

Spring migration of Pallid (*Circus macrourus*) and Montagu's Harriers (*Circus pygargus*) in relation to sex and age classes at two watchsites of the Central Mediterranean

Průběh jarního tahu motáka stepního (*Circus macrourus*) a motáka lužního (*Circus pygargus*) přes centrální Středomoří s ohledem na pohlaví a stáří ptáků

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ABSTRACT. This study provides information on the spring migration of Pallid (*Circus macrourus*) and Montagu's Harriers (*Circus pygargus*) in relation to sex and age classes at two sites of the Central Mediterranean. Observations were made over the island of Ustica and at the Strait of Messina between 1 April and 20 May 2002 and 2004, respectively. We identified a total of 40 Pallid Harriers over Ustica and 25 at the Strait of Messina, and estimated the passage of 66 and 35 birds, respectively. Among adults, females outnumbered males, while adults outnumbered juveniles. A large overlap in the migration periods of birds belonging to the two age classes occurred. In the case of the Montagu's Harrier a total of 126 individuals was identified over Ustica, 143 at the Strait of Messina, and estimated the passage of 184 and 195 birds, respectively. Adults outnumbered juveniles also among Montagu's Harriers but the proportion of juveniles was higher among Pallid Harriers. In the Montagu's Harrier the difference between total numbers of adult females and adult males estimated at the two sites was not significant. Adult males peaked earlier than adult females while juveniles did not show a peak passage. In both species, when comparing the proportions of estimated birds in the two sites, no significant differences were reported between birds belonging to different sex and age classes. These results suggest that harriers tend to move along approximate parallel pathways across the Central Mediterranean. Among adults, the proportions of birds belonging to different sex classes could reflect their proportions in the wintering areas of West Africa. Finally, conclusions concerning a partial circular migration of the Pallid Harrier in the central-eastern Mediterranean are discussed.

INTRODUCTION

The Montagu's Harrier (*Circus pygargus*) is a summer visitor in Europe and western and central Asia, with some pairs breeding in North Africa. This species winters in sub-Saharan Africa and southern Asia (Indian subcontinent and adjacent areas). The breeding range of the Pallid Harrier (*Circus macrourus*) is concentrated in eastern Europe and western and central Asia and, such as Montagu's Harriers, most of them winter in sub-Saharan Africa and southern Asia, although some winter in the Middle East and North Africa (FERGUSON-LEES & CHRISTIE 2001). Unlike other species of Accipitriformes using mostly soaring flight over land during migration, harriers regularly

undertake long water crossings using powered flight (KERLINGER 1989). For this reason rarely concentrations of harriers occur at watchsites where large numbers of soaring raptors are reported. Each spring a significant passage of Pallid and Montagu's Harriers is recorded in some watchsites in the Central Mediterranean (GENSBØL 1992, GUSTIN & PIZZARI 1998, CORSO 2001, CORSO & CARDELLI 2004, PANUCCIO et al. 2004).

The aim of this study was to analyse the spring passage of these two species in relation to sex and age classes at two sites of this region: the Strait of Messina and the island of Ustica.

STUDY AREA AND METHODS

Observations (9 h per day), aided with 10 x 40 binoculars and telescope, were made over Ustica and at the Strait of Messina between 1 April and 20 May 2002 and 2004, respectively. Ustica is a small island (8.5 km²) about 60 km N of western Sicily, 270 km NE of the Cap Bon promontory (Tunisia) and 230 km W of the Italian peninsula (Fig.1). The observation post was at the highest point (approx. 150 m) of the promontory dominating the NE coast of the island (its highest point, inland, reaching about 250 m). From this post it was possible to detect birds really undertaking the crossing



Fig. 1 – The study area.

Obr. 1 – Studované území.

of the Tyrrhenian Sea and those stopping migration. To avoid replication of data we did not count birds stopping migration but only those crossing the sea and those roosting at the site only when they were not recorded the following morning. At the Strait of Messina observations were made using a post located along the continental coast. At both sites, we reported the passage of birds belonging to different age and sex classes. We divided the 50 days of observation into five 10-day periods. At each site the total of adult males, adult females and juveniles was derived during each 10-day period by multiplying their proportions in the sample of identified individuals (KJELLÉN 1992). In particular, during each 10-day period, to exclude a bias due to the better identification of adult males of both species, the proportion of females and juveniles was estimated dividing unidentified individuals of the group female *pygargus* / *macrourus* and juvenile *pygargus* / *macrourus* between the four groups (female *pygargus*, female *macrourus* and juvenile *pygargus*, juvenile *macrourus*) according to their proportion among the identified birds.

