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Journal of Raptor Research

Volume 37 | Issue 2 Article 11

January 2024

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Sara, Maurizio (2003) "The Colonization of Sicily by the Black Kite (milvus Migrans)," *Journal of Raptor Research*: Vol. 37: Iss. 2, Article 11.
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J. Raptor Res. 37(2):167–172
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THE COLONIZATION OF SICILY BY THE BLACK KITE (*MILVUS MIGRANS*)

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KEY WORDS: *Black Kite;* Milvus migrans; *Red Kite;* Milvus milvus; *colonization; Sicily.*

The Black Kite (*Milvus migrans*) is a locally common and widespread migratory breeder throughout the Palearctic (Bijlsma 1997). This species was much more abundant in the recent past and it has been classified as vulnerable within Europe (Viñuela and Sunyer 1994). In Italy, the species' stronghold is located in the lake district of the Italian Alps, where eight of nine populations surveyed in the 1990s were found to be declining (Sergio and Boto 1999, Sergio et al. 2002).

MATERIALS AND METHODS

The Sicani Mountain, in central Sicily, is an area of ca. 1500 km^2, where the raptor population has been continuously monitored for the last 30 years. The raptor surveys have included both the wintering population, by road census, and the breeding pairs by direct observation and counts. To monitor the wintering birds of prey some 6000 km of road were surveyed by vehicle for over two decades (Massa 1980, Sarà et al. 1993, Sarà 1996a and references therein). The breeding population was monitored during the first (Massa 1985) and second Regional Atlas of breeding birds (Lo Valvo et al. 1993) and then continuously from 1999–2001.

From January 1990–August 2001, 130 excursions have been carried out to count the local population of Black and Red kites (*M. milvus*) totalling 620 hr of observation. Local ornithologists, studying other raptors in the area in 1980–2001 also provided 340 records of kite observations.

All the records on the Black Kite (N = 86 out of 470) were extracted from these databases and chronologically ordered to investigate the trend of population settlement. Black Kites were aged in the field following characteristics in Forsman (1999).

Several factors facilitated this analysis, namely the continuous monitoring of the area, the low densities of wintering and breeding kites, and their preferential use of some easily-monitored sites (e.g., dumps, roosts, cliffs). In addition, the review of the ornithological literature of past centuries allowed the reconstruction of the historical status of the species.

RESULTS AND DISCUSSION

Historical Status (1840–1900). The Black Kite was known in Sicily since the 19th century. The vernacular name of this species was '*Nigghiu di passa*' (migrating kite) or '*Nigghiu niuru*' (black kite). Sicilian ornithologists (Benoit 1840, Minà Palumbo 1853, 1857, Doderlein 1869–74, 1893) mostly considered the species as rare and occasional. However, Maltese Schembri (1843), reported Black Kites as common in inland Sicily. Doderlein (1869–74) considered the latter report a mistake and wrote in 1869: "*. . . indigenous in Northern Africa, very rare in Sicily; Schembri considers it as common but I think he is wrong. I have had notice of only one specimen around Palermo, which was stuffed, and I am not sure it exists in Sicily.*" The living and working locations of the past ornithologists, who reported the species' rarity, were distributed along the current migration route (Fig. 1) and cast very few doubts on this past status.

Recent Status (1950–2000). Today, the Black Kite is a common passage migrant along the Northern coasts of Sicily and the Messina Strait, from early March to late May. During spring, it was ranked as the second species crossing the Messina Strait in order of abundance (Dimarca and Iapichino 1984, Galea and Massa 1985, Agostini 1992). Thiollay (1977) estimated that 15 000 was the minimum number of Black Kites crossing the Mediterranean Sea, from Tunisia (Cape Bon) to Sicily. The species is more numerous on the autumnal passage, from early August to late October (Iapichino and Massa 1989). Huge concentrations of up to 1000 birds were recorded recently during late August to mid September over the Egadi Islands (Agostini et al. 2000).

