HABITAT PREFERENCES, POPULATION SIZE, FOOD AND BREEDING OF SIX OWL SPECIES IN THE SPRINGBOK FLATS, SOUTH AFRICA

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SUMMARY

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Information on the habitat preferences, population size, food and breeding of Barn, Grass, Whitefaced, Marsh, Pearlspotted and Spotted Eagle Owls was obtained in a 6900-ha area in the Springbok Flats, South Africa. Seventy-two per cent of the area consisted of cultivated fields not usually used by owls. Hunting, roosting and nesting requirements were largely met in 1930 ha of verges, farmyards and patches of woodland and grassland. There was an estimated total population of 303 owls in the area, giving an overall density of 22,7 ha/owl for the whole area or 6,4 ha/owl for those areas used by owls. These high densities were attributed to an abundance of *Mastomys natalensis*, the most important prey item for all except Pearlspotted Owls. Rates of predation on *M. natalensis* varied in relation to their population density, as indicated by rodent trapping results. Marsh Owls ate more insects in summer than at other times. Barn and Marsh Owls usually laid in March–April and August–September, while other species started breeding in July–October. The timing of breeding of some owls may be related to changes in rates of recruitment of juvenile *M. natalensis*. Most Marsh Owl nests were placed on the southwestern sides of grass clumps or shrubs.

INTRODUCTION

Of 12 owl species that occur in southern Africa, six are resident in the Settlers area of the Springbok Flats in the Transvaal. This paper presents information on the habitat preferences, density, food and breeding of these six: Barn Owl *Tyto alba*, Grass Owl *T. capensis*, Marsh Owl *Asio capensis*, Spotted Eagle Owl *Bubo africanus*, Pearlspotted Owl *Glaucidium perlatum* and Whitefaced Owl *Otus leucotis*. The information was obtained in a 6900 ha study area on Springbok Flats Turf Thornveld (*Acacia*) (Acocks 1975), northeast of Settlers (24 57 S; 28 33 E) (Fig. 1).

Steyn (1982), Kemp & Calburn (1987), Kemp (1988) and Wilson *et al.* (1988) summarize what is known of the biology of the six species, providing comparative information on aspects of biology reported in this paper. Dean (1973) and Vernon (1972) analysed Barn Owl prey from the Springbok Flats at Panfontein/Sandfontein (24 54 S; 28 22 E), Clarcot (25 15 S; 28 32 E), Mosdene (24 37 S; 28 43 E) and Vaalbos (25 15 S; 28 22 E) farms.

STUDY AREA & METHODS

The study area was almost flat, with a 60-m drop over 12 km from north to south. Soils were either black turf (64 %) or red clay (36 %). About 72 % of the area was cultivated, while the remaining vegetation, described by Acocks (1975) as Springbok Flats Turf Thornveld, consisted of patches of *Acacia* woodland (17 %) and grassland (5 %), road and field verges (5 %) and farmyards (1 %) (Fig. 1).

Summers were warm with average monthly minimum temperaures of 30,3 to 27,2 °C during October to March, while average monthly minimum temperatures in winter varied from 3,0 to 11,2 °C between April and September. The mean annual rainfall was 601 mm, about 90 % of which fell in summer between October and April. The

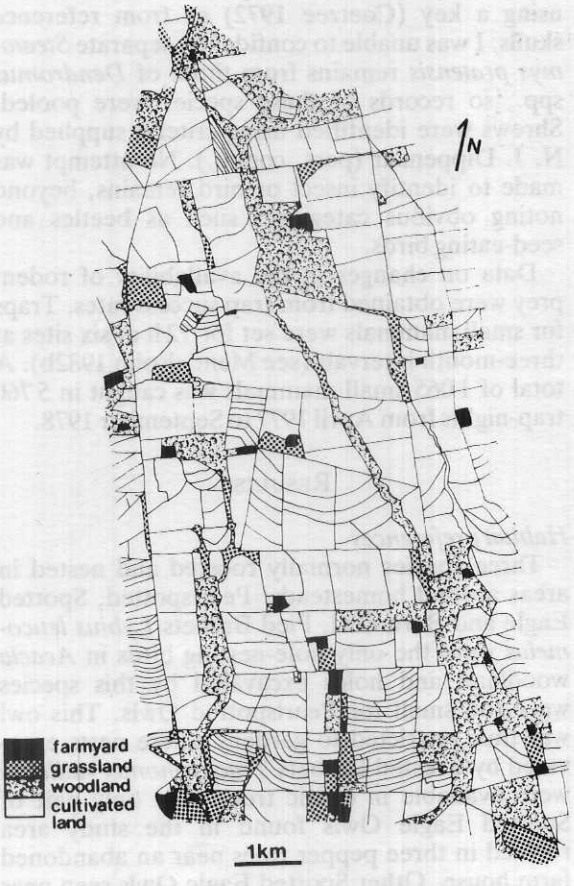

FIGURE 1

Main habitats in the Settlers study area. Lines represent road and field verges.

