

Analysis of the spring migration of Honey Buzzards (*Pernis apivorus*) and Marsh Harriers (*Circus aeruginosus*) at two sites of central Italy

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Honey Buzzard (*Pernis apivorus*)

During spring migration thousands of Honey Buzzards cross the central Mediterranean at its narrowest point, between the Cap Bon peninsula (Tunisia) and western Sicily, part of them concentrating at the island of Marettimo (Fig. 1; Agostini *et al.* 1994a, b, Agostini and Logozzo 1998). While hundreds of birds reach the Italian peninsula flying over the Tyrrhenian Sea via the island of Ustica (Agostini 2002), most of Honey Buzzards follow northern Sicily concentrating at the Strait of Messina (Fig. 1), where during observations made between 1996 and 2000 on average 20.473 individuals were counted each year (Corso 2001). After the crossing of the Strait, they tend to follow the Italian peninsula. Few birds cross the Jonian and, probably, the Adriatic Sea heading towards NE and concentrating at Cap Otranto (Apulia, southern Italy; Gustin 1989; Fig. 1). In central Italy concentrations of Honey Buzzards have been recorded at two sites located along the Adriatic coast: the Conero promontory and Mount S. Bartolo (Fig. 1; Pandolfi and Sonet 2001, Gustin *et al.* 2002). At these two sites they show different behaviour. At the Conero promontory a total of 1699 Honey Buzzards was counted in 300 hours between 21 April and 20 May 1999. Many birds passed singly (52% of the observations) while "flocks larger than 6 individuals accounted for about 9% of the observations". Honey Buzzards left the study area towards ESE and ENE, apparently undertaking a water-crossing of about 130 km to reach the coasts of ex-Yugoslavia (Fig. 1; Gustin *et al.* 2002). At Mount S. Bartolo, located only 60 km north of Conero, observations were made from 1 March to 15 June 1999. Apparently, at this site, the migratory flow was less intense

(Pandolfi and Sonet 2001). In particular, a total of 783 Honey Buzzards was recorded in 577 hours mostly moving along the Adriatic coast. Only 17.5% of raptors migrated alone. Thus the proportion of birds migrating singly was significantly higher at the Conero promontory than at Mount S. Bartolo ($\chi^2 = 264.74$, d.f. = 1, $P < 0.0001$). The strong tendency of Honey Buzzards to migrate in flocks recorded at Mount S. Bartolo, agrees with all previous studies made on this species (Cramp and Simmons 1980, Kerlinger 1989, Agostini 1992, Finlayson 1992, Kjellén 1992, Bruderer *et al.* 1994, Agostini *et al.* 1994b, Agostini and Logozzo 1995, 1997, Agostini *et al.* 1999, 2002). During migration over land raptors use flocking for the location of thermals currents (Kerlinger 1989). Moreover, because apparently among Honey Buzzards male and female reach together their breeding area (in this species pairing is life-long; Gensbøl 1992) while immatures tend to spend the summer in Africa (Forsman 1999), few solitary birds are expected during spring migration. Previous researches made on the flight behaviour of raptors in many coastal areas both in Europe and North America, showed that it is very difficult to avoid a recounting of migrating birds when they tend to undertake a water-crossing. Since thermals are almost absent over water, the sea-crossings imply a long, powered flight with considerable expenditure of energy (Kerlinger 1989); for this reason, often raptors do not continue migrating, passing again in the study area (Kerlinger 1984, 1985, Agostini *et al.* 1994a, b). In the case of the Honey Buzzard, birds reaching the Cap Bon promontory during spring migration, rarely leave soon after the African mainland being affected both by atmospheric conditions and flock size. In particular

these birds tend to undertake the crossing of the Channel of Sicily (approx. 150 km) mostly during weak lateral winds and, likewise Black Kites (Agostini and Duchi 1994), when migrating in large flocks (Agostini *et al.* 1994a,b). Moreover, recent observations made over Ustica from 29 April to 16 May 2001, showed that the proportion of solitary birds is significantly higher among not crossing individuals (Agostini *et al.*, unpublished data). In their paper Gustin *et al.* reported that, from the observation post used at Conero (Pian Grande), it was possible to detect raptors flying over both the sea and the promontory. However, differently from other sites such as the Cap Bon promontory and the islands of Marettimo and Ustica (Agostini *et al.* 1994a, b, 2000, Agostini and Logozzo 1998, Panuccio *et al.* 2002), the view over water was not complete from their post. In particular birds leaving the coast towards ESE soon disappeared from observers' sight being covered by the promontory's tip (Panuccio pers. obs.). At the Cap Bon promontory flocks were observed leaving the coast ESE apparently heading towards the island of Pantelleria (Fig. 1). Often birds flew back to the coast south of the promontory when they were so far over the sea that it was not possible to see them without binoculars; they passed again over the promontory arriving from inland sometimes after an hour (Agostini *et al.* 1994b, Agostini pers. obs.). Also birds disappearing over the sea towards NE sometimes flew back to the promontory (Agostini *et al.* 1994b). Because of these behaviours, the Cap Bon promontory was not considered suited to carry out counts of migrating raptors (Agostini *et al.* 1994a, b, Agostini 2002). Probably, data collected at Conero in 1999 were affected by replication perhaps mostly in the sample of birds leaving the mainland towards ESE. This could explain the unusual proportion of solitary Honey Buzzards recorded there.