RESULTS

Pallid Harrier

We identified a total of 40 individuals over Ustica and 25 at the Strait of Messina, and estimated the passage of 66 and 35 birds, respectively. Considering the total number of Pallid Harriers estimated at the two sites ($N = 101$) females outnumbered males among adults (Table 1; $\chi^2 = 8.45$, d.f. = 1, $P < 0.01$) while adults outnumbered juveniles (Table 1; $\chi^2 = 20.95$, d.f. = 1, $P < 0.01$). Although adults peaked earlier than juveniles, a large overlap in the migration periods of birds belonging to the two age classes occurred (Fig. 2). Among adults, both males and females peaked between 11-20 April (Fig. 2). No significant differences were reported in the proportions of estimated birds between the two sites considering both birds belonging to different sex and age classes (Table 1).

Montagu's Harrier

A total of 126 individuals was identified over Ustica, 143 at the Strait of Messina, and estimated the passage of 184 and 195 birds, respectively. Although adults outnumbered juveniles also among Montagu's Harriers (Table 1; $\chi^2 = 276.9$, d.f. = 1, $P < 0.001$), the proportion of juveniles was higher among Pallid Harriers ($N = 480$; contingency table: $\chi^2 = 28.57$, d.f. = 1, $P < 0.01$). The difference between total number of adult females

Table 1 – Total numbers of adult male, adult female and juvenile Pallid Harriers estimated over Ustica and at the Strait of Messina during spring 2002 and 2004, respectively.

Tab. 1 – Celkový počet dospělých samců a samic a juvenilních jedinců motáka stepního zaznamenaných na dvou pozorovacích místech během jarního tahu v letech 2002 (Ustica) a 2004 (průliv Messina).

	Ustica (2002)	Strait of Messina (2004)
Males <i>samci</i>	16	8
Females <i>samice</i>	34	16
Juveniles <i>juv.</i>	16	11

and adult males estimated at the two sites was not significant (Table 2). Among adults, males peaked earlier than females while juveniles did not show a peak passage (Fig. 2). Like Pallid Harriers, when comparing the proportions of estimated birds in the two sites, no significant differences were reported between individuals belonging to different sex and age classes (Table 2).

Table 2 – Total numbers of adult male, adult female and juvenile Montagu’s Harriers estimated over Ustica and at the Strait of Messina during spring 2002 and 2004, respectively.

Tab. 2 – Celkový počet dospělých samců a samic a juvenilních jedinců motáka lužního zaznamenaných na dvou pozorovacích místech během jarního tahu v letech 2002 (Ustica) a 2004 (průliv Messina).

	Ustica (2002)	Strait of Messina (2004)
Males <i>samci</i>	79	76
Females <i>samice</i>	96	101
Juveniles <i>juv.</i>	9	18

DISCUSSION

In a previous study made on the spring migration of Pallid Harriers at the Strait of Messina, CORSO & CARDELLI (2004) supposed that birds crossing the Channel of Sicily, between the Cap Bon Peninsula (Tunisia) and western Sicily, head towards the Strait of Messina where, between 1997 and 2001, they identified on average 62 birds per year, with a minimum of 25 in 1997 and an exceptional passage of 132 birds, mostly juveniles, in 2001: “migrant Pallid Harriers passing Cap Bon, in northeast Tunisia, are surely the same as those using the Strait of Messina flyway”. In this picture it is interesting to note that an adult female ringed at Cap Bon on 8 April 1955 was recovered in eastern Sicily four days later (SPINA & BENDINI 1983). However, this flyway is in contrast with the strong tendency of harriers to migrate on broad front undertaking long water crossings since individuals passing through the Channel of Sicily should avoid the following passage over the Tyrrhenian Sea. Like Ustica, during spring a substantial passage of Pallid Harriers is reported over Malta (GENSBØL 1992) and Cap Otranto (Apulia, southern Italy, GUSTIN & PIZZARI 1998) located SW and NE of the Strait of Messina, respectively (Fig. 1). We suggest that Pallid Harriers, such as Marsh (PANUCCIO et al. 2002) and Montagu’s Harriers, tend to move along approximate parallel pathways in the Central Mediterranean, migrating on a broad front over water. Thus birds leaving Africa from the Cap Bon Peninsula could be those reported over Ustica while individuals observed at the Strait of Messina could cross the sea via Malta and probably other smaller islands between southern Tunisia and southern Sicily. However, during adverse weather (for instance strong winds), some birds crossing the Channel of Sicily could avoid the further water crossing of the Tyrrhenian Sea concentrating at the Strait of Messina as a result of a conservative strategy (see also PANUCCIO et al. 2002, AGOSTINI et al. 2005).

