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SPRING MIGRATION OF HONEY BUZZARDS (*PERNIS APIVORUS*) AT THE STRAITS OF MESSINA IN RELATION TO ATMOSPHERIC CONDITIONS

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The Honey Buzzard (*Pernis apivorus*) is a summer resident in Europe. It winters in west-central equatorial Africa, although some individuals have been observed in southern and eastern Africa (Vaurie 1965, Glutz et al. 1971, Moreau 1972, Cramp and Simmons 1980). The Honey Buzzard follows three migration routes across the Mediterranean Sea: the Straits of Gibraltar, the Channel of Sicily and the Bosphorus (Cramp and Simmons 1980, Porter and Beaman 1985). At the Straits of Gibraltar, most buzzards migrate north in spring, from the end of April to the end of May. On the Bosphorus, however, observations in spring are scarce (Cramp and Simmons 1980). Between these two important migration routes, a third is across the Channel of Sicily. At various places along this route a great number of buzzards were counted. At Cap Bon, Tunisia, 8100 individuals moved between 2-18 May 1975 (Thiollay 1975, 1977). Other concentrations were observed in Malta (Beaman and Galea 1974) and on the Straits of Messina, in observations carried out between 1984 and 1990 (Dimarca and Japichino 1984, Agostini et al. 1990, 1991).

In the present study we examined the spring migration over the Straits of Messina. We document the migration route and examine the relationship between migration and atmospheric conditions. The Strait of Messina is 3 km wide at its narrowest point, southward it becomes wider. Migrating raptors have been observed from Capo dell'Armi to Palmi, but the most concentrated migration is between Reggio Calabria and Scilla (Agostini et al. 1990). A secondary migratory route occurs through the Aeolian (Lipari) Islands (Galea and Massa 1985, pers. observation).

STUDY AREA AND METHODS

Observations were made from 24 April to 28 May 1989 in the foothills of the Aspromonte Mountains on the Calabrian side of the Straits of Messina. The 40 km of coast where observations were made was divided in two sections, A and B (Fig. 1). In each section, three observation posts were chosen based on four years of observations to discover the route used by the buzzards. These observation points were on the slopes of the Aspromonte Mountains up to 5 km inland, and along the coast. The six observation posts were not used at the same time.

Each observation group was provided with 10×40 binoculars, telescopes, compasses, anemometers and maps of

the Military Geographical Institute (1:25 000). Two-way radios were used to avoid counting the same buzzards twice.

Each observation day was divided in three periods: morning 0740-1139 H, mid-day 1140-1539 H and afternoon 1540-1940 H. A total of 406.2 observation hours were tallied: 83.6 hr in section A and 322.6 hr in section B.

Hourly meteorological data for Reggio Calabria were provided by the Italian Air Force.

RESULTS AND DISCUSSION

The number of Honey Buzzards observed was 6057, 176 in section A and 5881 in section B. The average number of individuals counted per hour of observations in the two sections was 2.1(±0.6) and 18.2(±2.5), respectively. During the 35 d of observation the migratory flow showed three bouts of movement lasting 3 d each (Fig. 2). The bout of movement from 5-7 May included 59.9% of all Honey Buzzards counted.

The direction of the wind had a significant effect on the migratory flow ($F = 5.5$, $P < 0.01$). The prevailing winds in the period of the observation were from N, NE and SW. Ideal conditions for crossing the Strait existed apparently with N and NE winds. The average number of birds counted per hour of observation was 16.9(±3.6) with N wind, 30.2(±6.8) with NE wind and 2.4(±0.9) with SW wind.

When SW winds exceeded 35 km/hr, I observed the buzzards to fly low to the ground and to make an abrupt rise followed by a dive toward the ground. This seems to confirm that wind from SW, during spring migration, impedes the birds' flight. Decreased aerodynamic lift may slow the movement of air along the outline of the wings (Agostini et al. 1990).

Wind also influenced raptors during the long flights from Tunisia to Sicily. Crossing this part of the Mediterranean may present considerable hindrance to migration (Agostini et al. 1991). Unfavorable weather over the Channel of Sicily or at Cap Bon could be the reason for such variation in number of hawks counted. Raptors were uncommon over the Straits of Messina during unfavorable weather.

