NESTING OF THE GREATER KESTREL *FALCO RUPICOLOIDES* IN ZAMBIA

by
Timothy O. Osborne
Alaska Department of Fish and Game
Box 155
Galena, Alaska 99741
and
J. F. R. Colebrook-Robjent
Musumanene
Box 303
Choma
Zambia

Abstract

Breeding data were obtained from 10 pairs of Greater Kestrels at Minyanya Plain, Zambia, during September 1975. Black Crow nests were the only nesting platforms utilized, and we concluded that they were acquired aggressively by the kestrel. Sixty % of the nests kestrels used had been built by crows during the 1975 season indicating a frequent occurrence of nest piracy. Incubation was undertaken by the female which was very shy on the nest. The distance between nests averaged 2.3 km, slightly more than the distance between all crow nests. The breeding distribution and nesting density of the Greater Kestrel in Zambia is directly influenced by the distribution and density of the Black Crow.

Introduction

Benson et al. (1971) summarized the distribution of the Greater Kestrel (*Falco rupicoloides*) in Zambia and noted that there were no breeding records. Aspinwall (1979) recorded the first nest of the species in Zambia which contained 4 fresh eggs on 30 August 1974 at Mitashi Plain (13°35'S., 22°50'E.), western Zambezi (formerly Balovale) District. The eggs were laid in an old nest of a Black Crow (*Corvus capensis*). The status of the Greater Kestrel in Zambia has been discussed briefly in a previous paper (Osborne and Colebrook-Robjent 1980). This paper presents breeding data on an undisturbed population of Greater Kestrels at Minyanya Plain, Zambia.

Study Area and Methods

Minyanya Plain (13°09'S., 22°23'E.) is a watershed *Loudetia* grassland lying between the North and South Kashiji Rivers in Zambezi District, North-Western Province, Zambia. The plain, approximately 1150 m above sea level, is bordered on the north by the North Kashiji floodplain; to the south and west by broken stands of *Diplorhynchus* woodland and to the east by degraded Kalahari (*Baikiaea*) woodland. The soils are Barotse sands with an uneven surface due to numerous *Cubitermes* mounds. Scattered over the plain are solitary trees or sparse clumps of trees rarely greater than 6 m high.

From 10–15 September 1975 we located all raptor and crow nests within a 5 km radius of our camp site in a small isolated stand of *Syzigium* just north of an east-west track which bisected the plain (Fig. 1). The open nature of the plain and the low stature of the trees enabled us to find all the nests. On 15 September we drove a transect SSE 60 km towards South Kashiji School and examined every nest we saw.

Results

Ten pairs of kestrel were located in the study area (Fig. 1). In addition, 3 single kestrels were observed on the edge of the study area. All 10 pairs were associated with either new or old nests constructed by Black Crows. The crow nests were within the upper canopy of the tree and were composed of a platform of sticks usually lined with animal hair.

Of 19 crow nests in the study area, 4 were old and unoccupied, 5 contained kestrel eggs, 2 contained Black Crow eggs, 2 contained Black Crow nestlings, 2 were under construction by crows, 2 were new nests with kestrels in attendance, and 2 were old nests with kestrels in attendance. We attributed one nest which contained broken eggs and appeared deserted to a kestrel pair which was perched 500 m away.

We observed incubation only by females. They allowed us to approach to within 250 to 400 m of the nest before flying unobtrusively away, just above ground level, out of sight. One female kestrel vigorously defended her empty nest every time we examined it, but neither this bird nor any other kestrel ever uttered a call.