area is described in greater detail in Mendelsohn (1982a, b).

Most information on owls was collected incidentally during field-work on Blackshouldered Kites *Elanus caeruleus*. The study area was visited frequently (almost daily for several hours during 19 months) and the habitat was such that most owls could be counted in those areas where field-work was intensive. Density estimates were obtained in the 6 900-ha study area, while some data on breeding, prey and habitat preferences were recorded in similar, adjoining habitat (within 10 km). The sites at which all owls were found roosting or nesting were noted and mapped (1 : 50 000 scale), and pellets found at these sites were collected. Some occupied roosts or nests were visited repeatedly to collect pellets and check nest contents. Obviously fresh pellets found at new roosts or nests were assumed to have been produced in the past month. It was thus possible to allocate most collections of pellets to particular months. Between June and September 1978 an attempt was made to systematically comb habitats suitable for Marsh and Grass Owls. About 80 % of these areas were covered during this census (Fig. 2). The owls were counted as they flushed from their roost sites in response to a line of 3–5 beaters (each person walking 10–15 m from the next) or a motorcycle ridden backwards and forwards on transects through the area.

Rodent prey remains in pellets were identified using a key (Coetzee 1972) or from reference skulls. I was unable to confidently separate *Steatomys pratensis* remains from those of *Dendromus* spp., so records of these species were pooled. Shrews were identified using criteria supplied by N. J. Dippenaar (pers. comm.). No attempt was made to identify insect or bird remains, beyond noting obvious categories such as beetles and seed-eating birds.

Data on changes in the availability of rodent prey were obtained from trap success rates. Traps for small mammals were set for 72 h at six sites at three-month intervals (see Mendelsohn 1982b). A total of 1 065 small mammals was caught in 5 760 trap-nights from April 1977 to September 1978.

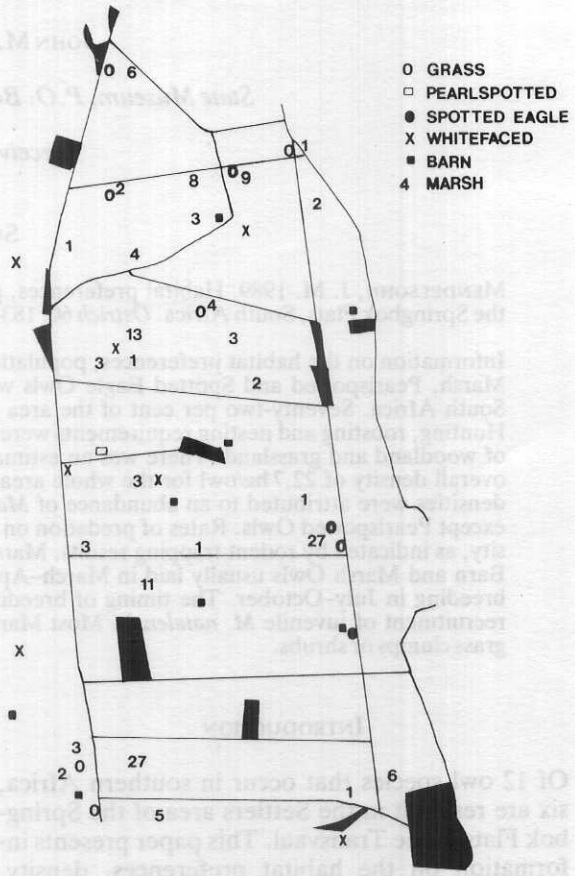

FIGURE 2

Sites at which Grass, Pearlspotted, Spotted Eagle, Whitefaced, Barn and Marsh Owls were found in the Settlers study area. Each symbol represents either a single bird or pair of owls. Dark shading shows areas of suitable habitat that were not surveyed for Marsh and Grass Owls. Numbers of Marsh Owls counted (total 160) in each area are shown.

