Communal roosting and feeding conditions in Blackshouldered Kites

John Mendelsohn, Durban Natural History Museum, P.O. Box 4085, Durban, South Africa, 4000. Present Address: State Museum, P.O. Box 1203, Windhoek, Namibia.

Communal roosting by Blackshouldered Kites *Elanus caeruleus* has been reported many times. In East and South Africa, Brooke (1965) found roosts containing 5–30 birds in reed beds and a stand of poplars, Morgan-Davies (1965) counted about 80 individuals roosting in a tree about 3 m high, Hustler (1979) recorded 60–80 kites on different nights gathered in a group of poplars in a reed bed and W. R. Tarboton (pers. comm.) made counts of 25–31 birds roosting in a bed of reeds. In Senegal, Morel & Poulet (1976) found 500–600 kites in one roost. Communal roosting has also been reported for the similar (probably conspecific) species in Australia, North and, perhaps, South America (Brown & Amadon 1968; Waian 1973; Meserve 1977).

Many other birds roost communally and current explanations of this behaviour hold that the aggregations serve either to protect birds from predation or to provide information on the distribution of food (and perhaps other) resources. Several predictions can be made if communal roosts serve as information centres (e.g. Clark & Mangel 1984; Caccamise & Morrison 1986; Waltz 1982, 1987), two of which are relevant to this study. 1. When food is abundant birds will roost alone, whereas they should join communal roosts when food is scarce. 2. Communal roosting is associated with patchy, ephemeral food resources. In addition to describing aspects of the roosting behaviour of Blackshouldered Kites, this paper provides results that support these predictions.

The observations were made during a 19-month study of Blackshouldered Kites at Settlers (24 57 S, 28 33 E) in the Transvaal, South Africa. The study area, methods and various aspects of the biology of kites are described elsewhere (Mendelsohn 1982, 1983a). Roosts were found by following birds at dusk or by searching for pellets and faecal deposits under trees. The number of birds in a roost was either counted directly or determined by the number of discrete accumulations of faeces and pellets, each of which was produced by one bird using the same perch night after night. Each kite produced one pellet daily and its dry weight was directly related to the weight of food consumed the previous day (Tarboton 1977).

Most kites arrived at roosts 10–35 min after sunset (Fig. 1). Early arrivals usually perched in trees near roosts and then flew from tree to tree, occasionally chasing each other. After later flying to the roost tree, they often hopped from perch to perch before finally settling. Late arrivals went directly to their roosting perches. Each roost was confined to one tree or bush of the following species: *Acacia nilotica* (eight roosts), *A. flecki* (two), *A. karroo* (one), *Rhus pyroides* (six), *R. lancea* (one), *Zizyphus mucronata* (two), *Eucalyptus* sp. (one) and *Melia azedarach* (one). There was a notable paucity of roosts in the two commonest trees in the study area (and those preferred for nest sites), *A. tortilis* and *A. flecki*. These species lacked exposed dead branches that were favoured roosting perches for most of the year. During the winter months of May to August kites roosted

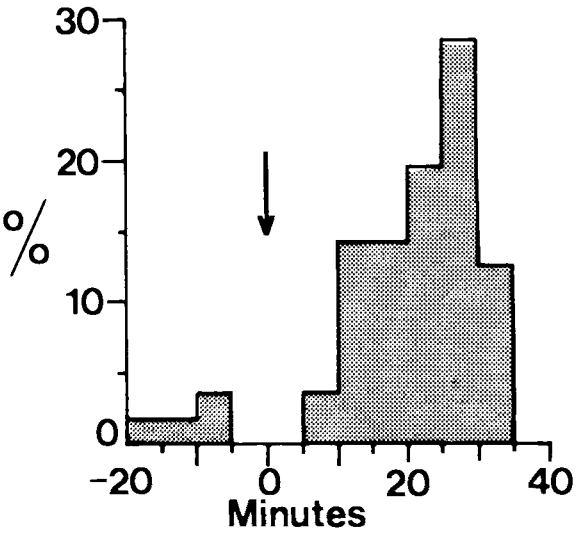

FIGURE 1

The number of minutes before/after sunset (arrowed) that 56 Blackshouldered Kites arrived at their roosts.

