

SEASONAL ABUNDANCE OF BLACK KITES ASSOCIATED WITH THE RUBBISH DUMP OF MADRID, SPAIN

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ABSTRACT.—This study describes the seasonal variations in number of black kites (*Milvus migrans*) foraging at the rubbish dump of Madrid, Spain. Seasonal changes in the abundance of kites using the dump showed two peaks corresponding to both pre- and post-breeding migratory passages. The autumn passage was more lengthy and produced the highest number of kites (847). During the breeding season the population of kites foraging in the dump showed no seasonal trends, suggesting that it consisted mainly of nonbreeding birds, both adults and subadults. Age-related differences were observed in the use of the dump by black kites during post-breeding which may simply reflect the existence of age-related differences in migration. A possible advantage for kites to forage in the dump is access to an abundant and predictable food supply. On the other hand, kites may face some dangers from entanglement in plastic materials and other rubbish in the dump.

KEY WORDS: *black kite; Madrid; Milvus migrans; rubbish dump; seasonal abundance; Spain.*

Abundancia estacional de Milanos Negros (*Milvus migrans*) asociados al basurero de Madrid, España

RESUMEN.—Este estudio describe las variaciones numéricas estacionales de Milanos Negros (*Milvus migrans*) en relación a su periodo de permanencia y paso migratorio sobre el basurero de Madrid, España. Los cambios estacionales en la abundancia de milanos reflejaron dos máximos correspondientes a los pasos migratorios. El paso migratorio postreproductor fue más prolongado y en él se alcanzó el número más alto de milanos (847). Durante la época de cría la población de milanos asociada al basurero no mostró variaciones numéricas, sugiriendo que estuvo compuesta principalmente por individuos no reproductores, tanto adultos como subadultos. La proporción de cada clase de edad varió durante el paso postreproductor en el basurero, lo cual podría estar relacionado con diferencias migratorias entre las distintas clases de edad. Se discuten las posibles ventajas y desventajas de alimentarse en basureros para los Milanos Negros.

[Traducción Autor]

Black kites (*Milvus migrans*) often gather in large communal roosts and breeding colonies. Large aggregations also occur where food is abundant and during migration (Bernis 1980, Cramp and Simmons 1980). Their highly gregarious and opportunistic foraging behavior leads them to eat the most abundant and available prey, especially slow-moving and injured animals as well as food obtained by scavenging (Valverde 1967, Arroyo 1978, Cramp and Simmons 1980, Shiraishi et al. 1990). As scavengers, black kites have been recorded in large numbers on waste accumulations generated by human activities, including rubbish dumps, markets, fishing-ports and abattoirs all over their world range (e.g., Bernis 1973, Pomeroy 1975, Roberts 1991, Shiraishi et al. 1990).

Despite the widespread range and abundance of the black kite (Brown and Amadon 1968), limited information is available concerning the proportion of age classes in resident groups and in migration (Bernis 1980, Cramp and Simmons 1980). Knowledge about the age distribution of kites using rubbish dumps, and the timing of residency and migration associated with these sites is almost nonexistent (Pomeroy 1975, Gómez-Tejedor and De Lope 1993).

The objective of this study was to determine the seasonal variations in numbers of black kites at the Madrid, Spain rubbish dump. I also present data concerning the age distribution of black kites associated with the dump through the summer, and discuss the possible advantages and disadvantages for black kites of foraging on refuse.

STUDY AREA AND METHODS

The domestic refuse generated by Madrid, a city of about 4 000 000 people, is deposited daily at the Valdemingomez municipal dump, about 12 km southeast of Madrid. Several bird species have been recorded feeding on the more than 1 000 000 tons of refuse deposited there annually (Cantos and Asensio 1990). The major scavengers recorded at this dump were white storks (*Ciconia ciconia*), black kites, black-backed gulls (*Larus fuscus*), black-headed gulls (*Larus ridibundus*), magpies (*Pica pica*) and jackdaws (*Corvus monedula*) numbering in the hundreds and thousands of birds in each case (Gómez and De Juana 1984, pers. obs.).

During 1993, I monitored the number of black kites using the Madrid dump by counting them when they arrived at the only communal roost in the area. The communal roost was situated in the bank vegetation of the Manzanares River, about 4 km east of the dump. The adjacent area was used for agriculture and cattle grazing (Blanco et al. 1991). Roost trees were mainly large cottonwoods (*Populus alba*) and elms (*Ulmus minor*).

About 2 hr before sunset I began observing and counting the kites perched on the roost trees from about 50 m with binoculars and a 20–60× spotting scope. Later I noted the number of kites entering the communal roost from the dump. Observations of arriving kites were conducted from a fixed vantage point located between the roost and the dump, and lasted until all the kites were settled on the trees.

When conditions of light and time allowed, I attempted to age as many kites as possible on the basis of plumage coloration, shape (Sylvén 1977, Cramp and Simmons 1980) and plumage features derived from molt. Black kites were considered either adult (definitive plumage), juvenile (first summer), or immature (second summer). Birds in their second summer were easily recognized by remnants of juvenile plumage especially in coverts and scapulars, as well as by the coloration of old primaries. In addition, kites in their second summer molting their flight feathers for the first time, were easily recognized in flight by their shape—an irregular appearance because of the loss of several flight feathers or irregular molt patterns. This clearly contrasted with the synchronized molt pattern of adults. Because of the impossibility of exactly aging a large number of kites by these criteria, I focused on recording whether they were molting (adults and immatures) or not (juveniles), which was easily accomplished at long distances. This partial ageing method was used from June, when the first juveniles appeared in the roost, to the end of July, when the development stage of molt in adults makes it difficult to assign each individual to an age class. After the end of July I considered only kites aged by means of plumage coloration, shape, and molting pattern.