RESULTS

Habitat preferences

Three species normally roosted and nested in areas around homesteads: Pearlspotted, Spotted Eagle and Barn Owl. Pied Barbets *Lybius leucomelas* were the only hole-nesting birds in *Acacia* woodland and holes excavated by this species were too small for Pearlspotted Owls. This owl was thus restricted to gardens where nests excavated by Crested Barbets *Trachyphonus vaillantii* were available in exotic trees. The only pair of Spotted Eagle Owls found in the study area roosted in three pepper trees near an abandoned farm house. Other Spotted Eagle Owls seen near the study area were either in large garden trees or in broad-leafed woodland. Suitable nest sites, such as large cavities, were apparently available in large exotic and broad-leafed trees, but not in the smaller acacias. Solitary Barn Owls were found roosting in acacias away from houses, but the majority regularly roosted and nested at homesteads. Most roost sites and nests were in buidings or other artificial structures, but two pairs occupied the bases of the large leaves of palm trees planted in gardens.

Most Whitefaced Owls were found roosting in acacias, but one pair roosted and bred in a line of exotic pines *Pinus* sp. Those acacias used for roosting were comparatively large, most being taller than 4 m. Grass Owls roosted in small patches of dense, tall grass, usually *Ischaemum glaucostachyum, Sehima galpini, Themeda triandra* or *Setaria woodii*. There were, however, relatively few patches of dense grass cover suitable to Grass Owls because most were grazed and trampled by cattle. By contrast, ground cover in areas occupied by Marsh Owls was more sparse. The

majority of these owls were flushed from small, isolated clumps of grass or from underneath small shrubs. Grass around these roost or nest sites had often been heavily grazed. The greatest number of Marsh Owls roosted communally in lightly-covered, open woodland where most *Acacia* shrubs were 0,5–3 m in height. Although some small areas were temporarily inundated after heavy rain, neither Grass nor Marsh Owls showed any preference for ground most likely to be flooded. Both species appeared to prefer fairly large expanses of grassland or open woodland, so few roosted in narrow strips of grass along field verges.

Whitefaced, Spotted Eagle and Pearlspotted Owls hunted from perches and were thus excluded from areas lacking trees or other elevated perches, such as telephone poles. While Barn, Grass and Marsh Owls that hunted in flight were less restricted, for most of the year rodent prey was not available in cultivated areas. This was because ploughed fields or those planted with maize or sunflowers lacked good cover. Other growing crops, for example millet and manna, were so dense that prey was not accessible to owls. For the remaining 1–3 months/year, however, freshly-harvested wheat, millet, sorghum and manna fields harboured large numbers of *Mastomys natalensis* (Mendelsohn 1982a, b), and Marsh, Barn and Grass Owls then hunted over the remaining stubble. Up to 43 % of the study area was planted with these crops, but different crops and fields were harvested at various times of the year.

Population size

Four species were present in substantial numbers, Marsh, Grass, Barn and Whitefaced Owls, while Pearlspotted and Spotted Eagle Owls were found in small numbers (Table 1). Estimates of total numbers of owls in the 6 900-ha area were extrapolated from densities in areas where I was certain that most, if not all, owls had been counted. It is difficult to give indications of confidence to these estimates, but they probably differ by less than 15 % from the true population sizes.

Populations of Whitefaced, Barn, Spotted Eagle and Pearlspotted Owls appeared to be relatively stable. Known sites were occupied throughout the study and no other birds were found moving into the area for short periods. Marsh Owls were counted between June and September 1978 only, but large numbers were seen during the earlier part of the study and on sporadic visits in later years. It was clear that this species was always very abundant in the Settlers area. Numbers of Marsh Owls flushed from roosts varied between one and 27 during the census of June to September 1978 (Fig. 2). Groups flushed at other times were similar in size, no more than 35 being found roosting together. Two Marsh Owl nests were 70 m apart, while three others formed a triangle, each about 75 m away from the next.