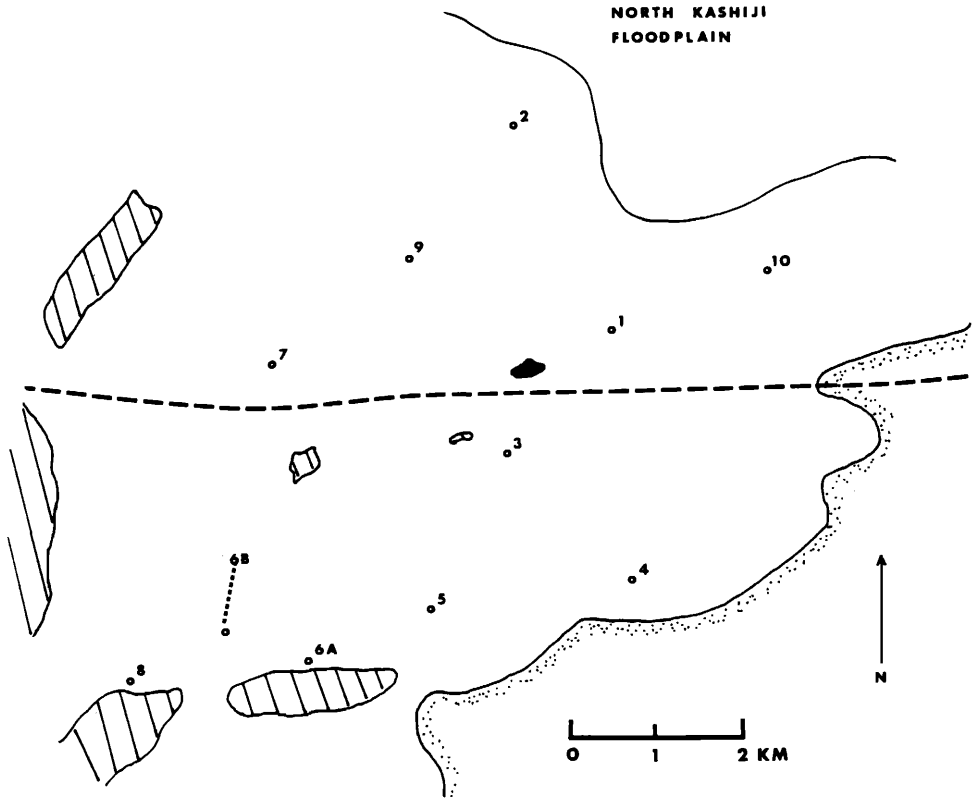

Figure 1.—Location of Greater Kestrel nest sites at Minyanya Plain, Zambezi District, Zambia, September 1975. The plain is bisected by a motor track; the *Diplorhynchus* woodland is shown crosshatched; the *Baikiaea* woodland stippled, and the *Syzigium* stand is black.

The average distance between kestrel nest sites was 2.3 km; the density was one nesting pair per 415 ha. The nesting activities of the kestrel pairs are summarized in Table 1. Clutch size of the kestrel was three C/4 and two C/2. Egg laying started at the end of August (Aspinwall 1979) and continued past mid-September. The average weight of seven unincubated eggs was 24.2 g (23.1–27.0 g). Measurements of 26 eggs averaged 41.5 by 32.7 mm (range 39.4–43.3 by 31.4–34.6 mm). These Zambian Greater Kestrel egg measurements, which included Aspinwall's (1979), are smaller than the averages given in McLachlan and Liversidge (1978).

On our transect towards South Kashiji School, we found 13 Black Crow nests, 4 of which were occupied by kestrels.

The Black Crows at Minyanya bred over an extended season. We found nests containing large young (eggs laid in early August), and nests still in the early stages of construction. Like Aspinwall (1979) and White (1946) we found the crows to be very shy, and

Table 1. Summary of Greater Kestrel nests at Minyanya Plain, Zambia, September 1975

Pair	Nest site	Contents	Notes on the kestrels
1	New crow nest 4.5 m high in leafy *Parinari mobola*, crow recently dispossessed	nil	Female unusually aggressive when nest inspected 12 Sept. Still empty 1000 h 15 Sept.
2	Old crow nest 2.4 m high in small defoliated tree	C/4	Three eggs 10 Sept. fourth egg laid before 0700 h 13 Sept.
3	Old crow nest 2.1 m high in small defoliated tree	nil	Pair at nest 10 to 15 Sept.
4	New unlined crow nest 4.2 m high in medium-sized tree. Nest still unlined 14 Sept.	nil	Pair perched nearby 11 Sept.
5	New fully lined crow nest 4.8 m high in solitary 'Mukutanlonga' tree, partly defoliated	2 eggs	No eggs 11 Sept. first egg laid before 1000 h 12 Sept., second egg laid before 1400 h 14 Sept.
6A	Old crow nest 4.5 m high in solitary medium-sized tree	1 or more eggs	Deserted nest with one egg and remains of others 12 Sept.
6B	Incomplete new crow nest in solitary tree	nil	Pair perched 500 m north 12 Sept. probably pair from failed nest 6A
7	New crow nest 5.4 m high in partly defoliated tree	C/3	12 Sept.
8	New crow nest in medium-sized tree	nil	Pair 100 m from nest 12 Sept.
9	Old crow nest 5.4 m high in partly defoliated tree	C/4	Freshly plucked button quail *Turnix sylvatica* remains on ground near nest site 13 Sept.
10	Old and delapidated crow nest 3 m high partly tipped over	nil	Kestrel perched nearby 10 Sept.

we were not able to observe any pairs at their nests. The density of the crows averaged 381 ha per nesting pair, considerably larger than the 60 ha average found in South Africa (Skead 1952).

Discussion

The Greater Kestrel uses the nests of crows or hawks in South Africa (McLachlan and Liversidge 1978); however, the Minyanya population of Greater Kestrels in Zambia has developed a restrictive breeding strategy in which Black Crow nests are exclusively utilized as the nest site.

