when immature = x. Vertical dotted lines roughly indicate the period of the drought.

era were ringed but from 1994/5 the number of warblers and seed-eaters decreased and once the *Protea repens* died (by 1995/6) fewer sunbirds were caught. During the drought most recaptured birds were sunbirds, but from 1996/7 a few of other genera were recaught, not having been seen since 1992/3 or 1993/4. Very few of the many genera ringed in 1997/8 have been recaught. Overall the recapture rate is low, but the rate for immature-ringed birds is the highest.

Longevity

Using the apparent age of each bird at ringing, the months of first and last capture and the breeding season, birds were aged to the nearest six months. For birds ringed when immature this is roughly correct, but for birds ringed when adult it is the minimum age and is given as 'more than'.

Table 4 lists the birds known to have reached at least four years old; 26% were

Table 4. Birds known to have reached four or more years old. Those marked as more than the age were ringed when adult. D/O = mainly in dense vegetation, but comes into the open. O = normally found in the open.

Species	Habitat	Age (years)													Species
		4	>4	5	>5	6	>6	7	>7	8	>8	9	>9	12	total
African Goshawk	D/O									M					1
Laughing Dove	O				M		F								2
Palm Swift	O						F								1
Speckled Mousebird	O	2	1												3
African Hoopoe	O		F												1
Blackcollared Barbet	O				F										1
Cardinal Woodpecker	O		F						F						2
Blackeyed Bulbul	O	2M	M, 2F		M, F	M	M, 2F		2F						13
Stripecheeked Bulbul	D/O						F		F				M		3
Kurrichane Thrush	O		3M, F	M, F	M		M		M						9
Olive Thrush	D/O					M			M, F						3
Heuglin's Robin	D/O	M, F	M												3
Cape Robin	D/O		M		F										2
Grassbird	O						M								1
Barthroated Apalis	D/O		2F		2M		2F				F				7
Singing Cisticola	O		M												1
Pallid Flycatcher	O						M								1
Black Flycatcher	O						M								1
Chinspot Batis	O						M								1
Paradise Flycatcher	O		F										M		2
Longtailed Wagtail	O		F								M				2
Southern Puffback	O		F												1
Olive Bush Shrike	D/O								F						1
Redwinged Starling	O		F												1
Malachite Sunbird	O								F						1

(**Table 4.** continued.)

Species	Habitat	Age (years)													Species
		4	>4	5	>5	6	>6	7	>7	8	>8	9	>9	12	total
Bronze Sunbird	O		2M	M		M	F	F	3M, 2F					M	12
Miombo Sunbird	O		F				M			M	M		M		5
Yellowbellied Sunbird	O	M, 2F	5M, F	M	2M, 3F		7M, 3F		F						26
Olive Sunbird	D/O	4M, 2F	9M, F	4M, 3F	2M,2F	3M	2M	4M	2M		M		M		40
Collared Sunbird	D/O	M	M		2M		F								5
Black Sunbird	O	M	2M	M			M	M							6
Yellow White-eye	D/O		3M, 2F, 3	M, F	4F		3M		2M						19
Yellowthroated Sparrow	O												M		1
Spectacled Weaver	O		M												1
Spottedbacked Weaver	O	M	2M												3
East African Swee	O				F										1
Redthroated Twinspot	D/O		M												1
Bluebilled Firefinch	D/O	F	M	M											3
Blue Waxbill	O	F			3M	F									5
Cape Canary	O	M	3M, F		2F	M									8
Yelloweyed Canary	O				M,F										2
Bully Canary	O	M	F		M		F								4
Streakyheaded Canary	O		M, F		M										3
Number immature/adult			22/61		15/33		8/33		7/18		2/4		0/5	1/0	55/154
Percentage immature			26.5%		31.3%		19.5%		28.0%		50.0%		0%	100%	26.3%
Number male/female			51/26		27/21		27/14		14/11		5/1		5/0	1/0	130/73
Percentage male			66.2%		56.3%		65.9%		56.0%		83.3%		100%	100%	64.0%
Number sex unknown			6												6
Total															**209**

ringed when immature and 64% are male. There are 88 of 12 species (42%) which prefer dense habitat and 121 of 31 species (58%) which live in the open. Most of the older birds are insectivorous or omnivorous; only ten (4.8%) of four species are purely seed-eaters.