Although total population sizes (Table 1) are for an area of 6 900 ha, densities were uneven (Fig. 2). Most owls were restricted to a small proportion of the area as a result of their habitat requirements for hunting, and to an even smaller area which provided suitable nest and roost sites (see above). Barn, Pearlspotted, Spotted Eagle and Whitefaced Owls were limited to about 1 240 ha (18 % of the area) that provided roost sites in trees. Places to nest were confined to farmyards (about 70 ha) for the former three species. Whitefaced, Spotted Eagle and Pearlspotted Owls were also restricted to about 1 590 ha (23 % of the area) where there were suitable hunting perches. The majority of Grass and Marsh Owls roosted and nested only in grasslands and woodlands (about 830 ha) and hunted largely over about 1 400 ha that made up road and field verges, grasslands and some of the more open woodlands. For most of the year both species were excluded from fields (72 % of the area) when rodent prey was not available.

Prey

A few disintegrated pellets collected beneath Pearlspotted Owl roosts contained fragments of insects only. For the other five species, substantial numbers of a wide variety of vertebrate prey were identified (Table 2). Small mammals comprised more than 96 % of the vertebrate diet, *Mastomys natalensis* being the most frequent prey item. The only other vertebrates to provide substantial (> 10 %) amounts of food were *Otomys angoniensis* and *Rhabdomys pumilio* eaten by Grass Owls.

Since the numbers and mass of insect prey was not recorded, the proportion of biomass of each prey item could not be estimated. However, Grass Owls consumed an insignificant number of insects (see below), so it is possible to show that *Otomys angoniensis* contributed more to their diet than suggested by their frequency (Table 2). Using

TABLE 1
NUMBERS OF OWLS COUNTED IN THE STUDY AREA, AND ESTIMATES OF TOTAL NUMBERS PRESENT AND DENSITY

Species	Numbers (pairs) counted	Estimated total numbers (pairs)	Estimated density (ha/owl)
Barn Owl	16 (8)	36 (18)	192
Grass Owl	17 (7)	22 (11)	314
Marsh Owl	160	195	35
Whitefaced Owl	16 (8)	40 (20)	173
Pearlspotted Owl	2 (1)	6 (3)	1 150
Spotted Eagle Owl	2 (1)	4 (2)	1 725
Total	213	303	23

TABLE 2
THE COMPOSITION OF VERTEBRATE PREY FOUND IN PELLETS FROM BARN, GRASS, MARSH, WHITEFACED AND SPOTTED EAGLE OWLS, AS A PERCENTAGE OF THE TOTAL NUMBER OF ITEMS IDENTIFIED

Prey Species	Barn Owl	Grass Owl	Marsh Owl	Whitefaced Owl	Spotted Eagle Owl
Mastomys natalensis	85,2	54,2	87,5	94,8	76,3
Otomys angoniensis	4,1	20,6	3,6	0,7	5,0
Rhabdomys pumilio	1,0	11,3	1,2	0	3,8
Lemniscomys griselda	0,9	1,0	0	0,7	0
Saccostomus campestris	0,7	0,8	0,3	0,7	1,9
Mus minutoides	1,7	6,3	0,8	1,5	3,8
Steatomys/ Dendromus	1,0	2,8	0,5	0	0,6
Cryptomys hottentotus	<0,1	0	0	0	0
Crocidura hirta	1,0	0,4	0,5	0	0
Crocidura fuscomurina	1,2	0,8	1,2	0	2,5
Suncus lixus	0,1	0	0	0	0
Suncus varilla	0,1	0	0	0	0
Suncus infinitesimus	<0,1	0	0	0	0
Unidentified shrews	1,3	1,4	1,2	0,7	3,1
Bat	<0,1	0	0	0	0
Birds	1,4	0,5	3,3	0,7	3,1
Frog	0,1	0	0	0	0
Lizard	0,1	0	0	0	0
Total No. Prey Items	2 144	781	608	135	160

body weights of prey items recorded at Settlers (see Mendelsohn 1982a) and assuming that Grass Owls consumed prey whole, *O. angoniensis* provided 43 % of prey biomass, *Mastomys natalensis* 45 % and *Rhabdomys pumilio* 10 %. Other prey made up about 2 % of the mass of their diet.

Samples of pellets from Whitefaced and Spotted Eagle Owls were too small to assess the importance of insects as prey. However, most pellets of both species contained a small fraction of insect remains, indicating that insect prey was a frequent, but not sizeable component of their diet. Marsh Owls consumed more insect prey than Barn and Grass Owls, respectively (Table 3). The majority of Marsh Owl pellets (66 %) contained both insect and vertebrate remains, while only 16 % held vertebrate remains alone. By contrast 87,2 and 96,7 % of Barn and Grass Owl pellets, respectively, contained only vertebrate remains.