We concluded that when a suitable nest site was not available within the kestrel's home range, the pair waited until a Black Crow built a nest and then pirated it. Of the 10 pairs of kestrels we observed, 2 were quietly perched 100–200 m away from crow nests under construction. Although we do not have direct observations of nest piracy, it was frequent because 60% of the kestrels were using nests built during the 1975 nesting season.

The average distance between crow nests built in the 1975 season irrespective of the present occcupant (either crow or kestrel) was 2.3 km. When this is compared with the 2.3 km we found between kestrel nests, it is apparent that the density of the kestrel nests is directly related to the density of crow nests. Once the minimum requirement of a nest site is satisfied, other factors, such as food, must affect density since the total crow nests outnumbered the nests occupied by kestrels.

A review of the genus *Falco* in Zambia indicated that perhaps breeding density is influenced by "host" nest site density in several other species. In parts of the range of the Red-necked Falcon (*F. chicquera*), a Pied Crow (*Corvus albus*) nest is the nest platform (Colebrook-Robjent and Osborne 1974). On the Kafue Flats a relationship between falcon and crow density is suspected (pers. obs.). In large areas of Zambia and Zimbabwe, where rock outcrops do not exist to provide cliff faces, the Lanner Falcon (*F. biarmicus*) nest in new or old Bateleur (*Terathopius ecaudatus*) nests (pers. obs., Steyn 1980).

The distribution of the Greater Kestrel in Zambia as stated by Benson et al. (1971) implies that the bird is widespread in suitable habitat throughout the south and west of the country. Their records mainly covered the period of July to October, and, since no nests had been discovered, they suggested that most kestrels found in Zambia were derived from Botswanan birds driven north during the cold dry season. However, with our knowledge of kestrel nest site preferences, a distinction must be made not in the date of the observation but whether or not the record occurs within the known range of the Black Crow. Kestrel records from elsewhere in Zambia (Fig. 2), regardless of the date, can be assumed to be wandering birds.

It is not possible to discuss the breeding distribution of the Greater Kestrel in Zambia without reviewing the distribution of its nest building "host," the Black Crow. The range of the crow in Zambia (Benson et al. 1971) parallels the distribution of the watershed grassland vegetation type found west of the Zambezi River and north of the Kalabo River (Fig. 2). There are further crow records from Konkano Plain (13°15'S., 24°00'E.), also a watershed grassland, and from Livingstone, but the latter record is thought to be an escape (Benson et al. 1971). It is not known what element in the watershed grassland determines its suitability to the crow. The distribution of the kestrel shows a concentration of records from these same grasslands. We expect the kestrel will be found as a breeding species on the Konkano Plain.

