

Migratory movements of western European Montagu's Harrier *Circus pygargus*: a review

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We review the migratory movements of European Montagu's Harriers, based on 152 ringing recoveries (from data published up to 1993) and published data on counts at migratory convergence points. Data were analysed according to age groups and time of the year (pre- and post-breeding migration). Results showed two main migratory routes across the Mediterranean for the western European Montagu's Harriers (Gibraltar and the Sicily Channel). Passage frequency was higher in the post-breeding than the pre-breeding migration in the Gibraltar Strait, but the opposite occurred in the Sicily Channel. We discuss the possibility that Montagu's Harriers present a partially circular migration, maybe as a result of movements within the wintering areas. Recovery frequency varied according to age group, being lower for first-year birds than expected from random, which suggests that some first-year birds do not return to the breeding areas during their first summer.

The Montagu's Harrier is a Palearctic species which breeds across Europe, up to 60°N, south to North Morocco, and east to West Siberia, Kazakhstan and Central Asia.^{1–3} All Montagu's Harrier populations are migratory, occupying two main areas during the Palearctic winter: (1) the Indian subcontinent and Sri Lanka (the Asian breeding populations) and (2) West Africa or the eastern fringe of Africa down to South Africa (the European breeding populations).

It is generally believed that the populations of western Europe winter in west Africa, where the maximum densities are found in the Niger valley,⁴ whereas birds wintering in east Africa would breed in the European Russian steppes. However, there are very few data on the exact distribution of the wintering European populations in Africa.⁵

Most of the descriptions of migratory movements of Montagu's Harriers are based on observational data at migratory conver-

gences,^{6–8} or on just a few ringing recovery data.^{9,10,1} There is no comprehensive review of all published data on the migration of the species. Our aim in this paper is to make such a review for western European Montagu's Harriers.

METHODS

Ringing recovery data came from published reports of ringing offices of Spain (ICONA, SEO), and the Netherlands (Dutch Bird Ringing Report) up to 1993, France (Bulletin du Centre de Recherche sur les Migrations des Mammifères et des Oiseaux) up to 1973, and reviews of data for the species in Germany,^{11,12} Britain¹³ and Italy.¹⁴ Each recovery was assigned to the following periods: (1) pre-breeding migration, recoveries between March and April; (2) post-breeding migration, recoveries between August and October. Recoveries from other months were considered to correspond to the breeding period (May to July) or the wintering period (November to February).

For the description of movements we considered only the country of ringing and of

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recovery, as detailed data on ringing and recovery sites (and, thus, actual distances) were not always available. Data were analysed by separating age groups, based on the time interval (in years) between ringing and recovery: as most ringing data belonged to individuals ringed as nestlings, we assumed that the number of years between ringing and recovery corresponded to different age groups. Additionally, birds ringed and controlled in the same country in July or August of the same year were not included in the analyses, as these recoveries could relate to juvenile dispersal and not to migratory movements. Overall, 152 ringing recoveries were analysed, of which 119 corresponded to migratory movements (Table 1). Ringing data were also compared with published data of bird counts at migration points, such as the Strait of Gibraltar,⁷ southern Israel⁸ or Malta.¹⁵

RESULTS

Pre- and post-breeding migration

Of the 119 recoveries that reflect migratory movements, 85.7% referred to post-breeding movements and 14.3% to pre-breeding movements (Table 1).

Post-breeding recoveries ($n = 102$) gave the following distribution by countries: France ($n = 48$; 47.05%), Italy ($n = 15$; 14.7%), Spain ($n = 13$; 12.7%), UK ($n = 10$; 9.8%), Belgium ($n = 4$; 3.9%), The Netherlands ($n = 3$; 2.9%), Bulgaria ($n = 2$; 1.9%), Sénégal ($n = 2$; 1.9%), Austria ($n = 1$; 0.9%), Germany ($n = 1$; 0.9%), Poland ($n = 1$; 0.9%), Yugoslavia ($n = 1$; 0.9%) and Nigeria ($n = 1$; 0.9%). The distribution of

pre-breeding recoveries ($n = 17$) according to country was as follows: Italy ($n = 5$; 29.4%), Spain ($n = 2$; 11.7%), Russia ($n = 2$; 11.7%), France ($n = 2$; 11.7%), Tchad ($n = 2$; 11.7%), Hungary ($n = 1$; 5.8%), Libya ($n = 1$; 5.8%), Austria ($n = 1$; 5.8%) and Malta ($n = 1$; 5.8%).

