Palewinged Starling gleaning on desert-dwelling Giraffe, northwestern Namibia

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The Yellowbilled Oxpecker *Buphagus africanus*, Redbilled Oxpecker *B. erythrorhynchus*, Cattle Egret *Ardeola ibis* and Forktailed Drongo *Dicrurus adsimilis* have all been observed in direct feeding association with Giraffe *Giraffa camelopardalis* (Innis 1958; Berry 1973; Tilson 1977; Dean & MacDonald 1981; Maclean 1993). While the first two are highly adapted obligate ectoparasite gleaners, the latter two species are facultative ectoparasite gleaners that otherwise actively prey upon insects incidentally flushed by mammals (Dean & MacDonald 1981).

The allopatric Palewinged Starling *Onychognathus nabourup* has been observed to have an affinity with Klipspringer *Oreotragus oreotragus*, similar to that of the Redwinged Starling *O. morio* in the southern part of its distribution range (Tilson 1977). Starling/Klipspringer feeding relationships are a commonly observed bird/mammal feeding association (Tilson 1977; Dean & MacDonald 1981; Maclean 1993). The feeding strategy of such ectoparasite gleaners is almost entirely restricted to open habitats and areas of increased biomass of large mammals. Therefore areas such as Namibia offer increased potential for the development of bird/mammal feeding associations (Dean & MacDonald 1981).

A number of recent observations of Palewinged Starlings gleaning from Giraffe *Giraffe camelopardalis angolensis* in northwestern Namibia, are the first known annotated records, although observations of their gleaning on Klipspringers and other mammals have been recorded (Tilson 1977; Dean & MacDonald 1981; Maclean 1993). Both Redbilled and Yellowbilled Oxpeckers regularly glean on Giraffe, as well as a host of other wildlife and livestock species throughout Africa. These birds, however, do not occur in the arid northwest of Namibia. In Namibia, Palewinged Starlings have been observed occasionally gleaning on other mammals, including Klipspringer, Hartmann's Mountain Mebra *Equus zebra hartmannae* (Joubert 1972) and Gemsbok *Oryx gazella* (Dean & MacDonald 1981).

It has been suggested that starlings occupy the feeding niche filled elsewhere by oxpeckers (Bean in Tilson 1977). Gargett (in Tilson 1977) postulated that, in areas where Redwinged Starling and Klipspringer cohabitat, starlings will exploit the gleaning niche, but only in environs where oxpeckers are excluded. The Palewinged Starling's distribution, unlike that of the Redwinged Starling, does not overlap that of the oxpeckers (Tilson 1977; Harrison et al. 1997).

Of the four separate observations, the following is an account of the first occasion. Two Palewinged Starlings were observed, for c.15 min, gleaning arthropod ectoparasites from two female Giraffe (one adult and one sub-adult), on the lower Hoanib River (19.30523°S, 13.27019°E) adjacent to the Skeleton Coast Park, in the early afternoon of 25 June 2002.

The Giraffe were content while the Palewinged Starlings were gleaning, except when the ears and head were the target areas. The starlings concentrated their gleaning activities on the mane and back of the giraffe, as well as the underbelly and tail hair.

While gleaning on both the mane and back, the starlings perched for up to 30 seconds at a time. On four separate occasions, the Giraffe shrugged its body to displace the birds. However, they returned to the host and continued gleaning immediately. On another

six occasions, while hovering and gleaning from the tail hair of the giraffe, the starlings flew off into nearby branches of the Ana Tree *Faidherbia albida* between bouts. Gleaning from tail hair has been observed in other bird/mammal feeding associations (Dean & MacDonald 1981; Maclean 1993). In this observation, however, concentration on the whole tail rather than the base and nearby orifices, was significant.