The analysis of weather reports from the Kelibia weather station indicates that in this area the relationship between the migratory flow and wind direction is complex. As compared with the Straits of Messina, the prevailing winds on the southern side of the Channel of Sicily during the observation period were from W, NW and E. This

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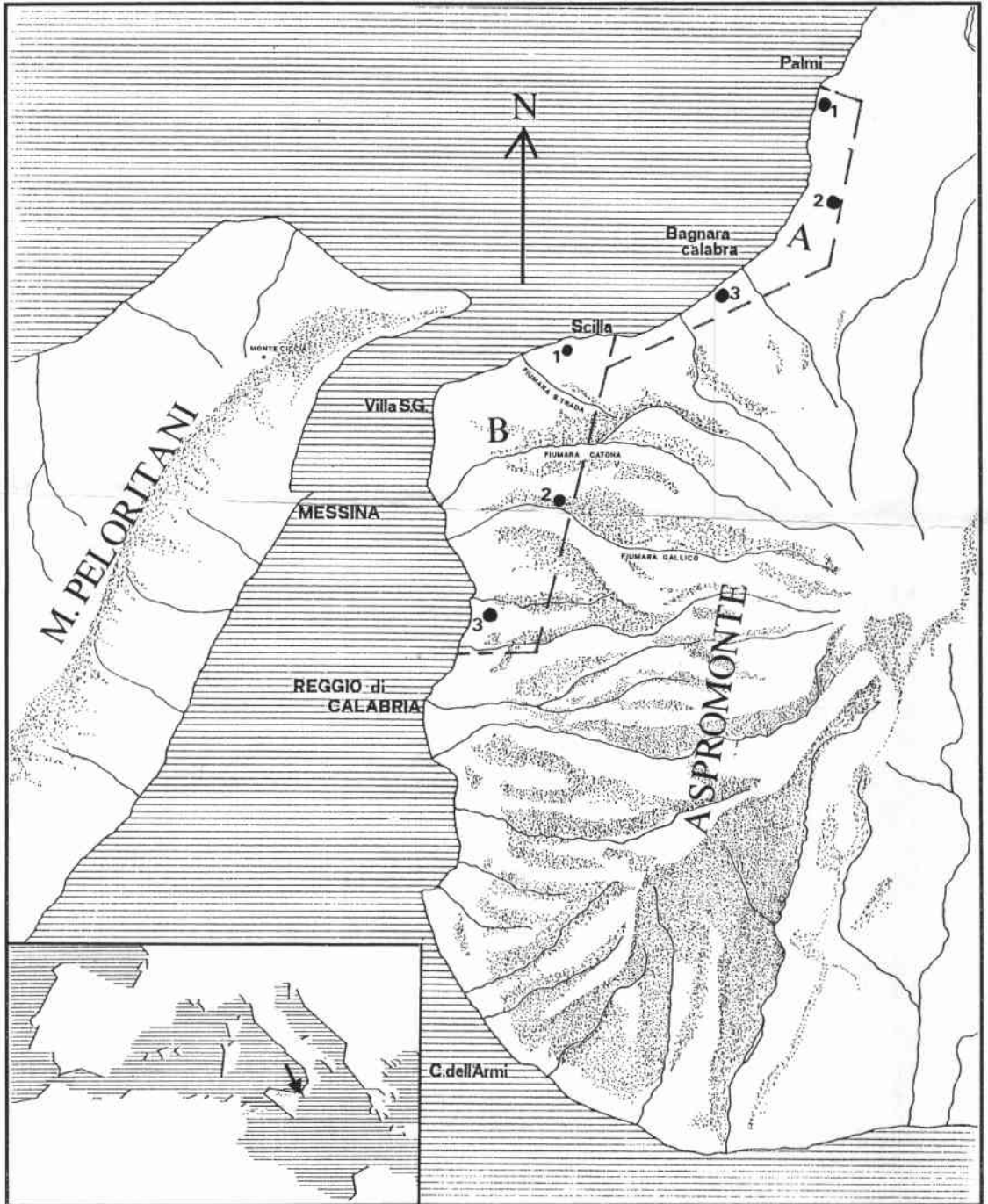


Figure 1. The location of the six observation sites in sections A and B on the Straits of Messina where migrating Honey Buzzards were observed.