Marsh Harrier (*Circus aeruginosus*)

The analysis of the spring migration of Marsh Harriers at the two sites of the Adriatic coast seems to confirm replication at Conero. As mentioned above, at Mount S. Bartolo observations were made between 1 March and 15 June 1999. In this period a total of 609 Marsh Harriers were counted with the peak between the end of March and the first half of April. Likewise Honey Buzzards, Marsh Harriers flew mostly along the Adriatic coast. At the Conero promontory observations were made only between 21 April and 20 May 1999, a late period for the spring migration of this species when Marsh Harriers observed are mostly juveniles (Agostini and Logozzo 1998, 2000, Pandolfi and Sonet 2001). Gustin *et al.* recorded 503 individuals (nearly all during the first half of May), 49 adults

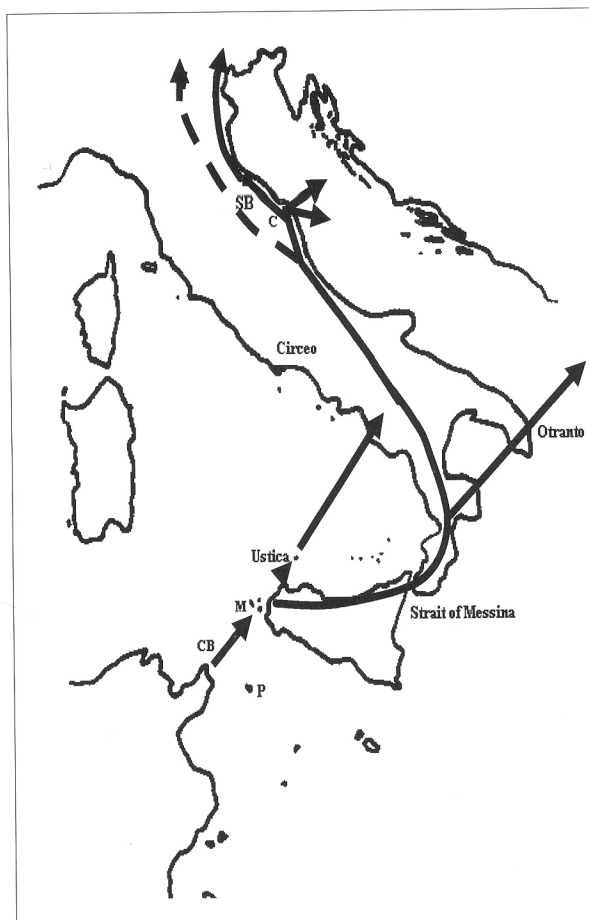


Fig. 1. Routes used by Honey Buzzards during spring migration across the Central Mediterranean (sketched arrow: supposed route; P = Pantelleria; CB = Cap Bon; M = Marettimo; C = Conero; SB = S. Bartolo).

and 454 juveniles, mostly leaving the peninsula towards ESE and ENE; "Marsh Harriers passed mainly singly (78%)... and late in the day: 46.5% of the observation occurring between 15-18.00 ...". During observations made at the Cap Bon promontory between 3 and 16 May 1990, a total of 219 Marsh Harriers, mostly juveniles, were counted, but only 15 (6.9%) birds really undertook the crossing of the Channel of Sicily probably causing a strong replication of the data (Agostini *et al.* 1994b). This result could reflect the fact that juveniles are not motivated by reproduction to continue migrating in front of the water barrier. During the same period 87 individuals were observed at the Straits of Messina (Agostini *et al.* 1994b). Finally, between 26 August and 30 September 2002, we made observations on the autumn migration of this species at the Circeo promontory (Fig. 1), an area similar to Conero. At this site we used an obser-