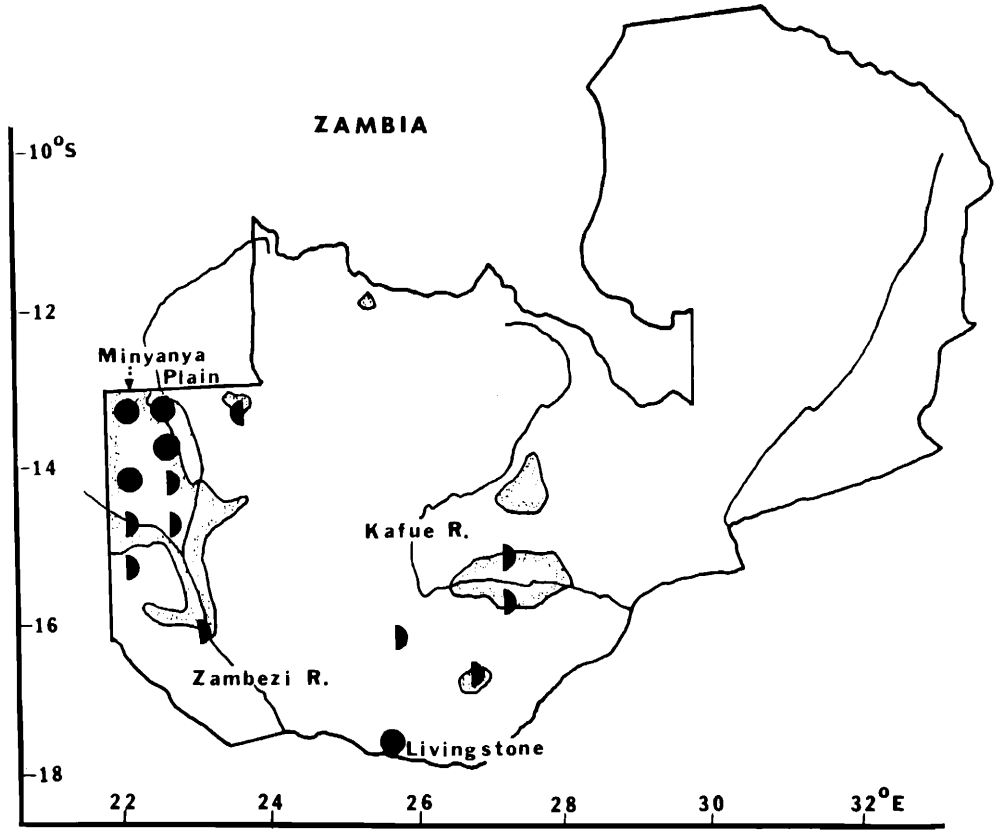

Figure 2.—Distribution of Greater Kestrel in Zambia. Watershed and floodplain grasslands of the western half of the country represented by stippled area. Locations where Greater Kestrels have been collected or sight records are represented by the symbol (◗). Locations where Black Crows have been collected or sight records are represented by the symbol (◖). From National Museums of Zambia Provisional Bird Atlas species numbers 112 and 384 (courtesy R. J. Dowsett).

The Black-shouldered Kite (*Elanus caerulus*) was common on the North Kashiji floodplain, the northern border of our study area, but we did not observe any on Minyanya Plain. Likewise Britton (1970) considered it was probably absent from watershed plains in the District. Conversely, we failed to find any kestrels on the floodplain. Since both species prey on similar food items (mice and insects) (McLachlan and Liversidge 1978), exclusive territories were not expected. Possible reasons for the exclusion could be interspecific aggression, competitive exclusion or a different hunting technique. The hovering hunting style of the kite may give it an advantage on the floodplain where grasses are taller than on the plain.

The differences in the average egg size between Minyanya and South African kestrels suggest that the Zambian kestrels may be smaller. We measured an additional 46 eggs of the kestrel from Transvaal; their average 42.5 by 34.2 mm (range 40.0–44.6 by 32.3–35.7 mm) falls between the Minyanya and South African eggs suggesting a size cline. However, a comparison of wing lengths does not show a significant difference. The wings of four females collected in Zambia averaged 280 mm (range 273–289 mm) (Benson and Irwin 1967, Aspinwall 1979) and 18 southern African females average 282 mm (range 272–290 mm) (McLachlan and Liversidge 1978). More data are needed to clarify this issue.

Summary

The breeding distribution of the Greater Kestrel in Zambia is very restricted. The breeding strategy of the kestrel restricts it to regions where its nest building "host," the Black Crow, nests. The density of kestrel nests on Minyanya Plain is related to the density of crow nests. The breeding season commenced in August, and some pairs had not laid eggs by mid-September. The average egg size was smaller than South African birds suggesting a difference in the size between the birds.

Acknowledgments

We thank the following who rendered field assistance, R. A. Conant, L. Mbewe, and L. Y. Osborne. D. R. Aspinwall and R. J. Dowsett made useful comments on an earlier draft and H. Walter is thanked for his help on the final draft. We thank the Minister of Lands, Natural Resources and Tourism S. Kalulu for the opportunity to visit Minyanya Plain.

Literature Cited

Aspinwall, D. R. 1979. Bird notes from Zambezi District, North-Western Province. *Zambian Ornithol. Soc. Occas. Papers* 2:1–60.

Benson, C. W., R. K. Brooke, R. J. Dowsett, and M. P. S. Irwin. 1971. *The Birds of Zambia.* Collins, London. 414 pp.

Benson, C. W. and M. P. S. Irwin. 1967. A contribution to the ornithology of Zambia. *Zambia Museum Papers* 1:1–139.

Britton, P. L. 1970. Birds of the Balovale District of Zambia. *Ostrich* 41:145–190.

Colebrook-Robjent, J. F. R. and T. O. Osborne. 1974. High density breeding of the Red-necked Falcon *Falco chicquera* in Zambia. *Bull. Br. Ornithol. Club* 94:172–176.

McLachlan, G. R. and R. Liversidge. 1978. *Roberts Birds of South Africa.* Fourth Ed. John Voelcker Bird Book Fund, Cape Town. 660 pp.

Osborne, T. O. and J. F. R. Colebrook-Robjent. 1980. The status of the genus *Falco* in Zambia. *Proc. IV Pan-Afr. Orn. Congr.* 301–306.

Skead, C. J. 1952. A study of the Black Crow *Corvus capensis. Ibis* 94:434–451.

Steyn, P. 1980. Breeding and food of the Bateleur in Zimbabwe (Rhodesia). *Ostrich* 51:168–178.

White, C. M. N. 1946. The ornithology of the Kaonde-Lunda Province, Northern Rhodesia. *Ibis* 88:68–103, 206–224, 502–512.