Figures 1 and 2 show the location of ringing and recovery places for all analysed recoveries in the pre- and post-breeding periods. Two main migratory routes to and from the winter quarters are evident from these ringing recoveries: the first would pass through the Iberian Peninsula and Gibraltar (the western route) and the second through Italy, Malta and Cap Bon (Tunisia) (the eastern route). Montagu's Harriers breeding in the Iberian Peninsula apparently migrate entirely through the western route, and those breeding in Central Europe seem to use both routes.

The relative proportion of recoveries in the eastern and western routes differed significantly between the pre- and post-breeding periods ($\chi^2_1 = 21.16$, $P < 0.0001$): most post-breeding recoveries occurred in the western route, whereas pre-breeding recoveries were mainly found along the eastern route (Figs 1 and 2).

Variations according to age

The frequency of recoveries for each age group differed significantly from a Poisson distribution ($\chi^2_2 = 21.7$, $P < 0.0001$), thus with that expected from random. The proportion of birds ringed and recovered within the same year was higher than that expected from random, although differences were not significant ($\chi^2_1 = 2.20$, $P = 0.14$, Fig. 3), whereas there

Table 1. Summary of the analysed ringing recoveries of Montagu's Harriers according to time of the year and time interval between ringing and recovery.

Interval	Number of recoveries				
	Pre-breeding (March–April)	Post-Breeding (Aug–Oct)	Breeding (May–July)	Winter (Nov–Feb)	Total
Same year	6	54	1	9	70 (46.05%)
Next year	3	8	8	0	19 (12.5%)
Two years later	3	25	4	1	33 (21.7%)
More than two years	5	15	8	2	30 (19.7%)
Total	17 (11.7%)	102 (67.1%)	21 (13.8%)	12 (7.8%)	152 (100%)

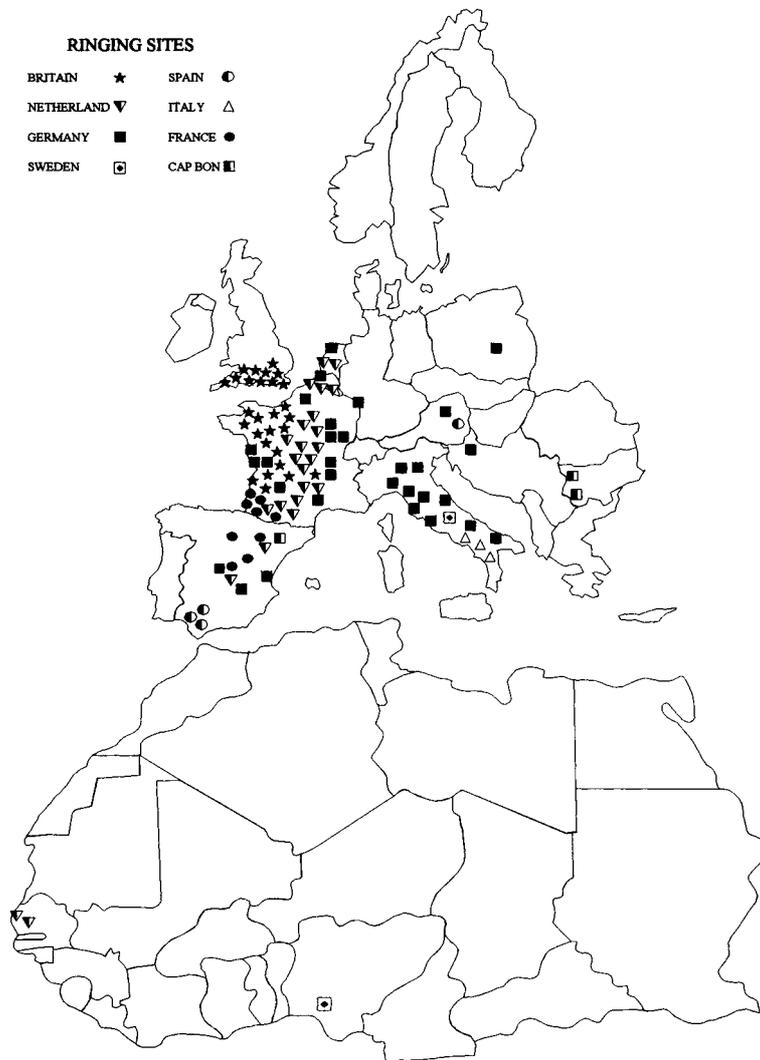


Figure 1. Locations where Montagu's Harriers have been recovered during the post-breeding migration. Country of origin of each recovery is indicated by different symbols.

was a significant decrease in the proportion of one-year-old birds recovered ($\chi^2_1 = 18.05$, $P < 0.0001$, Fig. 3).