The proportion of *Mastomys natalensis* in the combined diet of Barn, Marsh, Whitefaced and Spotted Eagle Owls changed during the study (Fig. 3). In both years numbers appeared to increase from a low during summer to a peak in late winter or spring. Although these changes matched fluctuations in the rate at which *M. natalensis* was trapped, this relationship could not be tested statistically. Time units (months or bi-months) for the two variables were not identical because some small samples were pooled into two-month periods. Other pellet samples could not be allocated to particular months. Accordingly, data for December and January and February and March were lumped, while those for June, July and August 1978 were pooled into two periods: June/July and July/August. Trap-success data were obtained for every month, however. Data on the diet of Grass Owls was excluded because they ate fewer *M. natalensis* and the large samples of their pellets collected at irregular intervals distorted the evenness of representation.

Marsh Owls were apparently more dependent on insect prey during summer than winter. Of 51 pellets collected between October and March,

TABLE 3
PERCENTAGES OF PELLETS CONTAINING REMAINS OF INSECTS AND VERTEBRATES

Species	Insects only	Verts only	Insects & verts	Total no. pellets
Marsh Owl	18	16	66	200
Barn Owl	0,3	87,2	12,5	682
Grass Owl	0	96,7	3,3	123

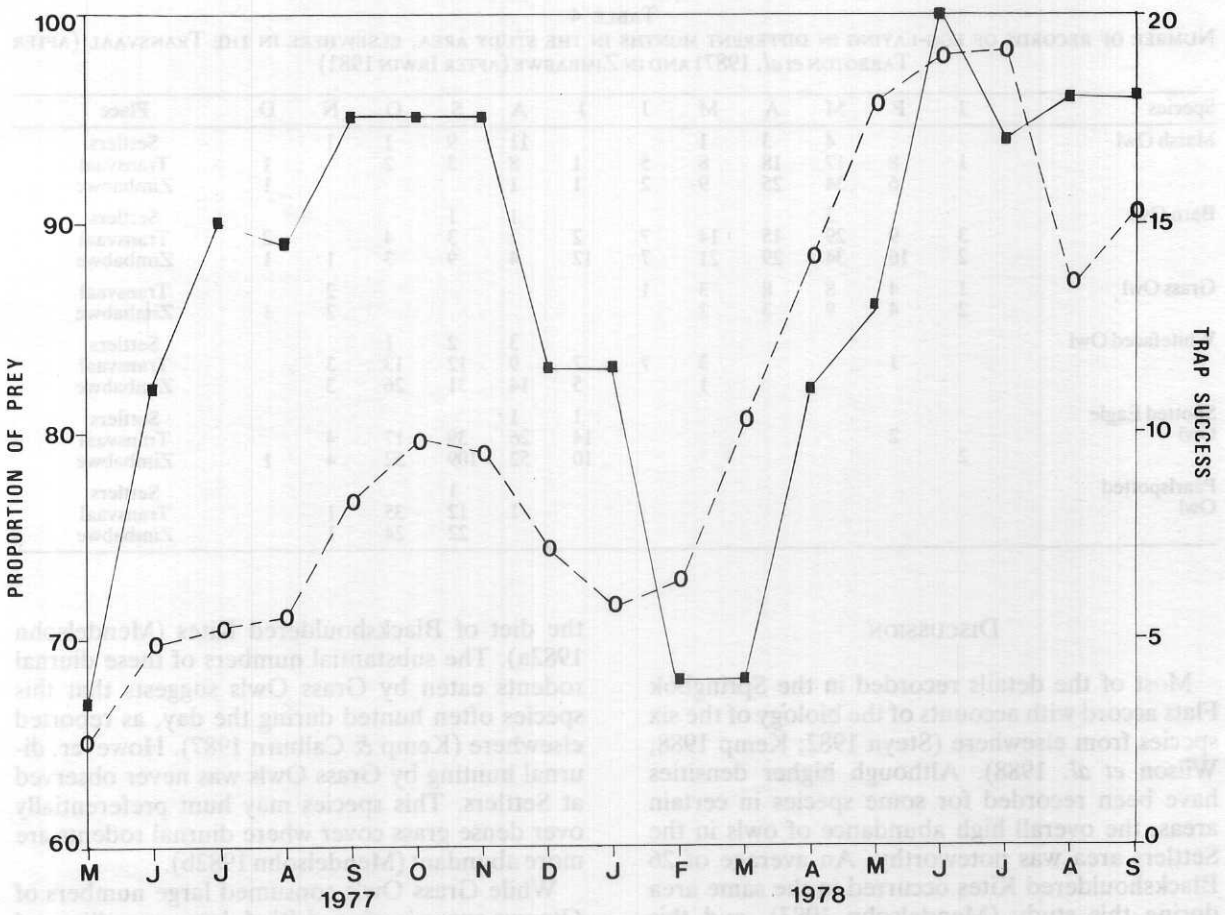

FIGURE 3

Changes in the proportion (%) of *Mastomys natalensis* in the diet of owls at Settlers (■——■) compared with changes in the rate (number caught/100 trap nights) at which this species (○---○) was trapped (after Mendelsohn 1982b).

29,4 % held insects alone, while 14,1 % of 149 pellets found between April and September contained only insect remains. The difference is significant ($z = 2{,}456$; $< 0{,}01$) and may have been greater than these figures suggest. Pellets containing only invertebrates were fragile and disintegrated more rapidly (especially during summer rains) than those bound together with hair or feathers. Pellets holding insects thus lasted shorter periods and were less likely to have been found during summer than other seasons.