The Colonization Process. Faunistic turnover is expected to occur on islands (MacArthur and Wilson 1967); but within birds, Passerines are most commonly involved (Diamond 1969, 1972, Blondel 1986). Because the past ornithological literature reported a striking difference in the Black Kite status from what occurs today, I analyzed the information related to colonization in detail.

The first confirmed breeding attempt in Sicily occurred in 1979 (Massa 1980), though earlier records of possible breeding were reported in the 1950s (Mebs 1957). Black Kites in Sicily breed on bare cliffs or, more often, on trees and big shrubs (mainly *Quercus ilex*) growing on the cliff face. Until now, only one nest is known on a tree in a woodlot, as commonly reported elsewhere in continental Europe (Sergio and Boto 1999).

During the road census completed during the winters 1977–80 (Massa 1980) the species was found to be ab-

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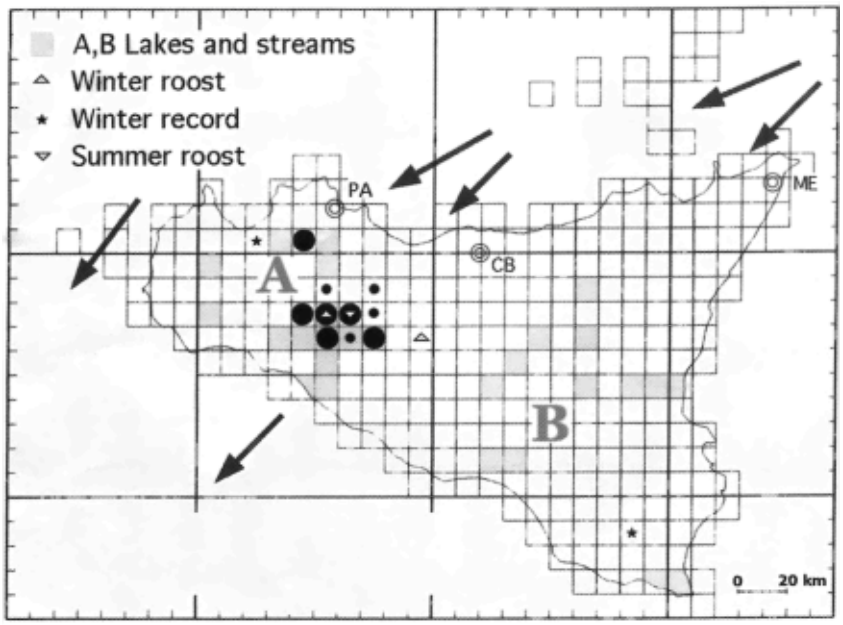

Figure 1. Map of Sicily with superimposed UTM grid of 100 km² cells, showing the main breeding and wintering area (A) of the Black Kite (*Milvus migrans*) and the other aquatic habitats potentially suitable for breeding (B). The main winter and summer roosts were in the core of the breeding range. The 2nd Regional Atlas in 1992 and 2000 recorded 10 breeding squares (large black dot = confirmed breeding; medium black dot = probable; small dot = possible). The census of 2000 showed differences in breeding status but not in the recorded number of squares. The large arrows show the main migratory routes of Black Kites over Sicily during late summer and autumn. Palermo (PA), Castelbuono (CB), and Messina (ME) are the cities where the 19th century ornithologists, who described the past species rarity, lived.

sent, but 10 yr later (1987–92), the censuses in the same area recorded a few birds overwintering regularly, with a mean of 0.3 individuals/100 km (Sarà et al. 1993). It is thus likely that, since the late 1980s, some birds formed a small group of year-long residents that, year after year, began to attract other individuals from migrating flocks in the spring.

