

Comparative study of the autumn migration of Marsh Harriers (*Circus aeruginosus*) at three sites of the central Mediterranean

Both during spring and autumn migration substantial numbers of Marsh Harriers (*Circus aeruginosus*) cross the central Mediterranean (GIORDANO 1991, AGOSTINI & LOGOZZO 2000, AGOSTINI 2001a, 2001b, CORSO et al. 2001). In this area the greatest concentration occurs at the Straits of Messina (between Sicily and continental Italy) during spring (max. 3074 individuals counted in 2000; CORSO et al. 2001). In this study, observations were made on the autumn migration of this species at three sites of the Central Mediterranean where notable concentrations of Accipitriformes are recorded each season: the Circeo promontory (CORBI et al. 1999) and the islands of Malta (BEAMAN & GALEA 1974) and **Marettimo** (western Sicily, AGOSTINI et al. 2000). The aim was to investigate the routes used by the Marsh Harrier in this area, by comparing the variations of the migratory flow and the proportion of birds belonging to different age and sex classes recorded at each site, to verify the tendency of this species to migrate on a broad front undertaking long crossings of water using powered flight (KERLINGER 1989).

Study areas and methods

Observations were made from 15 to 29 September 2000, each day from 9.00 h CET until the dusk, aided with telescope and binocular. The Circeo promontory is located in the southernmost point of the Pianura Pontina reaching 541 m. a.s.l. (Fig.1). The observation post was located along its southern slope and was chosen to detect the direction of birds leaving the promontory. Here no monitoring was made on 20 September because of

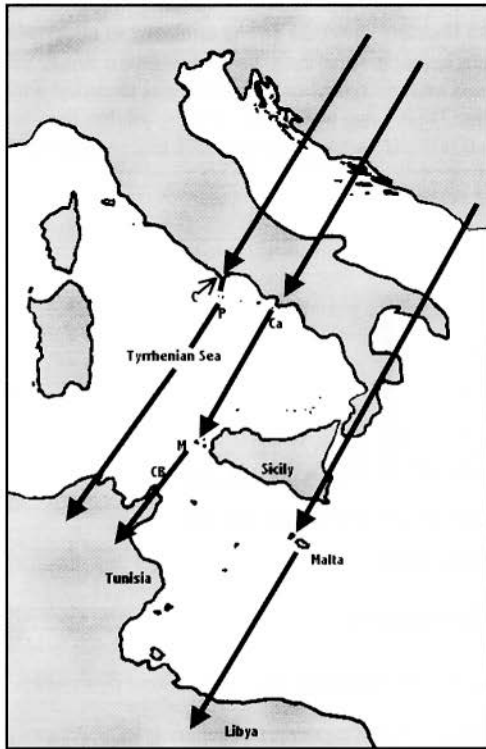


Fig. 1: Supposed routes used by Marsh Harriers during the autumn migration over the central Mediterranean (C = Circeo, P = Ponziac islands, Ca = Capri, M = Marettimo, CB = Cap Bon).

Abb. 1: Vermutete Herbst-Zugrouten von Rohrweihen über den zentralen Mittelmeerraum nach Beobachtungen im Circeo-Vorgebirge (= C), auf Malta und auf der Insel Marettimo (= M). P = Ponziac-Inseln, Ca = Capri, CB = Cap Bon.

heavy rainfalls. Marettimo is a mountainous island (12 km²), about 30 km off western Sicily and 20 km west of the islands of Levanzo and Favignana (Fig. 1). This island is located at the narrowest point of the central Mediterranean, about 130 km NE of the Cap Bon peninsula (Tunisia). Monte Falcone is its highest relief, reaching 686 m. The observation post was located at the altitude of c. 500 m. To date, on this site, observations were made between the end of August and the beginning of September 1997 and 1998 when the greatest concentration of Black Kites (*Milvus migrans*) and Egyptian Vultures (*Neophron percnopterus*) through Italy was recorded during post-reproductive movements (AGOSTINI et al. 2000) while only some tens of Marsh Harriers were counted. During spring migration hundreds of Marsh Harriers concentrate on this island (AGOSTINI & LOGOZZO 1998, AGOSTINI 2001 a, b). The Maltese Islands are situated about 90 km south of Sicily and 335 km north of Libya (Fig. 1). Raptors concentrate along the cliffs on the western side of the Island of Malta (BEAMAN & GALEA 1974). The observation post was situated in this area, on one of the highest points of the island (250 m a.s.l.).

It was possible to determine the age and sex of 552 birds by observation of their plumage (FORSMAN 1999). The total of males, females and juveniles was derived at each site by multiplying their proportions in the sample of identified individuals, following the method used by KJELLÉN (1992) in his study on the autumn migration of raptors at the Falsterbo peninsula (Sweden). In particular, to exclude a bias due to the better identification of adult males, the proportion of females and juveniles was estimated dividing unidentified individuals of the group female/juvenile between the two age groups according to their proportion among the identified birds (see also AGOSTINI & LOGOZZO 2000).