DISCUSSION

Many recoveries related to birds which were shot, especially in the 1960s, when hunting raptors was widespread in many European countries.¹⁶ Thus it is possible that the data presented here show biases due to the different density of hunters in different regions or at

different times of the year. The high frequencies of recoveries in France and Italy probably reflect both strong passage and a strong hunting pressure in those countries.¹⁶ The high density of recoveries in the straits (Gibraltar and Cap Bon) is not surprising, as soaring birds tend to concentrate at narrow sea-crossings.^{1,17}

Observational data indicate that Montagu's Harriers migrate in large numbers through the straits.^{7,18} However, the high frequency of recoveries and observations at the straits might

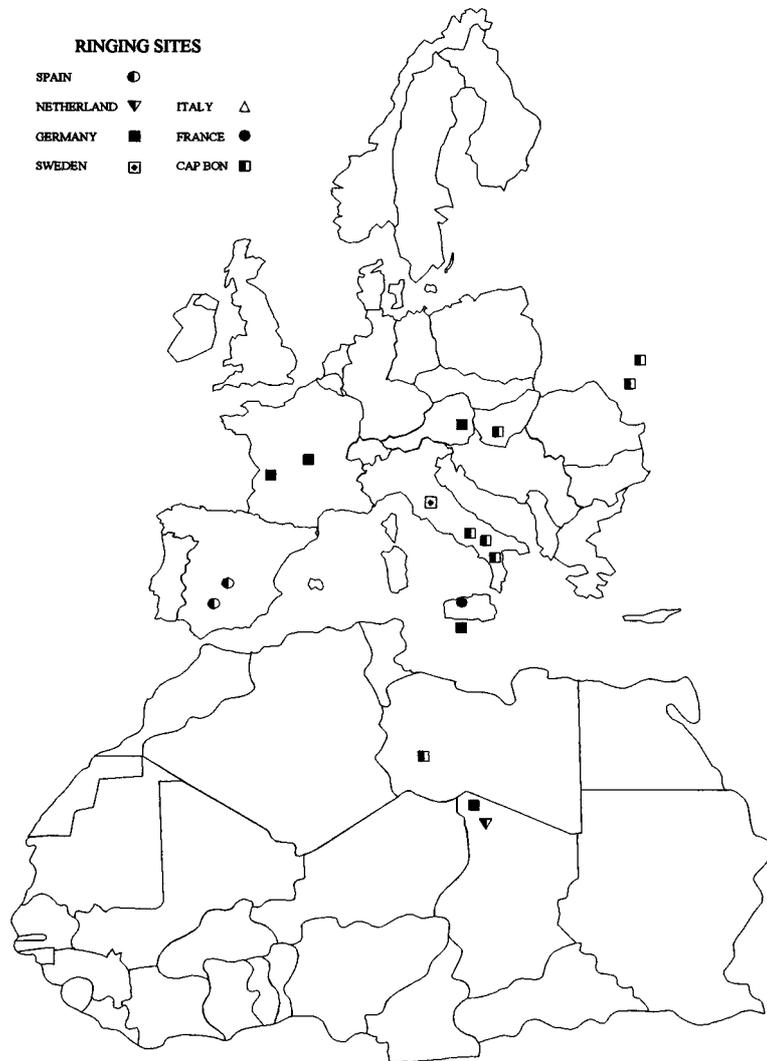


Figure 2. Locations where Montagu's Harriers have been recovered during the pre-breeding migration. Country of origin of each recovery is indicated by different symbols.

also reflect the concentration of observers and hunters at those places, since the Montagu's Harrier is not a typical soaring raptor: it migrates frequently with flapping flight^{6,19} (García, pers. obs.) and apparently readily crosses large water bodies (e.g. Moreau¹⁰). For instance, Bried¹⁸ describes two observations of migrating Montagu's Harriers over sea at 1 km from the coast of Biarritz (France), and numbers are seen annually migrating through the Balearic Islands (Spain) (J.R. King, pers. comm.).