Although juveniles of many species of raptors tend to remain in the wintering areas during their first summer, apparently substantial numbers of juvenile Pallid

Harriers undertake northward movements (see also CORSO & CARDELLI 2004). Generally, among long distance migrants, juveniles migrate later than adults during spring (KERLINGER 1989). In the Pallid Harrier, a large overlap in the migration periods of birds belonging to the two age classes was also reported in the previous research made at the Strait of Messina between 1997 and 2001 (CORSO & CARDELLI 2004). Like among Marsh Harriers (AGOSTINI 2001), this result could be explained assuming a contemporaneous passage of juvenile wintering closer to the central Mediterranean region (CORSO & CARDELLI 2004) and adults wintering in Tropical Africa but beginning earlier their northwards migration. Unlike CORSO & CARDELLI (2004), in the Pallid Harrier we did not find a clear earlier passage of adult males, although their migration was concentrate more than adult females between 1-20 April. In this

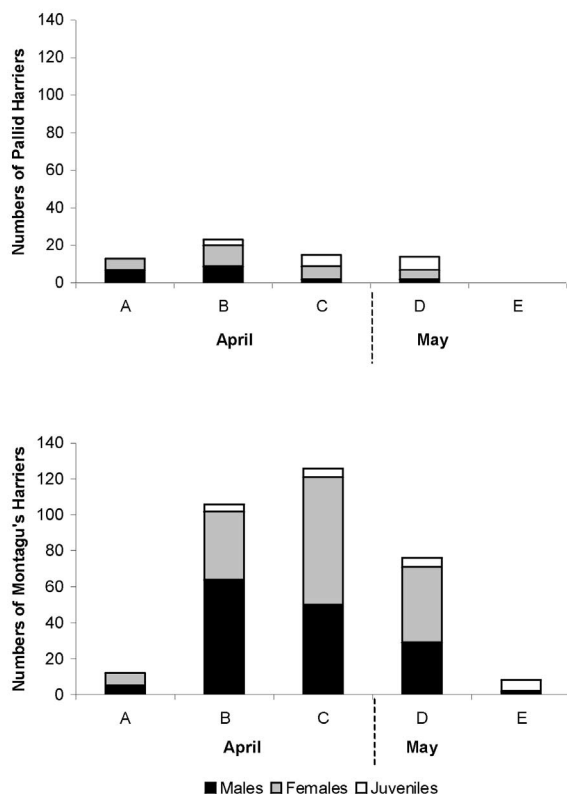


Fig. 2 – The occurrence of Pallid and Montagu's Harriers considering the total numbers of adult males, adult females and juveniles estimated at the two sites between 1 April and 20 May 2002 (Ustica) and 2004 (Strait of Messina), during the five 10-day periods of the study (data from two years have been pooled).

Obr. 2 – Počty dospělých samců a samic a juvenilních jedinců motáka stepního a motáka lužního zaznamenaných během pěti desetidenních sčítacích období na dvou pozorovacích místech mezi 1. dubnem a 20. květnem 2002 (Ustica) a 2004 (průliv Messina) (data z obou let byla sloučena).

species polygyny is apparently unknown and adults arrive paired on breeding grounds (FERGUSON-LEES & CHRISTIE 2001). Conversely, in the case of the Montagu's Harrier, a species in which polygyny is not uncommon, protandry agrees with previous results of studies made both during migration and at breeding areas (GUSTIN & PIZZARI 1998, FERGUSON-LEES & CHRISTIE 2001).

The proportions of birds belonging to different sex classes reported in our study could reflect those in the wintering areas in West Africa. In particular, observations made in Senegal showed no difference in the number of adult males and adult females among Montagu's Harriers (ARROYO et al. 1995). Unfortunately, no data are available on the sex classes of Pallid Harriers wintering there. However, in this species, STRONACH (1991) reported an imbalance towards adult males among birds wintering in East Africa.