Results and Discussion

At the Circeo promontory a total of 337 Marsh Harriers was counted and more than 80% of them were seen in 5 days (Fig. 2). According to their proportions among aged individuals it has been pos-

sible to estimate the passage of 140 (41.5%) juveniles while, among adults, females outnumbered males (Table; $\chi^2 = 22.1$, d.f. = 1, $p < 0.001$). Marsh Harriers showed a strong tendency to undertake the water-crossing: they left the coast flying south, heading apparently towards western Sicily via the Ponziane Islands. Over the island of Marettimo a total of 220 Marsh Harriers was recorded with about 50% in two days (19 and 24 September, Fig. 2) and also at this site, among adults, females outnumbered males (Table; $\chi^2 = 21.7$, d.f. = 1, $p < 0.001$). However, by comparing daily variation in

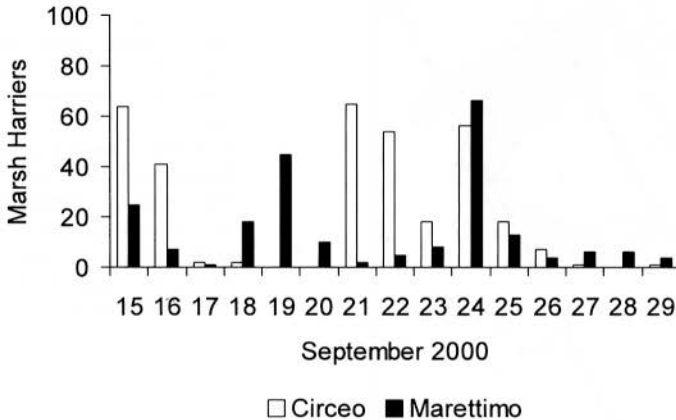


Fig. 2: Variations in migration of Marsh Harriers from 15. – 29. September 2000 on the Circeo promontory and Marettimo.

Abb. 2: Rohrweihen-Zug vom 15. – 29. September 2000 im Circeo-Vorgebirge und auf der Insel Marettimo.

the migratory flows it is possible to note a lack of correspondence between Circeo and Marettimo (Fig. 2). Over the island of Malta 416 Marsh Harriers were seen with an evident peak comprising 191 birds on 23 September. At this site, mostly juveniles were recorded and, among adults, the difference between males and females was not significant (Table). These results confirm the strong tendency of this species to migrate on a broad front carrying out long powered flight over water (KERLINGER 1989). For this reason, differently from other raptors using mostly soaring flight over land during migration, concentrations of thousands of Marsh Harriers rarely occur (KERLINGER 1989, ZALLES & BILDSTEIN 2000) although 51.000–74.000 pairs breed in Europe (mostly in Russia, Poland and Ukraine; FERGUSON-LEES et al. 2001). Probably the hundreds of birds recorded in our study belong to populations breeding in eastern Europe moving along parallel NE-SW directions

Table: Juveniles, adult males and adult females estimated at the three sites according to their proportions among identified individuals.

Tab.: Aufgliederung der an den drei Beobachtungsplätzen erfassten Rohrweihen nach juvenilen Vögeln, adulten ♂ und adulten ♀ (hochgerechnet nach Befunden an Individuen, die entsprechend identifiziert werden konnten).

Site	Juveniles	Adult males	Adult females
Circeo	140	65	132
Marettimo	65	48	107
Malta	312	49	55

(Fig. 1). This flight direction agrees with that recorded by radar among harriers leaving the coast of southern Spain (MEYER et al. 2000). Perhaps the migratory flow observed over Marettimo is correlated with that observed over Capri (JONZÉN & PETERSSON 1999) where a total of 134 and 186 birds were seen in 1994 and 1995, respectively, leaving the coast towards SW. Moreover, birds concentrating over Malta could be those observed along the Calabrian Apennines (southern continental Italy; AGOSTINI & LOGOZZO 1997, 2000), located NE of the island. Finally, Marsh Harriers undertaking the crossing of the Tyrrhenian Sea from the Circeo promontory apparently towards western Sicily, probably deviate SW flying directly towards Tunisia via the Ponziane Islands. On the contrary Marettimo, as in spring (AGOSTINI 2001 a, b), should attract birds crossing the Channel of Sicily stressing a correspondence with the variation of the migratory flow recorded at Circeo.

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Zusammenfassung

Vergleichende Studie zum Herbstzug von Rohrweihen (*Circus aeruginosus*) an drei Beobachtungspunkten im zentralen Mittelmeerraum.