The desert-dwelling Giraffe populations of northwestern Namibia do not appear to rely heavily upon the gleaning of ectoparasites by birds for grooming, although observations suggest that it is not uncommon. However, they have been regularly observed using small shrubs and bushes, for example *Colophospermum mopane, Salvadora persica* and *Pechuel-Loeschea leubnitziae*, and tree branches of, for example, *F. albida, Acacia erioloba* and *A. tortilis*, to scratch themselves (pers. obs.). This behaviour is assumed to assist in the removal of ectoparasites as large ticks are obvious and parasite load, although not measured, is estimated high.

Another observation of ectoparasite gleaning in northwestern Namibia is of a Pied Crow *Corvus albus* on Gemsbok in the Skeleton Coast Park (J. Bartlett & B. Paterson pers. comm.). Pied Crows have been observed in feeding associations with numerous mammals throughout their range (Dean & MacDonald 1981; Maclean 1993), included records of perching on Giraffe in Namibia's northwest (R. Braby pers.comm.), although no gleaning behaviour was reported.

It is assumed that the feeding association of African Sturdinae (starlings and oxpeckers) with mammals evolved when prey were flushed out by mammals. This subsequently led to the birds perching on the host mammals, and finally evolved to gleaning of ectoparasites on the host mammals (Dean & MacDonald 1981). The evolution of bird/mammal feeding associations in areas where facultative ectoparasite gleaning is commonly observed, positively correlates with the absence of specialist ectoparasite gleaners from the same habitat (Dean & MacDonald 1981). Such a scenario is observed in Namibia's arid northwest where it is assumed that the evolutionary process is dynamic. The feeding niche of the Palewinged Starling and other facultative ectoparasite gleaners may become more obvious with increased research.

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Bias, error and serendipity in ringing

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During October 1996, Kevin Hendrikse and I travelled from Port Elizabeth to a farm close to Fort Beaufort. We took Balchatri traps and mice to trap raptors encountered on telephone poles along the way. One of many Rock Kestrels *Falco tinnunculus* trapped that day was a bird with heavily worn plumage and extremely gnarled bare parts, giving the appearance of great age. The 6 mm stainless steel ring on the tarsus also showed severe deterioration.

Processing of the bird was undertaken with great care because of the possibility of a longevity record. Both of us independently read the ring number as 5H 87322. Curiosity about the age of bird and ring was great, but displaced by total disbelief when Terry Oatley (past SAFRING Coordinator) informed us that a ring bearing that number still had to be manufactured. Could this be true? Both of us misread the ring number, twice, independently of each other? Eventually we had to accept that we had made an inaccurate observation and live with the disappointment that the bird's age would remain forever unknown.

Five years later to the month, John Moorcroft, a fellow raptor ringer, Kevin and I were in a pub. During the course of discussion the subject of double-ringing (Malan 1996) and misreading ring numbers was raised. This brought to mind the case of the misread ring number on a controlled Rock Kestrel north of Grahamstown, that resulted in valuable information being lost through negligence. John asked for details as he had done much raptor ringing in the area. The ring number, with the exclusion of the H behind the 5, was indeed from a bird he had ringed 6 km from the place of control.

Thus the correct number was 5 87322. Earlier manufacture of 6 mm stainless steel rings had only the 5 prefix, whereas in later manufacture the prefix 5H was used. Thus the mystery of the old Rock Kestrel was solved. It had been ringed only 3 years and 7 months prior to being controlled. Of 35 Rock Kestrel ring recoveries and controls out of 1259 ringed, the longest lived was 7 years 5 months 23 days, with an approximate average of 2.9 years (Oatley et al. 1998).

Inscribed lettering on 6 mm rings is large and easy to read, so how could a significant error of observation occur, with both observers having the same bias? Normally bias can be minimized by using a carefully standardized procedure to achieve consistency. In this instance, bias was reinforced. Both observers had a bias towards a pre-conceived expectation of an H behind the 5. This arose from having ringed a number of Rock Kestrels during the day, with 5H-prefix rings.

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It isn't easy being the dove of peace.

Ringing and BIRPing in the Mountain Zebra National Park

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Proclaimed in 1937 to protect the Cape Mountain Zebra, the Mountain Zebra National Park (hereafter MZNP) also preserves important habitats for birds in the Karoo. It includes mountains and plains, riverine bush and dams. Recently the acquisition of new land to the north of the park has doubled its area from 6500 ha to more than 13 000 ha, and further expansion is envisaged.