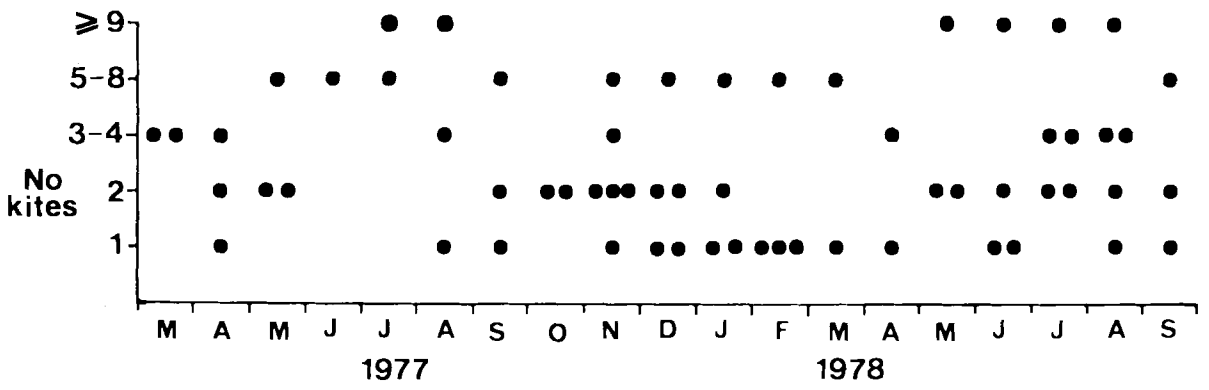

FIGURE 2

The number of Blackshouldered Kites in roosts observed each month, each dot showing an active roost.

within the foliage of *Rhus pyroides, R. lancea* and *Melia azedarach*. The choice of these sheltered perches was probably in response to the cold winter nights, average minimum temperatures ranging between 5 and 10 °C with frost recorded on about 20 % of nights. These species also lacked thorns which, in *Acacia* sp. were frequent causes of injury and mortality in kites (Mendelsohn 1983b).

Resident kites roosted alone, in pairs, in family parties (parents + flying young), or in groups comprised of neighbouring residents and perhaps occasional nomads. When first found, six roosts had one kite, 11 had two birds, seven had 3–4 kites, five had 5–8 birds, and two had >9 attendant kites. Although the largest roosts were usually observed in summer and winter when few birds were breeding (Mendelsohn 1984), a range of different-sized roosts was present in most months (Fig. 2). The largest number of kites recorded roosting communally at Settlers was 22. Residents that roosted alone were either unpaired territorial or breeding males (females roosting on their nests). The number of kites roosting together varied from night to night as some birds joined and others left the roost.

Kites that roosted alone, in pairs or family parties remained on their territories. Those that joined large roosts flew up to 10 km each night to and from their territories, while others were drawn from within 5 km of smaller roosts. Residents were highly territorial during the day, driving out all intruding neighbours or nomads. At dusk and dawn, by contrast, there was relatively little aggression as kites trespassed on their way to and from roosts.

As indicated by pellet weights, kites that roosted communally had a lower daily food intake than those that roosted alone or in pairs (Table 1). There were also indications that the food supply of kites in large roosts (>5 birds) was poorer than that of those in smaller communal roosts (3–4 birds), perhaps reflecting a general inverse relationship between the size of a roost and food supply in the area from which the roosting kites were drawn.

These results are consistent with the prediction that kites should roost communally when feeding conditions were poor, probably in response to a need for information on better feeding conditions elsewhere. Several results indicated that residents did indeed desert their territories to move elsewhere when food was in short supply (Mendelsohn 1983a). Residents either left their territories permanently or returned after temporary absences. Most females moved directly to pair with unpaired males on other territories, while males usually became nomadic and searched for vacant territories.

Blackshouldered Kites evidently roost communally frequently, both in Africa and elsewhere in the world. This accords with their world-wide dependence on rodent prey, populations of which fluctuate substantially and often unpredictably (Brown & Amadon 1968; Mendelsohn & Jaksić in press.). Many accounts of irruptive kite popu-

TABLE 1

THE WEIGHTS OF PELLETS (G) COLLECTED FROM ROOSTS OF VARIOUS SIZES. PELLETS FROM FAMILY ROOSTS (PARENTS + FLYING YOUNG) ARE NOT INCLUDED

Number of kites in roost	Mean pellet weight	Standard deviation	Number of pellets
1	1,34	0,59	61
2	1,40[a]	0,68	212
3–4	1,31[ab]	0,64	243
5–8	1,12[b]	0,66	259
>9	1,15	0,64	385
All non-communal	1,37[c]	0,65	245
All communal	1,20[c]	0,64	915

paired comparisons: [aa]$p<0,1$; [bb]$p<0,005$; [cc]$p<0,005$ — Student's t-tests

lations (reviewed in Mendelsohn 1983a) suggest that they move around in response to changes in prey availability, great numbers suddenly arriving in an area, often breeding at high densities, and then leaving when rodent densities decline. Their movements often cover hundreds of kilometres (Mendelsohn 1983a) and communal roosts may provide some of the information needed to find ephemeral food resources.