Während der zweiten September-Hälfte des Jahres 2000 wurden im zentralen Mittelmeerraum an drei Plätzen Beobachtungen zum Herbstzug von Rohrweihen vorgenommen: im Circeo-Vorgebirge (Zentral-Italien), auf Malta und auf der Insel Marettimo (West-Sizilien). Es konnten insgesamt 973 Rohrweihen erfasst werden (416 davon über Malta). Im Circeo-Vorgebirge folgten die Rohrweihen nicht der Küste, sondern zogen südlich in Richtung der Ponziane-Inseln über das Tyrrhenische Meer. Vergleicht man an den drei Beobachtungspunkten jeweils die Zahl beobachteter Rohrweihen/Tag und die jeweilige Aufgliederung nach Alter und Geschlecht, ist kein Zusammenhang zwischen den Beobachtungen im Circeo-Vorgebirge und den Inseln Marettimo und Malta festzustellen. Die Befunde lassen vermuten, dass die Rohrweihen den zentralen Mittelmeerraum in breiter Front in NE-SW-Richtung überfliegen.

References

- Agostini, N. (2001 a): Spring migration in relation to sex and age of Marsh Harriers *Circus aeruginosus* in a central Mediterranean island. *Ardeola* 48: 71-73. * *Idem* (2001 b): The island of Marettimo, a strategic point for surveying the migratory flow of Accipitriformes crossing the Channel of Sicily. *Buteo* 12: 99-102. * Agostini, N., & D. Logozzo (1997): Autumn migration of Accipitriformes through Italy en route to Africa. *Avocetta* 21: 174-179. * *Idem* (1998): Primi dati sulla migrazione primaverile degli Accipitriformi sull'isola di Marettimo (Egadi). *Riv. Ital. Orn.* 68: 153-157. * *Idem* (2000): Migration and wintering distribution of the Marsh Harrier (*Circus aeruginosus*) in southern Italy. *Buteo* 11: 19-24. * Agostini, N., D. Logozzo & M. Pannuccio (2000): The island of Marettimo (Italy), important bird area for the autumn migration of raptors. *Avocetta* 24: 95-99. * Beaman, M., & C. Galea (1974): Visible migration of raptors over the Maltese Islands. *Ibis* 116: 419-431. * Corbi, F., F. Pinos, M. Trotta, G. Di Lieto & D. Cascianelli (1999): La migrazione post-riproduttiva dei rapaci diurni nel promontorio del Circeo (Lazio). *Avocetta* 23: 13. * Corso, A., A. Giordano, D. Ricciardi, C. Cardelli & G. Chiofalo (2001): La migrazione degli Accipitriformes del genere *Circus* sullo Stretto di Messina. *Avocetta* 25: 198. * Cramp, S., & K.E.L. Simmons (1980): The birds of the western palearctic. Vol. II. Oxford Univ. Press. * Ferguson-Lees, J., D.A. Christie, K. Franklin, D. Mead & P. Burton (2001): Raptors of the world. Helm Identification Guides. Helm Edition, London, UK. * Forsman, D. (1999): The raptors of Europe and the Middle East: a Handbook of Field Identification. T & AD Poyser. * Jonzén, N., & J. Pettersson (1999): Autumn migration of raptors on Capri. *Avocetta* 23: 65-72. * Kerlinger, P. (1989): Flight strategies of migrating hawks. Univ. Chicago Press. * Kjellén, N. (1992): Differential timing of autumn migration between sex and age groups in raptors at Falsterbo, Sweden. *Ornis Scand.* 23: 420-434. * Meyer, K.S., R. Spaar & B.

Bruderer (2000): To cross the sea or to follow the coast? Flight directions and behaviour of migrating raptors approaching the Mediterranean sea in autumn. *Behaviour* 137: 379-399. * Zalles, J., & K. Bildstein (eds, 2000): *Raptor watch: a global directory of raptor migration sites*. BirdLife International, Cambridge, U.K.; and Hawk Mountain Sanctuary, Kempton, PA U.S.A.

Nicolantonio Agostini, Charles Coleiro, Ferdinando Corbi,
Giuseppe Di Lieto, Fabio Pinos and Michele Panuccio

Addresses of the authors:

Via Carlo Alberto n. 4, 89046 Marina di Gioiosa Jonica (RC), Italy (N. A.); St. Michael Flat 2, Paris Street, Zebbug, Malta (Ch. C.); Gruppo Pontino Ricerche Ornitologiche, Via Ticino n. 12, 04100 Latina, Italy (F. C., G. Di L., F. P.); Via Mario Fioretti n. 18, 00152 Roma, Italy (M. P.). Corresponding author: N. Agostini, e-mail: nicolantonioa@tiscalinet.it