Migratory routes

The presence of two main migratory routes for European Montagu's Harrier, through Gibraltar and Cap Bon, was mentioned by Glutz *et al.*⁹ and Cramp & Simmons.¹ Observational data also indicate a third route through Israel/Suez Canal,^{7,8,20} although the number of Montagu's Harriers observed there is not very high.²⁰ The fact that no recoveries exist in that area for birds ringed in western Europe suggests that birds migrating through

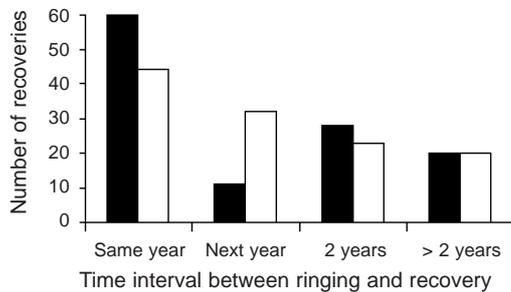


Figure 3. Number of recoveries of Montagu's Harriers according to the time interval (in years) since ringing. Number observed (■) and number expected (□) according to a Poisson distribution.

that area come from the Russian breeding populations (or from the countries where few birds are ringed), whereas birds breeding in western Europe migrate through the two other routes.

Results in this study suggest that both routes are used differentially according to the time of the year, as the proportion of recoveries differed significantly between routes and migratory periods. Similar results were obtained in counts of migrant raptors: in Gibraltar, counts of Montagu's Harriers in autumn were much higher than counts in spring,⁷ whereas in Malta the opposite was the

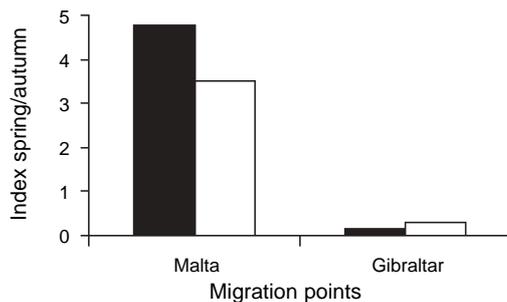


Figure 4. Relative frequency of the number of Montagu's Harriers passing in autumn and spring through the two main western European migration points. ■, Counts for Gibraltar from Finlayson,⁷ counts for Malta from Beaman & Galea.¹⁵ □, Ringing recoveries (this study) expressed as percentage of total recoveries in each migratory period (% of recoveries in spring/% of recoveries in autumn for each migration point).

case^{15,21} (Fig. 4). Thus there appears to be a partially circular migration, with some birds entering Africa to the west in the autumn, and returning to the breeding grounds to the east in spring (Fig. 5). A likely example of such behaviour was a Montagu's Harrier ringed as a nestling in Castellón (eastern Spain) and recovered two years later in east Austria (near the Hungarian border), which it probably reached through the eastern route. Additionally, observational data suggest that in Israel Montagu's Harriers are more common in spring than in autumn⁷ and the same happens in Iraq.²²

In contrast, Brown *et al.*²³ noted a large number migrating through northeastern Ethiopia in the post-breeding period, thus many must enter Africa across the Red Sea. This could also be interpreted as a partially circular migration for the populations of eastern Europe (Fig. 5), with many birds entering Africa to the northeast of Ethiopia in the autumn and returning in spring via Suez, Eilat (Israel) and Iraq. Such differential movements have been described in other birds, such as the Red-footed Falcon *Falco vespertinus* and the Quail *Coturnix coturnix*.¹

These frequency changes could correspond to movements throughout the winter within the wintering areas, maybe following changes in food availability. Montagu's Harriers feed mainly on locusts *Schistocerca gregaria* during the winter, at least in west Africa.^{24,25} Thiollay²⁶ showed that the number of locusts in west Africa increased southwards and eastwards from October until February. However, Thiollay²⁶ also indicated that most Montagu's Harriers did not seem to follow a partial migration strategy within the wintering areas. Nevertheless, this strategy could be adopted by only part of the population, such as the non-breeders (i.e. juveniles). In this case, the proportion of first-year birds in spring should differ between routes, but not enough data exist to test this hypothesis; in most cases, females and first-year birds are not differentiated. Thus, the reasons for such movements, if any, remain unclear.