Jack Skead visited the park in its early days, and published the first bird survey (Skead 1965). Later additions to the bird checklist were published by staff of the park, until a guide to MZNP was printed, that included checklists for plants and vertebrate animals (Grobler & Hall-Martin 1982). Hans Grobler, then resident in the park, added a number of bird records and made observations on the breeding of several species of birds of prey, such as the Booted Eagle *Hieraatus pennatus*. Joan Collett also cited new records for MZNP in her account of the birds of the Cradock district (Collett 1982). The guide to the park is long out of print, and visitors now receive a one-page bird list with English and Afrikaans common names and Roberts' numbers, that bears the heading 'Revised by Dr Gordon Maclean'. This list does not separate breeding residents from occasional vagrants or single records, and there are some surprising inclusions such as the Red-necked Falcon *Falco chicquera*. According to ASAB1, there are no recent records south of the Orange River for this species.

In 2001, the Department of Zoology and Entomology at Rhodes University launched a new option within the Honours programme, focusing on African vertebrates. By this time there was no longer a research officer based in MZNP, and after discussions with the research staff of South African National Parks responsible for the southern parks, we proposed a long-term survey of the birds and small mammals to compare the fauna of the newly-acquired areas at MZNP with the original park area. This would be both a research project and a training exercise for our students. The park staff were enthusiastic about this venture, and we now make three field trips to MZNP each year during the honours course: in March–April, June–July, and September. Individual researchers may also visit at other times.

On each trip we set up mist-nets at the same sites inside and outside the original park boundaries, and these are normally

Table 1. Recaptures of MZNP birds after >12 months

Species	No. of birds	Interval (months)
Brown-hooded Kingfisher *Halcyon albiventris*	1	12
Cape Robin *Cossypha caffra*	2	15, 21
Titbabbler *Sylvia subcaerulea*	4	12 (×2), 15, 21
Fiscal Shrike *Lanius collaris*	1	12
Cape White-eye *Zosterops pallidus*	1	12
Whitebrowed Sparrowweaver *Plocepasser mahali*	2	12, 19
Masked Weaver *Ploceus velatus*	1	12
Blue-billed Firefinch *Lagonosticta rubricata*	2	12 (×2)

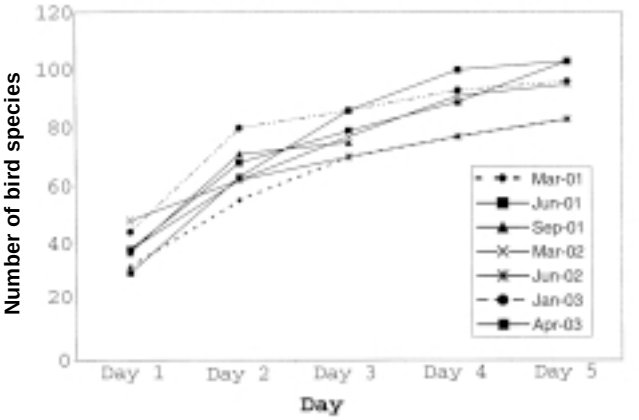

Figure 1. Cumulative totals of bird species recorded on visits to Mountain Zebra National Park.

manned for two full days at each site. To date we have ringed 573 birds of 59 species, and neither ringers nor nets have had close encounters with Buffalo or Black Rhino. One species, the African Marsh Warbler *Acrocephalus baeticatus*, has been recorded only as a mist-net capture. Birds of 12 species have been recaptured on subsequent visits, all at the original ringing sites, and 14 individuals have been recaptured more than one year after ringing (Table 1). One recovery, a White-browed Sparrow-weaver, was found six months after ringing as a skeleton lodged in a clump of thorns. It was not clear how the bird had died.