RESULTS

Seasonal changes in abundance of kites using the Madrid dump clearly peaked in correspondence with both pre-breeding and post-breeding migration (Fig. 1). Black kites usually arrived on the study area from Africa about the first week of February. Spring

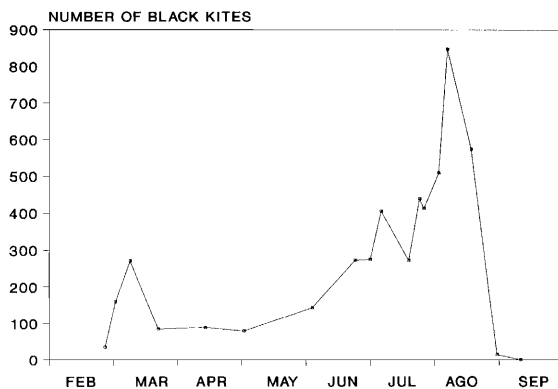


Figure 1. Seasonal abundance of black kites foraging in the Madrid dump, 1993.

migration rapidly increased the number of kites to nearly 300. Numbers were lowest during the breeding season (March–July), and increased from June as the first juveniles joined the roost. The proportion of juveniles increased to the end of July although the highest proportion was reached later (Fig. 2) when the major influx of migrants occurred (Fig. 1). The autumn migration was more lengthy and the numeric increase of kites was not always constant, suggesting the arrival and/or departure of successive surges of migrants. By recording if black kites were molting, I was able to assign 31–86% ($N = 134$ –235) of the birds present each day to one of the two age classes defined by this method. By the more precise ageing technique, I successfully aged only about 13% ($N = 2$ –109). Adults were the highest proportion of the population throughout the period in which the more precise method was used (Fig. 2). The percentage of adults increased to 100% by the end of period when black kites were resident in the area. On the other hand, the sightings of immature individuals peaked in early August and then declined steadily (Fig. 2). Departure of nearly 850 kites occurred in the first week of August, and black kites disappeared entirely by the end of that month (Fig. 1).

During the breeding season kites foraging at the dump showed no seasonal trends (Fig. 1). Most kites observed arriving from the dump used the communal roost, and breeding individuals usually roosted close to their nesting sites. Hence, it is unlikely that the presence of active breeders in the roost may have been influenced by the lack of seasonal variations in the size of the population during the breeding season.

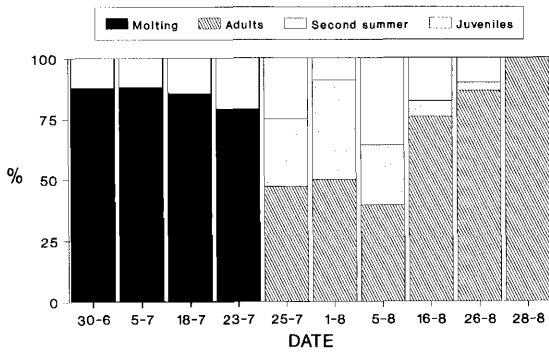


Figure 2. Percentage distribution of black kites by age classes using the Madrid dump in summer. Molting kites include birds in their second summer and adults.

This suggests that the communal roost contained mainly nonbreeding birds. Observations on the age and behavior of kites using the communal roost showed that both breeding and nonbreeding (immatures and nonbreeding birds with definitive plumage) foraged in the dump throughout the breeding season. However, it was impossible to obtain a large enough sample of aged birds to assess the proportion of each age class.

DISCUSSION

The results of this study indicate that black kites used the Madrid dump as a feeding station before and during their migratory travels. The increase of black kites foraging at refuse dumps during migration has been reported at several other Spanish localities (Sánchez et al. 1990, Donázar 1992, Gómez-Tejedor and De Lope 1993), suggesting that such sites could act as stopover and/or congregating centers for migrant black kites throughout their migratory range in Spain.

The number of black kites using the Madrid dump may be much larger than the maximum abundance peak indicated. In fact, my results suggested that successive surges of migrants used the dump at different dates. Moreover, the highest count in the Madrid dump in early August was larger than counts recorded at other dumps in Spain. These numbers were only comparable with roosting and migrating aggregations of black kites passing southward over the Strait of Gibraltar (Bernis 1980). Such a circumstance could be explained by the superabundant and permanently available food supply found in Madrid dump, but especially by the lack of other abun-

dant sources of food in the surrounding area. The use of the Madrid dump by black kites has been known for several decades (Bernis 1973, pers. obs.) which suggests that the high predictability and abundance of food could have influenced the recruitment of birds from year to year.

No previous studies attempted to examine seasonal age-dependent variations in the use of dumps by black kites. Black kites in their first summer did not constitute a major part of population foraging in the dump. This study revealed that timing of the use of the dump by the different age classes simply reflected age-related differences in the timing of migration.

By foraging in dumps, black kites could benefit from the availability and predictability of food found there (Pomeroy 1975, Donázar 1992). In contrast, several negative effects associated with the exploitation of refuse by birds have been pointed out (Iñigo 1987, Donázar 1992). But, no electric power lines dangerous to black kites were in the vicinity of the Madrid dump, and there was no indication that toxic materials were ingested by the kites. Five kites were observed with pieces of rope, plastic bags, and pieces of plastic (up to 40 cm long) entangled with their legs, and one immature was seen with an empty can (approximate weight of 850 g) caught on a leg. The effects of these and other potential dangers to kites foraging in dumps remains unknown.

Further research is needed to determine how much of a trade-off occurs between the costs and benefits of feeding on refuse for kites. More studies are also needed to understand the long-term influence of foraging in dumps on the population size and life-history strategies of the black kite and other species.

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