Table 5 lists 37 birds of seven or more years old in some detail; 27% were immature when ringed and 67.6% are male, while 17 of seven species (46%) favour a dense habitat and none is a seed-eater.

Hanmer (1997) listed 19 of the birds in Table 5 as being five or more years old at June 1997, of which seven have not been seen since 1996, although they were present during the drought. Twelve were recaught after June 1996, of which three were present throughout the drought and nine were seen at the start of the drought, but not again until 1996/7 and of these nine, four have not been seen since June 1997.

In the present list there are 18 'new' birds aged over seven, of which 14 had not been seen since the start of the drought, but reappeared after good rain, one bulbul in 1996 and the rest in 1997–99. Only four of the 'new' birds were caught during the drought; they were not caught in 1996/7 but probably were present and are still present.

Table 6 shows the year in which each of the birds listed in Table 4 was last seen. Of the 147 reported by Hanmer (1997) as having reached four or more years old, only 29 were seen after June 1997. Of 91 more birds of 4–9 years old last seen between July 1997 and June 1999, only 18 were seen during the drought. Some of the birds last seen before 1996 may have died, but there is no climatic reason for the 62 birds last seen between January 1996 and June 1997 to have died. Of the 91 last seen after July1997, a high proportion probably are still alive and may be caught again (some have been), so totals for those six-monthly periods merely relate to recapture figures, but many of those birds had not been seen for years.

Movement

From local trapping and recovery data there is some evidence of movement. An adult female Miombo Sunbird, caught at La Rochelle in consecutive winters, was recovered c. 25 km away early in the breeding season (October 1991). A Malachite Sunbird, ringed on the Vumba during winter, was recaught at Mountain Home (October 1991), presumably on the way to a breeding area and some Bronze Sunbirds, ringed at Seldomseen (on the Vumba), were recaught at Vumba Gardens a few kilometers away in 1990–92. An Olive Sunbird, ringed at La Rochelle (April 1998) was recaught at Mountain Home the following month, a straight line distance of c. 8 km, with two high, pine-clad ridges in between (and I thought this species was sedentary). None of these movements was drought-related.

A young Kurrichane Thrush, ringed at La Rochelle before the drought, was killed on the Pungwe River in Mozambique five years later, as the drought ended; its movements in the interim are unknown. An adult Yelloweyed Canary, ringed at Mitsasa before the drought, was killed near the dam 1,5 km away in March 1992 and an adult Southern Puffback, also ringed at Mitsasa before the drought, was killed partway up the Vumba Mountains in July 1992, as was a young Brubru Shrike, although this last may have been an instance of immature dispersal and not drought-related. However, of those which probably were, two had moved down towards permanent water and one had moved up to a cooler, moister altitude.

Discussion

Movement

The increase in the number ringed in 1991/2 (Table 1) when trapping effort remained constant, suggests that birds were moving into trapping areas at the start of the drought. The decline in number caught until 1996/7 suggests a reduction in the number of birds at sites during the drought, due to death or emigration, with an increase once the rains returned, due to immigration or breeding success. That the latter was a factor is shown by the increased number of immatures ringed in 1996/7 and 1997/8 (Table 3).

Table 5. Birds known to have reached seven or more years old by June 1999, with site of capture and age when ringed. Hanmer (1997) listed 19 as having reached the age of five or more and there are 18 new birds. The years in which birds were seen are given under Comments.