In addition, we compile daily lists of all birds recorded for the two sectors (these are pooled for our BIRP submissions). We are now also starting point-counts to estimate abundance more accurately. There is an ongoing project on the behaviour and breeding of White-browed Sparrow-weavers, for which the birds in the camp area are colour-ringed. Each year a new group of students learns some bird behaviour from their observations of this population, and we are appealing to all birders to take careful note of the ring combinations that they can record during their visits. So far we have an enviable record as rain-gods, and have experienced some surprisingly wet visits with unseasonable cold! In September 2002 it was particularly wet, and no mist-netting was possible.

Our cumulative species totals continue to rise over five days, a reminder that short visits of 1–2 days provide poor coverage of the birds present (Fig. 1). However, one must bear in mind that the effort on each day is not the same. Part of the first day is spent setting up camp, and since there are usually only two experienced observers, at times they are both based at the netting sites, and areas such as the high grassy plateaus are not covered every day. Nevertheless we believe that our lists, combined with other BIRP data, will form a sound basis for a checklist for visiting birders.

More than 220 species have now been recorded in MZNP, some of them only once in the past 40 years (e.g. a stray Goliath Heron *Ardea goliath*). Our draft checklist has 183 species reliably recorded several times since 1995, and we have used simple codes to indicate which ones are most likely to be encountered. But since we are able to walk freely away from the tourist and game-viewing areas, we certainly see species that the average visitor will not, such as Levaillant's Cisticola *Cisticola tinniens* and the Orange-breasted Rockjumper *Chaetops aurantius*. Only 76 species on the draft checklist rank as 'regulars' that are commonly recorded. We

will be looking for comments on this checklist once it is in circulation. Perhaps guided walks with trained local rangers will be something that can be promoted, if there is sufficient demand from tourists.

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Bird communities at Ruretse, southeastern Botswana

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Rather little is known of the bird communities of southern Africa in terms of species' relative abundance, density and seasonality of occurrence. Some data, on densities in the former Transvaal, were provided by Tarboton et al. (1987), for southern Africa by Harrison et al. (1997), and for the Free State by Kopij (2001). In Botswana, Herremans (unpubl. data and data in Harrison et al. 1997) obtained some useful information on bird communities and densities from point counts in different habitats and geographical locations.

Tyler (2001a) provided some data on the abundance and seasonality in southeastern Botswana of three species of seedeater (Namaqua Dove *Oena capensis*, Green-winged Pytilia *Pytila melba* and Violet-eared Waxbill *Uraeginthus granatinus*) and a nectarfeeder/insectivore (Marico Sunbird *Nectarinia mariquensis*). This paper describes results from transects carried out in southeastern Botswana during 1997–2000. It provides data on diversity and density of bird species in *Acacia* savanna in this area of Botswana, and on their seasonality of occurrence.

Study area and methods

The study area has been described elsewhere (Tyler 2001a,b). Recording of birds along three transects was carried out in 1997/98 and the end of 2000. The first transect followed a track for 1 km through fairly uniform open, grazed *Acacia* savanna, dominated by *Acacia mellifera* and *A. erubescens*. There was a small abandoned cattle post at one end of the plot close to an ephmeral stream and dam. This had some taller *A. tortilis* trees and a small patch of old pasture. The second transect followed a small road for 2 km through similar savanna. One side was fenced and there was denser cover in places. In addition, this transect included a small area of *Terminalia sericea* and *Combretum apiculatum* and crossed a small seasonal watercourse. The third transect fol-

lowed a road. On one side were areas of *Acacia* savanna and, on higher ground, patches of *Combretum apiculatum*, *C. zeyheri* and *Terminalia sericea*, with some fenced plots with houses set back in the *Acacia*. On the other side of the road was a mosaic of *Acacia* and mixed savanna, *Acacia* scrub on regenerating fallow land and some arable fields, largely abandoned.

All birds seen or heard within 50 m of each transect were recorded, although sightings or calls of large birds, such as raptors, storks, francolins and korhaans, from greater distances were included. A total of 67 visits were made to the first transect between June 1997 and November 2000, 56 to the second transect between July 1997 and November 2000, and 33 to the third transect between January 1998 and November 2000. Unfortunately, coverage was uneven, but in most months at least one visit was made to each transect.