The area of breeding and overwintering, in central Sicily, is today about 1000 km² with a core area of ca. 700 km². However, other records of this kite were reported from elsewhere on the island. The kite population is probably concentrated in the vicinity of the lacustrine and riverine system (Fig. 1; area A). The breeding area and the number of Black Kite pairs currently seem to be (1999–2001) rather stable, ca. 25–35 residents corresponding to 6–10 territorial pairs, plus a flock of 20–25 summer birds. The mean number of young fledged per successful pairs was 2.25 ± 0.96 (SE, $N = 4$), a relatively high productivity level (Sergio and Boto 1999). Systematic exploration of area B (Fig. 1) is needed to complete a survey for the species on the island.

During the winter 1990–91, one Black Kite was observed for the first time in a roost of Red Kites (*Milvus milvus*), which was located in the middle of the area A (Fig. 1). In the following years, a small group was regularly recorded in the Red Kite roost from early September to late March (Fig. 2). The observation of juveniles of the year and second-year individuals in the winter roost was very recent (1999).

Central Sicily is a suitable habitat for Black Kites, which usually select aquatic and open habitats for foraging and for breeding (Bijlsma 1997). This area has a large number of artificial dams and large streams (Sosio, Platani, and Belice), open croplands, grazing, and some large Mediterranean mixed-oak woods. This suitable habitat lies along the migration route of the passage Black Kite flocks moving inland, and which cross the island more or less through its center en route to the southern coasts and later to pass over the Sicilian channel. I propose that after kites established this new migratory route in the early 1900s, some pairs found and began to breed in suitable habitats (Mebs 1957, Massa 1980). Initially these kites were probably present only during spring and summer; later some individuals presumably became resident and were recorded also during winter.

The last step of the colonization process was the establishment of a summer roost in a patch of pines (*Pinus pinea*) near a garbage dump (Fig. 1). Since 1998, a group

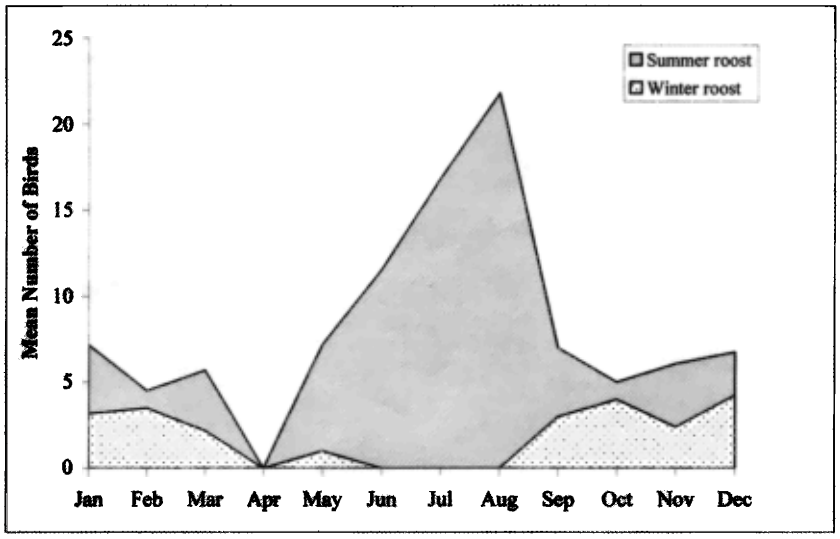

Figure 2. Mean number of Black Kites recorded in two roosts (garbage dump in summer and Red Kite roost in winter; area A, Fig. 1) in western Sicily (1992–2001).

of non-breeders arrived in late spring and settled in this roost near the dump. The number of Black Kites recorded in summer at the dump increased from a mean of 6.6 individuals to 19 non-breeding birds in 2001 (Fig. 3). In early spring, only adults were recorded. Numbers decreased to 50% in the other seasons when the second-year individuals formed half of the summer population. Young of the year hatched in the vicinity of the roosts were observed from late August to December (Table 1).