The majority of birds eaten by owls were seed-eaters, largely in the genera *Passer, Euplectes, Ploceus* and *Quelea*, which were abundant in the study area. Most insect prey items were either beetles or grasshoppers. Groups of up to 30 Marsh Owls were seen hawking termite alates when these emerged sporadically in the late afternoon during summer.

Breeding

The following clutch sizes were recorded: Marsh Owl c/2–4, c/3–5, c/4–2; Barn Owl c/4–1; Whitefaced Owl c/2–3, c/3–1. Brood sizes, midway through the nestling period, were: Marsh Owl b/2–3, b/3–4, b/4–1; Barn Owl b/2–2, b/5–2; Whitefaced Owl b/1–1, b/2–4; and Spotted Eagle Owl b/3–1. An incubation period of 29 days was recorded for one Marsh Owl egg, while a chick of this species left the nest at an age of 17 days.

Marsh Owl nests were small depressions in the grass, either at the base of grass clumps or small shrubs. These were usually placed between the southerly and westerly sides of the clump of grass or shrub ($x^2 = 44{,}1$; df = 7; $p < 0{,}001$). Orientations of nests in relation to the centres of grass clumps or shrubs were as follows: S–3 nests, SW–12, W–4, NW–1, N, NE and E–0, and SE–1 nest.

Most Marsh and Barn breeding attempts started during two periods, March–April or August–September while all the laying records for Spotted Eagle, Whitefaced and Pearlspotted Owls were between July and October (Table 4). The greater number of Marsh Owl laying records in August and September at Settlers was attributable to the intensive searching that took place during the census between June and September 1978. No Grass Owl nests were found.

TABLE 4
NUMBER OF RECORDS OF EGG-LAYING IN DIFFERENT MONTHS IN THE STUDY AREA, ELSEWHERE IN THE TRANSVAAL (AFTER TARBOTON *et al.* 1987) AND IN ZIMBABWE (AFTER IRWIN 1981)

Species	J	F	M	A	M	J	J	A	S	O	N	D	Place
Marsh Owl			4	3	1			11	9	1	1		Settlers
	1	8	17	18	8	5	1	8	3	2		1	Transvaal
		6	34	25	9	2	1	1				1	Zimbabwe
Barn Owl			3					1	1				Settlers
	3	9	29	15	14	7	2	2	3	4		2	Transvaal
	2	16	34	29	21	7	12	4	9	3	1	1	Zimbabwe
Grass Owl	1	4	8	8	3	1					2		Transvaal
	2	4	9	3	2						2	1	Zimbabwe
Whitefaced Owl								3	2	1			Settlers
		1			3	7	7	9	12	13	3		Transvaal
					1		5	14	31	26	3		Zimbabwe
Spotted Eagle							1	1					Settlers
Owl		2					14	26	39	17	4		Transvaal
	2						10	52	109	52	4	1	Zimbabwe
Pearlspotted									1				Settlers
Owl								1	12	35	1		Transvaal
									22	24	1		Zimbabwe