The post-reproductive passage across the Central Mediterranean of both species is less conspicuous than during spring (AGOSTINI & LOGOZZO 1997, CORBI et al. 1999, JONZÉN & PETTERSSON 1999, FERGUSON-LEES & CHRISTIE 2001, CORSO 2001, AGOSTINI & PANUCCIO 2003, GUGLIELMI et al. 2003, AGOSTINI et al. 2004, PANUCCIO et al. 2004, SAMMUT & BONAVIA 2004, PANUCCIO et al. 2005). In the case of Montagu's Harriers the opposite occurs at the Strait of Gibraltar (FINLAYSON 1992, GARCÍA & ARROYO 1998) and a partial circular migration was supposed in the central-western Europe (AGOSTINI & LOGOZZO 1997, GARCÍA & ARROYO 1998). Since at least some Montagu's Harriers do not suspend moult during autumn migration (ARROYO & KING 1996), AGOSTINI & LOGOZZO (1997) suggested that such partial circular migration could be explained assuming that gaps in the wings would imply higher energetic costs during the long powered flight across the Central Mediterranean during post-reproductive movements. A moult related hypothesis was also suggested by CORSO & CARDELLI (2004) to explain a possible partial circular migration of Pallid Harriers in the central-eastern Mediterranean. However, no data have been yet published supporting the no suspended moult in this species during post-reproductive movements. Unlike CORSO & CARDELLI (2004) other authors suggested that the more consistent passage of Pallid Harriers across the Central Mediterranean during spring could be the result of a westward movement in Africa during winter: during spring at least some birds wintering in West Africa could take a more direct route to reach their breeding areas in eastern Europe (FORSMAN 1999, FERGUSON-LEES & CHRISTIE 2001). However, further surveys should be made to verify the real consistence of the migratory flow of this species during autumn across the Central Mediterranean. In particular, ring recoveries seem to suggest that, during this period, Pallid Harriers cross this region late in the season: three birds ringed at Cap Bon during spring migration were recovered in southern Italy in November (SPINA & BENDINI 1983). In the Central Mediterranean, systematic observations on the autumn migration of raptors have been made mostly between the second half of August and mid October, while are lacking in November. Consequently, many Pallid Harriers could have passed as undetected in this period. On the other hand, which would be the route used by Pallid Harriers wintering in Tunisia?

SOUHRN

Práce se zabývá průběhem jarního tahu motáka stepního (*Circus macrourus*) a motáka lužního (*Circus pygargus*) přes centrální Středomoří, přičemž analyzuje rozdíly v tahovém chování s ohledem na pohlaví a stáří ptáků. Průtah motáků byl sledován na ostrově Ustica a nad Messinským průlivem (Obr. 1) v období od 1. dubna do 20. května v letech 2002 (Ustica) a 2004 (Messina). Celkově bylo pozorováno 66 jedinců motáka stepního protahujících nad ostrovem Ustica a 35 jedinců nad průlivem Messina. Na obou pozorovacích místech převažovali dospělí ptáci nad mladými jedinci (Tab. 1; $\chi^2 = 20.95$, d.f. = 1, $P < 0.01$), mezi dospělými ptáky převažovaly samice (Tab. 1; $\chi^2 = 8.45$, d.f. = 1, $P < 0.01$). Staří ptáci protahovali o něco dříve než nedospělí jedinci, celkově je však v období průtahu obou věkových skupin velký překryv a rozdíl není statisticky významný (Obr. 2). V případě motáka lužního bylo pozorováno celkem 184 jedinců protahujících nad ostrovem Ustica a 195 jedinců nad Messinským průlivem. Opět převažovali staří ptáci (Tab. 2; $\chi^2 = 276.9$, d.f. = 1, $P < 0.001$), ale proporce mladých jedinců byla u tohoto druhu vyšší než u motáka stepního ($\chi^2 = 28.57$, d.f. = 1, $P < 0.01$). Poměr pohlaví byl u motáka lužního vyrovnaný (Tab. 2). Dospělí samci měli vrchol průtahu dříve než samice, zatímco mladí ptáci protahovali po celé období průběžně, bez výrazného vrcholu (Obr. 2). U obou druhů nebyl nalezen rozdíl mezi oběma studijními plochami v proporcí samců a samic, respektive starých a mladých jedinců. Výsledky naznačují, že oba druhy motáků využívají obě tahové cesty přes centrální Středomoří – z mysu Bon přes Sicilský průliv, západní Sicílii a ostrov Ustica dále na Apeninský poloostrov a z jižního Tuniska přes Maltu podél jihovýchodního pobřeží Sicílie.

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(Received 9.6.2005, accepted 1.7.2006)