Variations with age

The high proportion of same-year recoveries reflects the high mortality of juveniles (most of

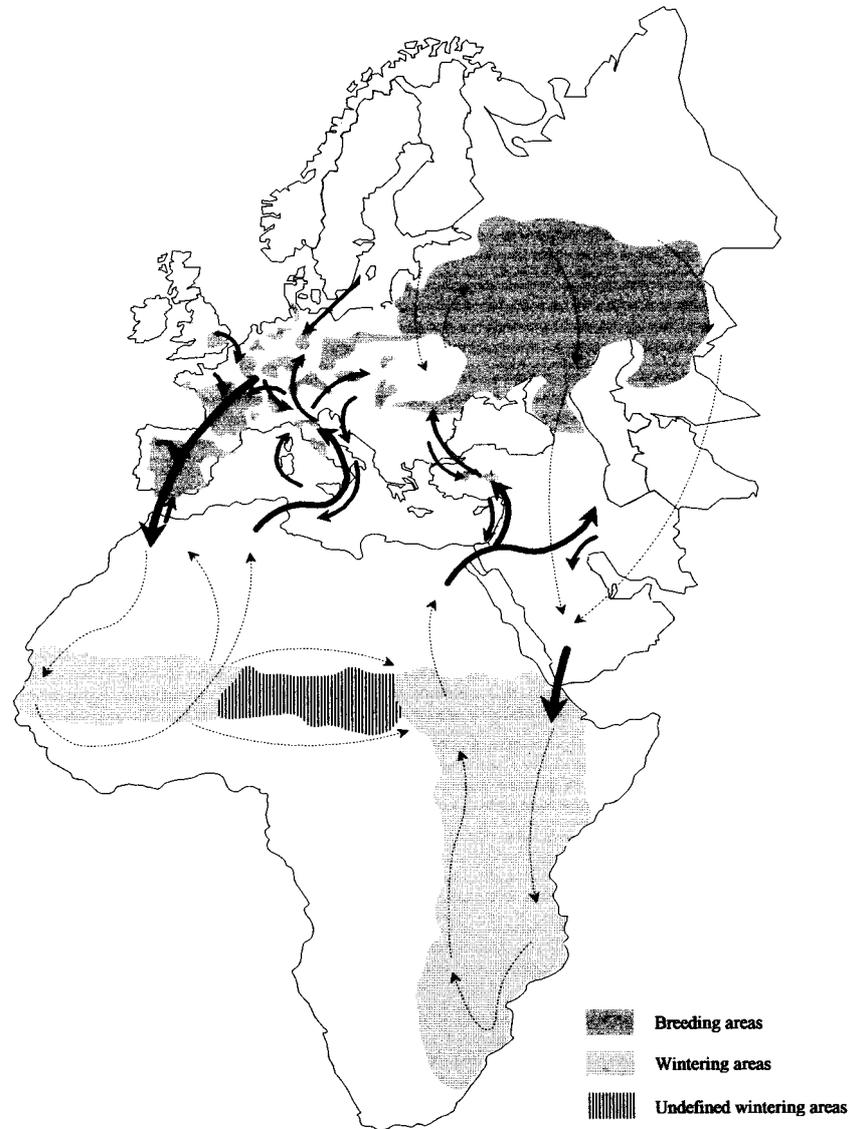


Figure 5. Summary information of migratory movements of European Montagu's Harriers. Thickness of solid arrows indicates intensity of passage (based on published data on counts). Dashed arrows indicate potential (unproved) movements.

the ringing data come from birds ringed as nestlings). The drop in recoveries of one-year-old birds¹³ suggests that at least some birds stay in the winter quarters during their first summer, as verified by Morel & Roux.²⁷ However, observational data at migration points showed that 35% of all Montagu's Harriers observed in Israel in spring⁸ and 54%

of those observed at Falsterbo (Sweden) in August²⁸ were first-summer. Unfortunately, no published data exist for the proportion of first-year birds observed migrating through Gibraltar or Italy. It is still unclear what exact percentage of individuals remain in Africa during their first winter and what their precise movements are if they return to breeding areas.

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