The maximum number of individuals was observed in late August, when also the residents and their young concentrated in the summer roost. From very late August to early September most of the resident population leaves the area and departures continue until early October. In

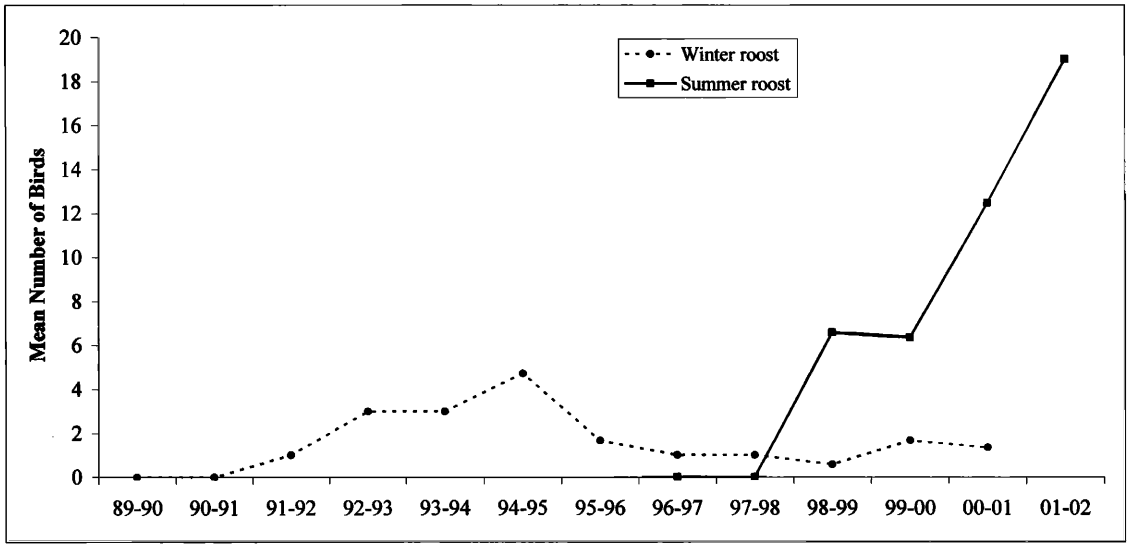

Figure 3. Mean number of Black Kites at the roosts in western Sicily (area A, Fig. 1) from November 1989–September 2001.

Table 1. Age class composition of Black Kites in western Sicily (area A, Fig. 1). Sample size is in parentheses including 74% of the total observed kites (N = 255) recorded during 24 visits between June 1998 and June 2001.

	NOV–FEB	MAR–MAY	JUN–JUL	AUG–OCT
Adults	0.50 (11)	1.00 (17)	0.50 (51)	0.51 (25)
Second-year birds	0.36 (8)	0.00 (0)	0.50 (50)	0.33 (16)
Young of the year	0.14 (3)	0.00 (0)	0.00 (0)	0.16 (8)

this regard, I made two direct observations (October 1994 and August 2000) of the arrival and mixing between one flock of migrating Black Kites and the group of residents in the area. In August 2000, a flock of some 120 migrating kites was recorded to arrive in late afternoon and to settle in at the roosting site that already hosted 40 residents. A visit to the roost a week later revealed the presence of only 15 birds, and that decreased to four wintering birds in November. I suggest that the dump area is a stop-over site in central Sicily for migrating kites and that its presence may have facilitated the colonization process.

It seems the first step of the colonization by Black Kites involved breeding, later followed by their presence in winter (breeders becoming residents) and finally presence in summer. This last step was probably favored by the return of birds originally bred in Sicily. Forero et al. (1999) have shown that Black Kites in Southern Spain are highly philopatric, with most of individuals coming back to breed near their natal site, but they suggested that this behaviour can vary depending on ecological conditions.

A first phase of colonization involving the presence of singles or a few birds before the onset of breeding probably occurred in the period when sporadic observations of this species were reported (Mebs 1957, Massa 1980). Thus the numerical increase recorded from summer 1999 would probably represent the second stage of the colonization process, involving the establishment of a surplus population.