Species	Ring number	Age/ sex	Site	Known age	Listed 1997	Comments
African Goshawk	5-33442	I.M.	Mit	8.5	no	Not seen between Jul 90–May 98
Cardinal Woodpecker	CC-00593	I.F.	Mit	7.0	no	Not seen between Jan 92–Aug 98
Blackeyed Bulbul	BB-94210	A.F.	VBG	>7.0	no	Not seen between Jan 92–Jan 98
Blackeyed Bulbul	BB-94277	A.F.	LaR	>7.0	no	Not seen between Jul 92–Oct 98
Stripecheeked Bulbul	BB-55998	A.M	VBG	>9.0	no	Not seen between Feb 93–Mar 99
Stripechecked Bulbul	BD-05665	A.F.	VBG	>7.0	no	Not seen between Mar 93–Apr 96
Kurrichane Thrush	4-81551	A.M.	VBG	>7.5	yes	Not seen since Nov 96
Olive Thrush	4-81567	A.F.	VBG	>7.0	yes	Not seen since Oct 96
Olive Thrush	4-81561	A.M.	VBG	>7.0	yes	Not seen since May 96
Barthroated Apalis	AB-69208	A.F.	VBG	>8.0	yes	Not seen between Jun 92–Apr 96
Paradise Flycatcher	AA-91813	A.M.	Mit	>9.0	no	Not seen between Oct 91–Oct 97
Longtailed Wagtail	F-17350	A.M.	VBG	>8.5	yes	Present throughout
Olive Bush Shrike	BD-05629	A.F.	Mtll	>7.0	no	Not seen between Nov 92–Jul 98
Malachite Sunbird	AD-01434	A.F.	MtH	>7.0	no	Not seen between Oct 92–Oct 98
Bronze Sunbird	AA-65742	I.M.	VBG	12.5	yes	Not seen since Jul 96
Bronze Sunbird	AB-69204	A.M.	VBG	>7.5	yes	Not seen since Aug 96
Bronze Sunbird	AA-91665	A.F.	VBG	>7.0	yes	Not seen since Nov 96
Bronze Sunbird	AA-91537	A.F.	VBG	>7.0	yes	Not seen since Oct 96
Bronze Sunbird	AD-01444	A.M.	MtH	>7.0	no	Not seen between Sep 93–Nov 98
Bronze Sunbird	AD-01461	A.M.	MtH	>7.0	no	Present throughout
Bronze Sunbird	AD-01450	I.F.	MtH	7.0	no	Not seen between Feb 95–Oct 98
Miombo Sunbird	AB-69397	A.M.	LaR	>9.0	yes	Not seen between Feb 95–Oct 98
Miombo Sunbird	AB-69322	I.M	LaR	8.5	yes	Present throughout
Miombo Sunbird	X-62872	A.M.	Mit	>8.0	yes	Not seen between Feb 94–May 97
Yellowbellied Sunbird	X-84416	A.F.	MtH	>7.0	no	Not seen between Sep 92–Aug 98
Olive Sunbird	AB-69313	A.M.	LaR	>9.0	yes	Not seen between Nov 90–Jan 96
Olive Sunbird	AA-91798	A.M.	VBG	>8.5	yes	Not seen between Jun 93–Apr 97
Olive Sunbird	AD-01361	A.M.	LaR	>7.5	yes	Not seen between Jul 92–Jun 96
Olive Sunbird	AA-91896	I.M.	LaR	7.5	yes	Not seen between Jan 94–Dec 96
Olive Sunbird	AD-01527	A.M.	MtH	>7.0	yes	Not seen between Jan 94–Jan 97
Olive Sunbird	X-84549	I.M.	MtH	7.0	no	Probably present throughout
Olive Sunbird	AD-01526	I.M.	MtH	7.0	no	Probably present throughout
Olive Sunbird	X-84504	I.M.	VBG	7.0	no	Not seen between Oct 92–Oct 98
Black Sunbird	AA-91570	I.M.	LaR	7.0	yes	Present throughout
Yellow White-eye	AA-91601	A.M.	LaR	>7.5	no	Probably present throughout
Yellow White-eye	AA-91652	A.M.	LaR	>7.0	yes	Not seen between May 91–Jun 96
Yellowthroated Sparrow	F-02220	A.M.	Mit	>9.5	no	Not seen between Sep 91–Apr 99

Number of birds	37
Number male	25 (67.6%)
Number immature when ringed	10 (27.0%)

Table 6. Year in which each bird, known to have reached four years old or more, was last seen. Each year is divided into July–December and January–June. A line marks the start of the rains in January 1996 and another the cut-off point for data presented by Hanmer (1997).