An approximate density was estimated by taking the mean number of records per visit in 1 km × 50 m width either side (10 ha). These figures reflect minimum densities as some birds will inevitably have been overlooked, for example, breeding females. Whilst a singing male might well indicate a pair, such a bird was entered as one record. In months outside the breeding season, birds sing infrequently and so are less conspicuous. Taking the maximum count on any visit might therefore better reflect true density.

Results

Species diversity

Some 181 species were recorded on the three transects, but only 143, 147 and 144 species on each respectively. In all transects, fewer than 10 records were obtained for 65 species. Other species were noted in the study area outside the survey periods. For example, crepuscular and nocturnal species, such as Spotted Eagle Owl *Bubo africanus*, Rufous-cheeked Nightjar *Caprimulgus rufigena*, Barn Owl *Tyto alba* and Spotted Dikkop *Burhinus capenis* were not, or only rarely, recorded on the transect visits but were heard and/or seen regularly in the study area at other times.

Species recorded were a mixture of residents, migrants and seasonal or erratic visitors. The species that were classed as resident were recorded in all months of the year and on a very high proportion of the visits (>90%). Migrants included both Palearctic and intra-African species. Most of these were present only in the summer months, although a few intra-African migrants (Fairy Flycatcher *Stenostira scita*, Fiscal Flycatcher *Sigelus silens* and Fiscal Shrike *Lanius collaris*) were winter visitors. Many species appeared in large numbers in some months but were absent, or nearly so, at other times. Marico Sunbirds, White-bellied Sunbirds *Nectarinia talatala* and Red-faced Mousebirds *Urocolius indicus* fell into this category (Tyler 2001a,b), all being largely absent for part of the winter.

Some wetland and open country species were occasionally registered along the transects. The wetland species (17) were mainly recorded flying to or from various small dams. At least two dams were within 100 m of two transects but were surrounded by trees and not visible from the transect lines. Various open-country species, such as Crowned Plover *Vanellus coronatus*, Temminck's Courser *Cursorius temminckii*, Chestnut-backed Sparrow Lark *Eremopterix leucotis* and Grassveld Pipit *Anthus cinnamomeus*, were seen mainly in arable and fallow fields along part of one side of the third transect. Flocks of seedeaters, notably Red-billed Quelea *Quelea quelea*, bishops and widows and whydahs, used these fields especially in the winter months. After exceptional rains in early 2000, many White-winged Widows *Euplectes albonotatus* and Golden Bishops *E. afer* bred in the long grass in the fields. Fan-tailed Cisticolas *Cisticola juncidis* appeared at this time, whereas in other years Desert Cisticola *C. aridula* was the commoner species.

Relative abundance of species

Seven species (Red-billed Quelea, Laughing Dove *Streptopelia senegalensis*, Scaly-feathered Finch *Sporopipes squamifrons*, Black-chested Prinia *Prinia flavicans*, Blue Waxbill *Uraeginthus angolensis*, Titbabbler *Parisoma subcaeruleum* and Rattling Cisticola *Cisticola chiniana*) were among the ten most numerous species in all three transects (Table 1). Sabota Lark *Mirafra sabota* was abundant in Transects 1 and 2 but less so in Transect 3. The three lists in Table 1 contain, in the main, the same species, albeit sometimes in different orders of abundance, and a few species occur only in one or two lists. For example, records of Black-throated Canary *Serinus atrogularis* and Wattled Starling *Creatophora cinerea* were numerous in the Transect 1 because of a few records of large, often wintering, flocks. For the same reason, White-winged Widow was common in the Transect 2. This species and both Shaft-tailed Whydah *Vidua regia* and Red-headed Finch *Amadina erythrocephala* figured highly in the Transect 3. Lark-like Bunting *Emberiza impetuani* appears in Table 1 solely because of a nomadic influx from April to October 1998 (Tyler & Tyler 2001). Red-billed Quelea was the most numerous species in two transects and its numbers in the third transect were exceeded only by European Swallows *Hirundo rustica*. However, they were recorded on fewer than 50% of visits to each transect whereas other top ten species were largely resident. Pied Babbler *Turdoides bicolour*, which was frequent on all transects, does not appear in Table 1 because a group was recorded rather than individuals. Of the migrants, only European Swallows and Red-backed Shrikes *Lanius collurio* were numerous. Swallows occurred occasionally in very large flocks, whereas Red-backed Shrikes were well-dispersed.