DISCUSSION

Most of the details recorded in the Springbok Flats accord with accounts of the biology of the six species from elsewhere (Steyn 1982; Kemp 1988; Wilson *et al.* 1988). Although higher densities have been recorded for some species in certain areas, the overall high abundance of owls in the Settlers area was noteworthy. An average of 26 Blackshouldered Kites occurred in the same area during this study (Mendelsohn 1983), and this species would have been described as very common in that area. The same would not necessarily have been said of inconspicuous owls, but populations of Barn, Grass, Marsh and Whitefaced Owls were of a similar or greater size (Table 1). Considering that most of the area was not suited to hunting, roosting or nesting, actual densities were indeed high. For example, if the total estimated population of 303 owls was limited for much of the year to the 1 930 ha of farmyards, verges, woodland and grassland (i.e. all except the cultivated areas), the density was about 6,4 ha/owl. For Marsh Owls, a similar reckoning gives a density of about 9,9 ha/owl. Although higher densities have been reported for small areas where Marsh Owls nested communally (for example, 2 ha/owl — Carlyon 1988), I am not aware of similar densities over large areas elsewhere.

The high density of owls was probably attributable to an abundance of rodent prey and roost and nest sites. Although the greater part of the area was cultivated, there were many small, scattered patches of undisturbed habitat where owls could roost and nest (Fig. 1). If cultivation had been more extensive, populations would have been much lower, as was the case in some large areas that lacked suitable habitat (compare Figs 1 and 2).

Mastomys natalensis was the staple food of Barn, Grass, Spotted Eagle, Marsh and Whitefaced Owls (Table 2). *Otomys angoniensis* and *Rhabdomys pumilio* are usually active during the day, and therefore formed a large component of the diet of Blackshouldered Kites (Mendelsohn 1982a). The substantial numbers of these diurnal rodents eaten by Grass Owls suggests that this species often hunted during the day, as reported elsewhere (Kemp & Calburn 1987). However, diurnal hunting by Grass Owls was never observed at Settlers. This species may hunt preferentially over dense grass cover where diurnal rodents are more abundant (Mendelsohn 1982b).

While Grass Owls consumed large numbers of *Otomys angoniensis* and *Rhabdomys pumilio*, and Marsh Owls perhaps obtained considerable quantities of insect prey during summer, no other kinds of prey provided regular, substantial food sources. Moreover, the five owl species and Blackshouldered Kites preyed upon these other "incidental" prey items in similar proportions (Table 2; Mendelsohn 1982a) suggesting that, compared with *Mastomys natalensis, Rhabdomys pumilio* and *Otomys angoniensis*, such items were either scarce or inaccessible to most predators. It is still unclear, though, why other owls did not prey more upon insects. Likewise, Blackshouldered Kites never consumed insects at Settlers, but these form a regular source of prey for some populations of this species elsewhere in the world (Mendelsohn & Jaksić 1989).

Data on trapping success (Fig. 3) revealed lower numbers of *Mastomys natalensis* during summer 1977–78 than earlier in the winter and spring and later in autumn and winter of 1978. These changes paralleled changes in the proportion of *M. natalensis* in the diet of owls and simultaneous changes in the proportion of insects eaten by Marsh Owls. However, it is not known whether Marsh Owls consumed more insects in summer because they were then more available or because they were less active during the cooler seasons.

The predominance of *M. natalensis* as owl prey was probably due to their great abundance. Data on their density are not available and small mammal traps do not accurately sample different species in direct proportion to their real numbers. However, 54,9 % of all captures in rodent traps were *M. natalensis* (Mendelsohn 1982b). The

pressure of predation on this species was probably considerable. In addition to owl predation, 29,8 % of Blackshouldered Kite prey consisted of this species. There were also many other rodent predators in the area, including several snake species, Blackbacked Jackals *Canis mesomelas*, Slender Mongoose *Galerella sanguinea* and some other birds of prey.

Analyses by Vernon (1972) and Dean (1973) showed that Barn Owls elsewhere in the Springbok Flats also prey predominantly upon *Mastomys natalensis*. This species formed 59, 47, 46, 83 and 70 % of prey (by frequency) taken by Barn Owls at different sites. The spectrum of other prey species was similar, although *Otomys* sp. were more abundant in some analyses and certain other species, not found on the turf thornveld at Settlers, were recorded.