Age	Year in which last seen													Total
	1993	1994		1995		1996		1997		1998		1999		
	J–D	J–J	J–D	J–J	J–D	J–J	J–D	J–J	J–D	J–J	J–D	J–J		
12							1							1
11														
10														
9									1	1	1	2		5
8								2	–	–	3	1		6
7							6	2	–	3	14	–		25
6				1	2	6	5	1	5	4	10	7		41
5			2	2	2	4	11	5	4	6	9	3		48
4	13	7	5	10	12	5	7	7	3	5	8	1		83
Total	13	7	7	13	16	15	30	17	13	19	45	14		209

Not seen after Dec 95	56	Not seen 1992/3–Jan 96	20
Not seen after Jun 97	62	Not seen 1992/3–July 97	53
	118		73
Seen since Jun 97	29	Seen during drought	18
Total aged >4 at Jun 97	147	Total aged >4 since Jul 97	91

The recapture rate (Table 1, Fig. 1) suggests that a high proportion of those ringed in two relatively wet years (1990/1 and 1992/3) survived the following dry years, whereas those ringed after the drought had a low survival rate; this is unlikely.

The low recapture rate of birds ringed in 1991/2 and between July 1993 and December 1995 may partly be due to death, because many were resident being recaught regularly until late in 1995, but it may in part be due to movement during the drought and the low recapture rate for birds ringed from 1996 is almost certainly due to movement out of trapping areas after good rain; the reappearance of old birds in 1997–99 indicates movement has occurred since the return of wet conditions. These birds must have left trapping areas during the drought and moved to a higher, cooler altitude or into lower, wetter valleys, returning to trapping areas once conditions improved.

Some birds found trapping areas to be suitable for drought conditions and remained, being recaught regularly, but many of these departed once conditions elsewhere improved. Emigration of refugees which remained resident during the drought and departed afterwards, would account in part for the small number of recaptures in 1998/9; birds last seen (Table 6) in late 1995 or in 1996–7 probably have moved out. If refugees moved into trapping areas at the start of the drought it is likely that far more birds passed through sites, than remained to become temporarily resident. If this is so, many birds ringed at the start of the drought, during periods of fluctuating rainfall in the middle of the drought and after the drought were 'in transit' and this would lower recapture rates.

Many recently seen old birds were ringed when adult in 1990/1 (and presumably were residents) or in 1992/3. The latter may have been residents which were not caught in the previous two years; they may not have been present during part of that time, having

moved out in 1991/2 and returned in the following, wetter year. Few birds ringed in 1991/2 have been recaught and it is probable that many of them were transients which had no reason to return to where they were ringed, since it was never 'home'.

The four sites (Fig. 2) show erratic recapture rates, but movement during and after the drought could account for this with site differences due to different proportions of residents which remained or returned, temporary residents and transients. The graphs do make sense if low percentage recapture relates to a high proportion of transients in the population being ringed and a high percentage to residency, even if temporary.

Age

At Nchalo in the lower Shire valley of Malawi, over 16 years 34.6% of birds ringed when immature lived to at least seven years old (Hanmer 1989, given incorrectly by Hanmer (1997) as 31%.). At Eastern Highlands sites (Table 2) only 27% of immature-ringed birds were recaught after at least one year, although the figures for La Rochelle and Mountain Home are 31.5%, and 37.9% respectively and for Mitsasa and Vumba Gardens, 19.5% and 17.7% respectively. Among older birds (Tables 4 & 5), immature-ringed birds aged four or more make up 26.3% and of those aged seven or more, 27.0%.

Immatures tend to disperse from natal areas, so a low recapture rate at a ringing site is to be expected. Immature mortality, due to wandering into unsuitable habitat or lack of experience must reduce the number of ringed immatures. However, the difference in immature recapture between Eastern Highlands sites is considerable, with dissimilar sites producing similar results.