Additional scientific names: Kalahari Robin *Erythropygia paena*, Cape Turtle Dove *Streptopela capicola*, White-browed Scrub Robin *E. leucophrys*, Marico Flycatcher *Melaeornis mariquensis*, Crimson-breasted Shrike *Laniarius atrococcineus*, Pied Barbet *Tricholaema leucomelas*, Chinspot Batis *Batis molitor*, Southern Grey-headed Sparrow *Passer diffusus*, Black-cheeked *Estrilda erythronotos*, Fork-tailed Drongo *Dicrurus adsimilis*, Rock Pigeon *Columba guinea*, Crested Francolin *Francolinus sephaena*, Glossy Starling *Lamprotornis nitens*, Masked Weaver *Ploceus velatus*, Grey Lourie *Corythaixoides concolor*, Brown-headed Tchagra *Tchagra australis*, Yellow-billed Hornbill *Tockus leucomelas*, Pied Crow *Corvus albus*, Lilac-breasted Roller *Coracias caudata*, Burnt-neck Eremomela *Eremomela usticollis*, Cape Sparrow *Passer melanurus*.

Densities

Excluding flocking species such as Scaly-feathered Finch and Blue Waxbill, those occurring at the highest densities were Black-chested Prinia, Titbabbler and Rattling Cisticola. However, in open, fairly uniform *Acacia* savanna, both Sabota Larks and Kalahari Robins occurred at high densities. Although density of Barred Warblers *Calamonastes fasciolatus* was estimated as <1 bird/10 ha, in reality there were 2–3 pairs per km, but unless birds were singing, they were rarely registered. The maximum number recorded on any visit (M) perhaps better reflects the density of resident species.

Seasonal patterns of occurrence

Many species of seedeater were largely absent in 1999, following poor rains, but were present in large numbers throughout much of 2000. These species included Namaqua Dove, Black-cheeked and Violet-eared Waxbills, Jameson's Firefinches *Lagonosticta rhodopareia*, Red-billed Quelea and White-winged Widows. Waxbills showed marked fluctuations in abundance through the year, with patterns of occurrence being different in successive years, depending on rainfall and the availability of cover and seed. For example, in the winter of 2000, there was a large influx of Black-cheeked Waxbills along with some other small seed-eaters, but they had

Table 1. The 30 most frequently recorded species in each transect with total number of records (No.), the proportion of visits (%) in which each species was recorded, and the maximum number (M) of each on any visit. 1 = Transect 1; 2 = Transect 2; 3 = Transect 3.