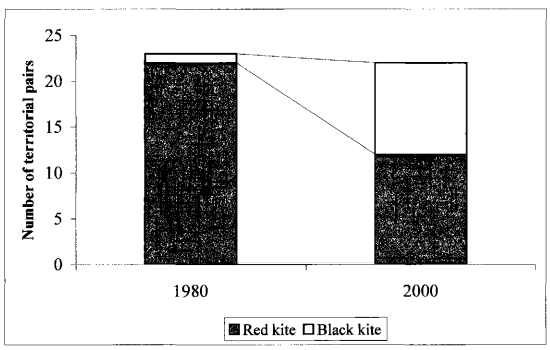

Figure 4. Number of territorial Black and Red Kite pairs recorded in 1980 and 2000 in central Sicily, Italy.

Apart from the process of recolonization following local extinction caused by human persecution or pesticides, relatively few status changes have been recorded in raptors (Newton 1979). For example, Newton described the sedentarization of Swainson's Hawks (*Buteo swainsoni*). Moreover, the regular year-long presence of the formerly summer breeding Red Kite populations in France (Valet 1975), Switzerland (Juillard 1977), and Germany (George 1996 and references therein) is well known. These authors suggest the Red Kite sedentarization was related to the increasing occurrence of mild winters without snow that allowed accessibility to the local food supplies (e.g., more active prey, development of garbage dumps).

The first overwintering of Black Kite in central Sicily occurred during four years (1987–90) of severe drought and warm winters. In the same period, the wintering of Lesser Kestrels (*Falco naumanni*) in the area was also recorded (Sarà 1996a). The sedentarization of Black Kite may have been initiated by such climate change, and one can speculate that global warming, increasing the mean local winter temperatures in recent decades, may have favored the extension of the species' wintering range northward.

The colonization process since 1980 may have also been facilitated by the recent decline of the local Red Kite population (Fig. 4). The ecological niche left empty by declining resident Red Kite pairs has likely been occupied by the Black Kite, a new colonizer expanding its range northward.

Human persecution and poor land management (e.g., summer fires, poisoning, and shooting) resulting in direct kite mortality and lower prey populations are probably the main factors currently limiting the density of Black Kites in Sicily (Sarà 1996b) and, thus, slowing the colonization process in the last 50 years.

RESUMEN.—Describo la colonización de los milanos negros (*Milvus migrans*) en Sicilia. Los antiguos ornitólogos del siglo IX consideraban esta especie como ocasional y rara en Sicilia. Comúnmente, el milano negro ha sido clasificado como la segunda especie más común observada en el estrecho de Messina en primavera y es inclusive más abundante durante la migración de otoño. Hábitats adecuados de ambientes acuáticos y de espacios abiertos están disponibles a lo largo de la ruta migratoria del milano, lo cual pudo haber favorecido la coloniza-

ción. Esta especie se encuentra reproduciéndose y permaneciendo durante el invierno en un área aproximada de 100 km^2 localizada en el centro de Sicilia. El primer registro reproductivo confirmado fue reportado en 1979, luego prosiguió una colonización más amplia. La estadía tardía fue registrada durante los censos vehiculares en 1987–92, estos milanos no fueron observados durante las investigaciones previas (1977–80). En la porción central del área del área de estudio, un individuo fue observado entrando a un dormidero del milano rojo (*Milvus milvus*) durante el invierno de 1990–91 y un pequeño grupo de cuatro a siete milanos negros es regularmente observado ahora. La última fase del proceso de colonización fue el establecimiento de un dormidero de verano sobre un vertedero de basura, el cual aumentó de una media de 6.6 a19 individuos no reproductivos en 1998–2001. La población total hacia finales de Agosto es de 50–60 aves.

[Traducción de César Márquez]

ACKNOWLEDGMENTS

I thank all the local ornithologists, mainly Bruno Massa, Massimiliano Di Vittorio, Salvatore Grenci, and Amedeo Falci, who gave me access to their data and Laura Zanca for accompanying me in the field and for drawing Fig. 1. Two referees, Fabrizio Sergio and Manuela Forero, improved the paper with useful comments and critiques.

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Received 29 November 2001; accepted 22 February 2003