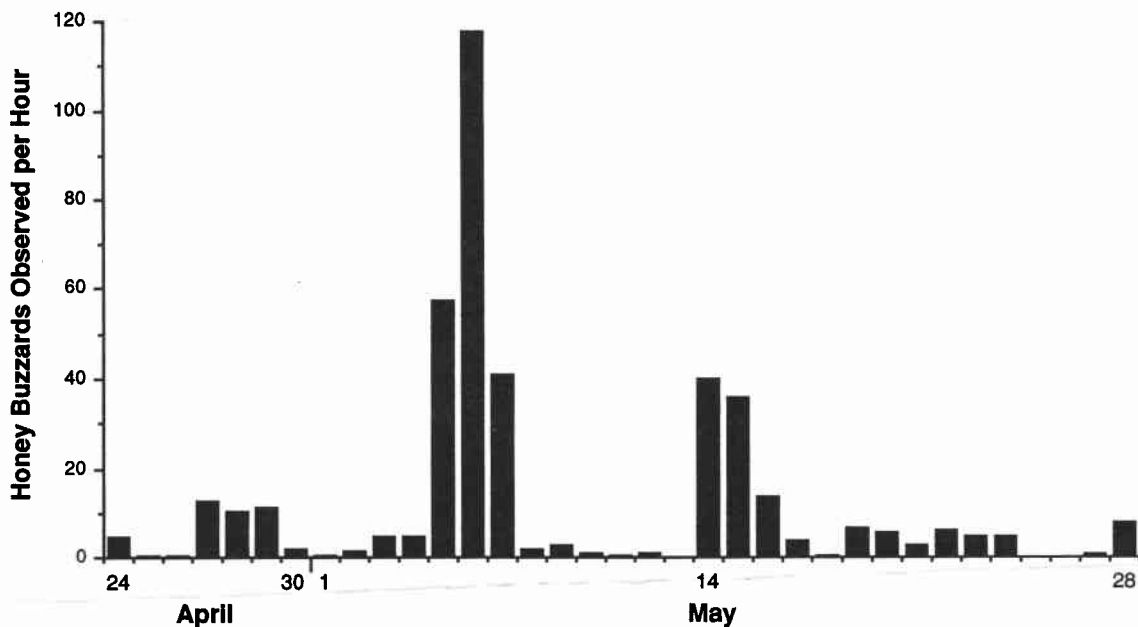


Figure 2. Seasonal occurrence of migrating Honey Buzzards at the Straits of Messina in spring 1989.

suggests that during crossings, the "drifting" by winds lateral to the migration direction could have a strong influence on migrants. Visual observations carried out at Cap Bon showed that buzzards crossed more often when lateral winds were weak (Agostini et al. 1991). This behavior was also noticed observing the migration of *Accipiter striatus* on Lake Superior. The author suggested that these birds preferred to cross when the possibility of being blown off course was low (Kerlinger 1984, 1985).

Therefore, during flight over the Channel of Sicily, it would not only be necessary to maintain a steady forward movement, but also to compensate for the deviation caused by such winds.

The migratory flow did not vary significantly throughout the day ($F = 1.9$, $P > 0.05$). The number of birds counted per hour of observation was $10.6(\pm 2.5)$ in the morning, $14.4(\pm 2.6)$ in midday and $16.0(\pm 5.9)$ in the afternoon. My observations confirm those of Dimarica and Japichino (1984) suggesting that raptors often precede a rain front. On 29 April, 63 buzzards flew south from observation site B1 after finding themselves between two storms, one west over Sicily the other northeast over Calabria.

Honey Buzzards migrated in flocks, sometimes as large as 200–250 individuals. On 463 occasions individuals merged into groups, accounting for a total of 5810 birds. On average groups were comprised of 12.6 individuals and 75% of groups contained fewer than 15 birds. On 235 occasions migrants flew alone. Forty-six interspecific associations were observed, mainly with Marsh Harriers (*Circus aeruginosus*) and Black Kites (*Milvus migrans*).

These were the two most commonly observed species except for the Honey Buzzard.

Once buzzards arrived on section B during their spring migration from SW or even from W or NW, they reached the mountains. The buzzards used powered flight, alternating with gliding, but on reaching the slopes they began soaring using thermals to glide inland toward NE. To approach the mountains, buzzards sometimes changed their direction. Moreover, both lone individuals and flocks were seen joining other birds of the same species in thermals. This was done from remarkable distances, even when the directions were sometimes opposed to the direction of migration (SW-NE). This seems to confirm that flock location can provide a clue for the location of the thermal currents (Kerlinger 1989).

On some occasions, groups split and used different thermals. It was not possible to quantify this because of poaching. Nearly 5000 rifle shots were counted. Raptors that were dispersed after the shots interrupted their approach toward the mountains and lost altitude. This exposed them more to the poachers' shooting. In response to shooting, we never observed, as noted by Cortone and Mirabelli (1984), that "... once one individual has been shot, the rest of the flock goes on wheeling in the same spot, not caring of shooting noise, without even trying to reach higher altitude ..."

RESUMEN.—Se observaron 6057 *Pernis apivorus* a lo largo del lado de Calabria que da frente al Estrecho de Messina, al sur de Italia, entre el 24 abril y el 28 de mayo de 1989. Más del 85% de las migraciones se realizaron en 9 días,

con remarcable concentración de individuos (más del 50%) migrando entre el 5 y 7 de mayo. La mayor razón para la variación en el flujo migratorio parece que es la dirección del viento. Los vientos del norte y noreste facilitaron la migración, mientras que los vientos del sudoeste la inhibieron.

Estos *Pernis apivorus* se movilizaron en bandadas de 200–250 individuos, probablemente debido a la ubicación de las corrientes térmicas. Ocasionalmente, individuos aislados o en grupos se unían a otras aves, en alto vuelo, desviándose considerablemente de su dirección migratoria.

[Traducción de Eudoxio Paredes-Ruiz]

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