	No.	%	M		No.	%	M
1. Red-billed Quelea	586	24	110	White-browed S Robin	185	97	6
Laughing Dove	446	95.5	42	Marico Flycatcher	176	81	8
Scaly-feathered Finch	425	97	22	Wattled Starling	126	10.5	30
Sabota Lark	380	100	12	Chinspot Batis	119	87	5
Black-chested Prinia	339	100	8	European Swallow	118	33	16
Blue Waxbill	329	76	22	Red-faced Mousebird	104	48	9
Titbabbler	312	98.5	8	Grey-headed Sparrow	101	57	8
Kalahari Robin	289	100	9	Red-backed Shrike	100	34	14
Rattling Cisticola	287	94	10	Black-cheeked Waxbill	98	49.5	10
Black-throated Canary	258	48	50	Long-billed Crombec	98	75	6
Crimson-breasted Shrike	255	97	9	Fork-tailed Drongo	94	72	6
Marico Sunbird	214	76	9	Rock Pigeon	90	60	6
Pied Barbet	207	95.5	7	Crested Francolin	88	73.5	5
Masked Weaver	205	72	17	Green-winged Pytilia	86	61	6
Cape Turtle Dove	201	94	7	Glossy Starling	83	55	12
2. Red-billed Quelea	1140	41	450	Grey-headed Sparrow	176	87.5	11
Blue Waxbill	572	87.5	45	White-winged Widow	160	23	50
Laughing Dove	566	98	60	Black-cheek. Waxbill	159	75	9
Rattling Cisticola	524	100	21	Pied Barbet	158	98	6
Scaly-feathered Finch	447	98	28	Lark-like Bunting	143	10	24
Black-chested Prinia	362	100	18	Long-billed Crombec	139	91	7
Cape Turtle Dove	295	96	15	Red-backed Shrike	129	34	19
Titbabbler	291	100	11	White-bellied Sunbird	126	71	10
White-browed S Robin	285	100	10	Chinspot Batis	117	96	6
Sabota Lark	284	100	11	Grey Lourie	108	71	18
Marico Sunbird	261	77	14	Fork-tailed Drongo	99	82	6
Crimson-br. Shrike	244	96	8	Crested Francolin	99	75	7
Kalahari Robin	240	98	9	European Swallow	97	34	24
Green-winged Pytilia	222	87.5	13	Brown-head. Tchagra	96	80	5
Masked Weaver	179	77	16	Glossy Starling	95	70	7
3. European Swallow	847	45.5	500	Kalahari Robin	220	100	13
Red-billed Quelea	718	54.5	150	Grey-headed Sparrow	202	100	20
Rattling Cisticola	585	100	36	Red-backed Shrike	171	36	25
Blue Waxbill	564	97	48	Red-headed Finch	166	42	70
Masked Weaver	524	94	110	Sabota Lark	166	94	12
Scaly-feathered Finch	468	97	50	Glossy Starling	158	91	20
White-winged Widow	404	61	80	Ch.bck Finch Lark	130	36	25
Black-chested Prinia	384	100	20	Black-cheek. Waxbill	119	67	27
Laughing Dove	364	100	70	Marico Flycacher	116	94	9
Titbabbler	341	100	17	Lark-like Bunting	110	24	35
Shaft-tailed Whydah	264	58	80	Long-billed Crombec	109	100	8
White-browed S Robin	244	82	14	Red-faced Mousebird	100	54.5	36
Marico Sunbird	237	94	22	White-bellied Sunbird	93	73	9
Green-winged Pytilia	229	100	27	Chinspot Batis	85	88	6
Crimson-breast. Shrike	223	100	14	Pied Barbet	78	94	8

largely disappeared from the area by October. Such influxes have been reported previously in southeastern Botswana (Herremans et al. 1995). Red-billed Quelea were abundant only in the late summer and winter of 2000. Likewise both Red-billed *L. senegala* and Jameson's Firefinches were common only in the first half of 2000 (Tyler in prep.), notably in the period April–June that year, following exceptional rains in February.

Discussion

Although density estimates in this study are crude, the figures do clearly indicate the relative abundance of species at Ruretse. In *Acacia karoo*-dominated areas in the Free State, Titbabblers, Black-chested Prinia, Laughing Dove and Kalahari Robin were, in that order, the most numerous species, occurring at abundances of 23, 11, 8 and 8 pairs/10 km respectively and comprising between them 45% by frequency (Kopij 2001). While these four species were among the most abundant at Ruretse (Tables 1 & 2), Scaly-feathered Finches, Blue Waxbills, Sabota Larks, Rattling Cisticolas and White-browed Robins were as or more abundant than some of the four.