Weatherhead (1983) suggested that some birds roost communally to obtain protection from predators while others in the same roost are there to obtain information on food resources. From his hypothesis one would expect that there would be greater variation in food intake between birds in communal roosts than between those roosting alone or in pairs, since communal roosts would consist both of birds that fed satisfactorily and others that had experienced food shortages. The variances for pellet weights (Table 1) collected at roosts of different sizes reveal no such trend, however.

The roosts at Settlers comprised birds drawn from relatively small areas, perhaps 50 km^2 at most. These may have been less effective sources of information than larger roosts, since the quantity of potential information on the distribution of food resources should be directly related to the size of area from which roosting birds are drawn. However, it is also possible that the roosts, being made up of territorial residents, could have provided information of a more local nature that was useful to kites experiencing food shortages on their territories. For example, females may have recognised unpaired resident males as potential new mates that they could follow and join. Similarly, the absence of a resident male from a roost may have indicated to other males in the roost that he had left the area and that they could explore and potentially occupy his vacant territory.

I thank the CSIR and University of Natal for financial support and farmers in the Settlers area for access to their land.

REFERENCES

BROOKE, R.K. 1965. Roosting of the Black-shouldered Kite *Elanus caeruleus* (Desfontaines). *Ostrich* 46: 43.

BROWN, L. H. & AMADON, D. 1968. Eagles, Hawks and Falcons of the World. Feltham: Country Life Books.

CACCAMISE, D. F. & MORRISON, D. W. 1986. Avian communal roosting: implications of diurnal activity centres. *Amer. Nat.* 128: 191–198.

CLARK, C. W. & MANGEL, M. 1984. Foraging and flocking strategies: information in an uncertain environment. *Amer. Nat.* 123: 626–641.

HUSTLER, K. 1979. Roost orientation of the Blackshouldered Kite *Elanus caeruleus*. B.Sc. thesis, University of Witwatersrand, Johannesburg.

MENDELSOHN, J. M. 1982. The feeding ecology of the Blackshouldered Kite *Elanus caeruleus* (Aves: Accipitridae). *Durban Mus. Novit.* 13: 75–116.

MENDELSOHN, J. M. 1983a. Social behaviour and dispersion of the Blackshouldered Kite. *Ostrich* 54: 1–18.

MENDELSOHN, J. M. 1983b. Causes of mortality in Blackshouldered Kites. *Bokmakierie* 35: 11–13.

MENDELSOHN, J. M. 1984. The timing of breeding in Blackshouldered Kites in southern Africa. *Proc. 5th Pan-Afr. Orn. Congr.*: 799–808.

MENDELSOHN, J. M. & JAKSIĆ, F. M. In press. Hunting behaviour of Blackshouldered Kites in the Americas, Europe, Africa and Australia. *Ostrich*.

MESERVE, P. L. 1977. Food habits of a Whitetailed Kite population in central Chile. *Condor* 79: 263–265.

MOREL, G-J. & POULET, A-R. 1976. Un important dortoir d'*Elanus caeruleus*, Accipitridae, au Sénégal. *Oiseau Rev. Fr. Orn.* 46: 429–430.

MORGAN-DAVIES, A. M. 1965. On the roosting habits of the Black-winged Kite *Elanus caeruleus*, Desfontaines. *Bull. Brit. Orn. Club* 85: 110–111.

TARBOTON, W. R. 1977. Food consumption and pellet production in the Blackshouldered Kite. *Zool. Afr.* 12: 252–255.

WAIAN, L. B. 1973. The behavioural ecology of the North American White-tailed Kite (*Elanus leucurus majusculus*) of the Santa Barbara coastal plain. Ph.D. thesis. University of California, Santa Barbara.

WALTZ, E. C. 1982. Resource characteristics and the evolution of information centers. *Amer. Nat.* 119: 73–90.

WALTZ, E. C. 1987. A test of the information-center hypothesis in two colonies of common terns. *Anim. Behav.* 35: 48–59.

WEATHERHEAD, P. J. 1983. Two principal strategies in avian communal roosts. *Amer. Nat.* 121: 237–243.