The south to westerly orientation of Marsh Owl nests was similar to that of the nests of White-browed Sparrow Weavers *Plocepasser mahali* and Blackshouldered Kites in the Springbok Flats (Mendelsohn 1968, pers. obs.). The orientation of nests of these three species was probably related to the prevailing northeasterly winds in this area. Marsh Owl nests may be less conspicuous and more shaded as a result of grass and other pliable material being bent over the nests by wind, while nests of the other species probably survive longer by being placed on the leeward sides of trees (Ferguson & Siegfried 1989).

For all species, the months in which most eggs were laid were similar to those recorded in the Transvaal and Zimbabwe (Table 4; Wilson 1988). Both the Settlers data and those from elsewhere demonstrate considerable flexibility in the timing of breeding of each species. Nevertheless, the six species fall into two groups — those that breed mainly in March–May and those that lay generally in August–October (Table 4). Scops *Otus senegalensis*, Wood *Strix woodfordii*, and Barred Owl *Glaucidium capense* fall in the latter group, usually laying in August–October (Irwin 1981; Tarboton *et al.* 1987). All nine of these species feed largely on rodents or insects (Steyn 1982; Kemp 1988). Cape Eagle *Bubo capensis* and Giant Eagle Owls *B. lacteus* usually start breeding between May and August, while Pel's Fishing Owls *Scotopelia peli* usually lay in April; these species feed on a different spectrum of larger prey, however.

The timing of breeding of the largely insectivorous owls — Pearlspotted, Barred, Scops, and Wood Owl — is probably attributable to the greater abundance of prey in summer. Their offspring will be present at that time of the year when food supply is best. Similarly, those owls that lay in March–May may benefit from the higher prey populations produced by rodent breeding, especially *Mastomys natalensis* (Coetzee 1975), during summer. Breeding attempts started in August–October are, however, less readily explained. One possibility is that they are timed to exploit increased insect populations in summer. However, Blackshouldered Kites, which eat no insects in the Transvaal (Mendelsohn & Jaksić 1989), show a very similar pattern of breeding to Barn and Marsh Owls. Most start to breed in March–May or August–October, possibly timing their laying in anticipation of increased rates of recruitment of juvenile rodents (Mendelsohn 1984). The same may be true for Marsh and Barn Owls. Several studies indicate that there is a small peak in recruitment of juvenile *Mastomys natalensis* in early summer (October–November), a trough in midsummer (December–February), followed by a much larger input of juveniles between March and June (Mendelsohn 1982b; Chidumayo 1984; Slotow 1987). Similar patterns have been reported for other rodent species (Davis 1973; Brooks 1974; Chidumayo 1980; Perrin 1980; Mendelsohn 1982b; Slotow 1987). Within these general cycles, there is some variation in the timing and degree of juvenile recruitment, perhaps accounting for the variation around the March–May and August–October laying peaks. It thus seems likely that the two breeding seasons of some owls are linked to changes in rodent reproduction and population size, while irregular laying may be due to sporadic changes in rodent demography. Why Whitefaced and Spotted Eagle Owls do not breed in March–May is not clear. Indications are that these species often feed more on insects and birds elsewhere (see Kemp 1988) which would be most abundant several months after their laying period in July–October.

In addition to reporting some observations, I hope this paper draws attention to an area in which further research on owls should be considered. Most of this area is highly conducive to field research: several owl species are abundant, roost and nests sites are easy to find, the area is flat (for radio tracking etc.), habitats are simple and easily demarcated, prey populations can be sampled readily, and the area is easy to travel in, there being no major obstacles to vehicles, even off recognized roads.

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COMMENTARY

Record of Redbilled Tropicbird *Phaethon aethereus*

Schmidt (1986 *Ostrich* 57: 244) recorded this species near Hout Bay and stated that his sighting is accepted by the Rarities Committee as the first record for South Africa. A record of more than half a century earlier, however, would appear to have been overlooked.

Dr Leonard Gill (1928 *S. Afr. J. Nat. Hist.* 6: 178) wrote that "an adult example of the bird was obtained at Dyers Island in February 1926 and presented to the museum by Mr W. R. Zeederberg, Superintendent of the Government Guano Islands. Although not quite the first recorded occurrence it is the first whole specimen obtained in South Africa." Presumably the specimen concerned is still to be found in the South African Museum's collection?

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