Densities in this study broadly equate with many of those found by Tarboton et al. (1987), Herremans (in Harrison et al. 1997) and Monadjem (2000). For example, Black-chested Prinias occurred at Ruretse at a density of 1 bird/1.9–3.4 ha versus 1 pair/8 ha (Tarboton et al. 1987) and a mean of a bird per 0.7 ha in thornveld (Herremans 1997). Sabota Larks occurred at densities of 5.7 birds/10 ha (1 bird/1.8 ha) at Ruretse, while Herremans noted a 1 bird/1.4 ha in *Acacia*-dominated thornveld. The figure for Long-billed Crombec *Sylvietta rufescens* at Ruretse is 1 bird/6.7 ha, very similar to an average of 1 bird/5–6 ha in *Acacia*-dominated bushveld in the eastern hardveld of Botswana as found by Herremans.

Subtle differences in habitat greatly influence densities. For example, Herremans found the density of Ashy Tits *Parus cinerascens* varied from 1 bird/6 ha to 1 bird/28 ha in pure *Acacia* to 1 bird/58 ha in arid mixed woodland on rocky substrates. At Ruretse, mean densities of some species varied between the three transects (see Table 1). Marico Flycatcher occurred at 0.8–2.6 birds/10 ha (1 bird/12.5–4 ha) versus 1 bird/ha on the Kalahari fringe to 1 pair/36 ha in the former Transvaal.

Firefinches and waxbills were rather erratic in this study. In some months and years they were common; in others they were largely absent. Jameson's Firefinch is generally considered to be sedentary throughout

Table 2. Minimum density (birds/10 ha) of 20 common resident or mainly resident species.

Species	Transect		
	1	2	3
Scaly-feathered Finch	6.3	4	3.6
Blue Waxbill	4.9	5	4.3
Black-chested Prinia	5.1	3.2	2.9
Titbabbler	4.7	2.5	2.6
Rattling Cisticola	4.3	4.5	4.4
Sabota Lark	5.7	2.3	1.3
White-browed Robin	2.8	2.5	1.85
Kalahari Robin	4.3	2	1.7
Laughing Dove	6.6	5	2.9
Cape Turtle Dove	3	2.5	1.5
Crimson-breasted Shrike	3.8	2.2	1.7
Marico Sunbird	3.2	2.3	1.8
Pied Barbet	3.1	1.5	0.6
Masked Weaver	3.1	1.5	4
Marico Flycatcher	2.6	0.8	0.9
Chinspot Batis	1.8	1	0.65
Red-faced Mousebird	1.5	0.6	0.75
Grey-headed Sparrow	1.5	1.5	1.5
Long-billed Crombec	1.5	1.2	0.8
Fork-tailed Drongo	1.4	0.9	0.5
Grey Lourie	1.1	1	0.6
Yellow-billed Hornbill	1	0.5	0.35
Brown-headed Tchagra	1	0.85	0.6
Pied Crow	0.6	0.8	0.5
Pied Babbler group	0.5	0.4	0.2
Lilac-breasted Roller	0.4	0.6	0.2
Barred Warbler	0.9	0.7	0.4
Burnt-neck Eremomela	0.5	0.1	0.35
Cape Sparrow	0.5	0.1	0.2

its range in southern Africa, as indicated by some ringing studies (Nuttall 1997). In eastern areas however, it has been reported as nomadic, while in southeastern Botswana, Herremans et al. (1995) reported marked fluctuations in numbers between 1991 and 1994. Data from this study show similar fluctuations between 1997 and 2000. Fluctuations are influenced by rainfall and the state of the vegetation, notably grass cover and grass seeds, with birds being more widely distributed after wet summers. In the Black-cheeked Waxbill, Barnard (1987) believed that seasonal movements were common. These waxbills appear to make short seasonal movements in northern South Africa and central Namibia, although Barnard suggested that increased conspicuousness might account for increases in reporting rates in these areas. At Ruretse, Black-cheeked Waxbills occurred in all months, but in the dry year of 1999, they were rarely recorded from April to December, whereas throughout 2000 they were very common. Some Black-cheeked Waxbills even moved into the dry Kalahari, outside its usual range, in the early 2000 wet season (Paul Funston, in Tyler & Brewster 2000).

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