At Mitsasa, few birds hatched there remained as adults and most young birds ringed there were probably in transit, apart from some small seed-eaters during and just after the drought. At Vumba Gardens a similar situation may have occured, except that it was mainly young sunbirds which became resident. At La Rochelle and Mountain Home more young birds became resident or returned regularly. Most of these were sunbirds, caught when *Aloe*, *Protea* and *Cestrum* spp. were in flower, which was not the case at Vumba Gardens, where the main aloe patch is outside the trapping area and there are few proteas or cestrum. It is likely that many immature-ringed birds recaught at La Rochelle and Mountain Home were not in fact resident within the trapping area, but returned regularly when a prime food source was available.

Far fewer immature-ringed birds were recaught years later in the Eastern Highlands than in the lower Shire valley, yet many species are the same. In the Eastern Highlands many sunbirds were ringed, while at Nchalo there was no major food source to attract them, so fewer were ringed and birds were not drawn in from the surrounding countryside to increase the number which appeared to be resident. Therefore, if sunbirds are excluded from recapture totals the percentage of immature-ringed birds which have been recaught in the Eastern Highlands is much lower than found at Nchalo. Either immature dispersal at Nchalo was less, or, more probably, immature survival there was far greater than in the Eastern Highlands during a severe drought.

Longevity

Tables 4–6 show the 209 birds known to have reached four or more years old at all sites and the 37 which reached seven or more despite the drought. As appears to be normal among bush birds (Hanmer 1989), a high proportion are male, suggesting that males are either more resident and faithful to an area, or that they do live longer; the increased percentage of males in the seven year old group suggests the latter.

Most of the old birds are insectivorous or omnivorous (as at Nchalo (Hanmer 1989)), suggesting that, even under drought conditions in the Eastern Highlands their food was less of a limiting factor than it was for seed-eaters. Size is a determining factor in longevity, but when small warblers, sunbirds and white-eyes can reach seven or more years old, while small seed-eaters seldom reach five

even under good conditions, food and water must be limiting factors. At Mitsasa the five waxbills aged 4–6 years probably survived on supplied seed and water, while at Mountain Home the other five (swee, twinspot and fire-finches) had water and the nearby montane grasslands presumably supplied sufficient food. No small seed-eaters ringed at Vumba Gardens have reached four years old, yet conditions seem similar to Mountain Home; perhaps the montane grasslands are too far from the trapping site and birds which moved there have not returned.

Open country birds may survive better than forest or dense vegetation birds, since they form 58% of those four or more years old and 54% of those over seven. This may not be a valid comparison, because fewer forest birds have been ringed and the recapture rate inreases in the older group. However it is a subject worth pursuing, as habitat may have some bearing on longevity. Hanmer (1984) found adult Terrestrial Bulbuls *Phyllastrephus terrestris* to live significantly longer than Blackeyed Bulbuls at Nchalo and suggested lower predation in dense thickets as the cause. It may be that forest birds, although long-lived, are dependent on the high humidity found in a montane forest. Drought could reduce this to unacceptable levels, leading to a greater movement out of trapping areas than occured among open country birds, with a lower or slower rate of return. Alec Manson (pers. comm. 1993) considered that he lost 70% of the Seldomseen forest birds during 1991/2, far more than had disappeared from my more open sites at that time (apart from Mitsasa, where nearly everything had gone), but many old Seldomseen birds reappeared in 1998/9; they had moved, not died.

Conclusion

Birds can survive both the normal extremes of the Eastern Highlands climate and episodes of extended drought, although insectivorous and omnivorous species survive better, perhaps because seed and water are limiting factors, whereas insect numbers remain reasonably high even under dry conditions.

The main element of their survival strategy is their ability to move from unsuitable areas either up to cooler altitudes which generally receive more rain or down into valleys with permanent water. Adults tend to return to previously held territory when conditions improve. Both species and individuals may differ in whether or not a bird continues to move during hard times or becomes temporarily resident in a refuge.

Immature birds, which normally disperse after the breeding season, may be less successful in finding a suitable residential areas especially during harsh conditions, hence having a lower survival rate than adults. The recapture rate of immatures in the Eastern Highlands during a drought, suggests that young birds had a much lower survival rate than was found at Nchalo, Malawi.

Males live longer than do females and open-country birds may live longer than do those of forest and dense vegetation although this could have been a drought effect; it needs further investigation.

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