

Breeding Biology, Habitat Selection and Conservation of Montagu's Harrier *Circus pygargus* in the Northern Apennines, Italy

Ugo Faralli

INTRODUCTION

During the 20th century, Montagu's Harrier decreased dramatically as a breeding bird in many European areas because of agricultural and forestry development; in some regions it has totally disappeared (Zijlstra & Hustings 1992).

In Italy this "smart" raptor mainly breeds in plain and cultivated regions of the Po valley (Lombardy, the Veneto, Emilia Romagna), in some plain areas along the Tyrrhenian coast (Toscana, Lazio) and in Sardinia, spreading from sea level to ca. 500-600m. a.s.l. (Chiavetta 1981; Martelli & Sandri 1991; Brichetti *et al.* 1992). The Italian breeding population is estimated at about 250 pairs, located along the eastern Po valley and pre-Apennine Adriatic belt (Brichetti *et al.* 1992).

The most frequently used habitats for nest and site selection are cornfields and the edges of wetlands. Unfortunately, in such sites agricultural activity starts almost always when the eggs have not yet hatched or when the nestlings are still unable to fly (Arcá 1991; Pandolfi & Giacchini 1991).

In recent years, some pairs have started breeding along the Apennines, in a particular "Mediterranean" habitat very similar to continental shrublands. In this habitat 8 pairs of Montagu's Harrier have been located and studied from 1986 to 1990. The present paper aims to present new data concerning the species' breeding biology, habitat selection and conservation in the northern Apennines.

STUDY AREA AND METHODS

The study area includes a wide territory which is part of the so-called Sub-Apennine; in particular the high hill area (700-1300m. a.s.l.), from the heights of Florence to the banks of Lake Trasimeno, crossing the whole province of Arezzo.

In such area, which spreads over 70km, the vegetation is quite particular: wide broadleaf woodlands, composed of Beech *Fagus silvatica*, Chestnut *Castanea sativa* and some oak species, alternate with small heathlands where the main species are Heather *Erica arborea* and *scoparia* and Broom *Spartium junceum*.

Through the years, this habitat has developed from the frequent annual fires which are a negative factor for nature conservation (as far as woodlands are concerned); but where the soil is

calcareous, fire has also had a positive influence, since it has created this rare and threatened heathland habitat. Moreover, the habitat required by Montagu's Harrier has developed following human action impeding the natural evolution of vegetation, contributing, with the fire, to the creation of steppe-grassland.

Besides, these areas also include a natural and discontinuous grass-shrub coverage. Juniper *Juniper communis* and Hawthorn *Crataegus monogyna*, together with groups of scattered trees, give the habitat structure its diversity.

Along this area, from north to south, the breeding sites of eight pairs have been located:-

- Site A: Pratomagno
- Site B: La Libbia
- Site C: Alpe di Poti
- Site D: Monte Dogana
- Site E: Monte Lignano
- Site F: La Foce
- Site G: Sant'Egidio

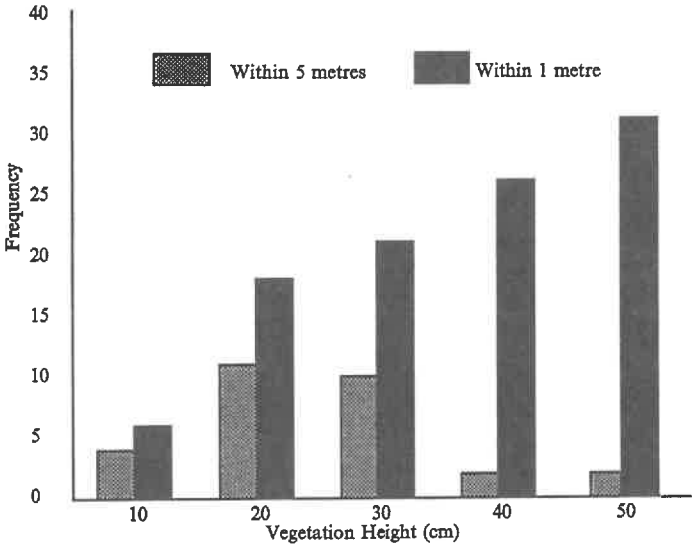
Observations have been carried out at regular intervals, from occupation of the site to the young birds' fledging; of course we tried not to disturb in order not to endanger the clutches.

RESULTS

In this study area we have located eight pairs of Montagu's Harrier. For seven pairs we have precisely located the nest sites; as to the last pair, we have located the breeding area but not the nest. All the nests have been in the heathlands with a north and north-east exposure.

Through the years we have noticed a strong attachment to the breeding site and in two cases (La Libbia and S.Egidio) the same nest (or nevertheless the same spot) has been used two years running. All the nests are on the ground and formed of heather sprigs and small sticks. As far as the choice of site is concerned, we have noticed that Montagu's Harrier prefers areas of tall heather and broom within which it chooses a small spot with shorter vegetation to lay its eggs. In 1990 we collected data concerning distribution of vegetation, height and cover around the nests (Fig. 1).

Figure 1. Distribution of vegetation height around the nests.



We also noted the height of nest above sea level, number of eggs laid and hatched, number of young and fledged nestlings. Table 1 shows the results concerning the breeding rate of Montagu's Harrier pairs during the period of the observations.

Table 1. Breeding rate of Montagu's Harrier in the Northern Apennines, 1986-1990.

Year	No. of eggs laid	No. of chicks	No. of young fledged	No. of nests
1986	3.25	2.75	1.50	5
1987	3.50	2.83	1.83	6
1988	3.16	1.83	1.16	6
1989	3.43	2.40	1.40	7
1990	3.28	2.00	1.16	7
Average	3.32	2.36	1.41	Total 31

Territory occupation takes place in the second half of April; the males are the first to arrive and start defending their territory, especially from Buzzard *Buteo buteo*, Sparrowhawk *Accipiter nisus* and Carrion Crow *Corvus corone cornix*. The females come to the breeding area some 10-15 days later.

Consequently, in this area nest occupation and incubation take place quite late compared with pairs breeding in plain and cultivated areas (Arcà & Sammuri 1983; Martelli & Sandri 1991); this is very similar to what Pandolfi & Pino d'Astore (1990) found in a pre-Apennine area in Marche region. At this stage in the breeding cycle, we have noticed a strong aerial courtship activity.

In this area we have found nests between 750 and 1,020 m above sea level, generally built along partially eroded slopes: this is the highest among those checked in Italy (Martelli 1987; Martelli & Sandri 1991; Brichetti *et al.* 1992) and one of the highest in the species' total range (Dementiev & Gladkov 1951; Chiscano & Fernandez Cruz 1971; Rufino *et al.* 1985). The top part of this area, covered with smooth turf, exploited as pastureland or completely abandoned, suffers from frequent human disturbance of many kinds (excursions, motorcycle sports and other activities).

Usually, although we do not have extremely precise data, it seems that nests are not built in particularly sloping areas (not more than 20-30%), as verified by Martelli & Sandri (1991). As mentioned above, the chosen areas are covered with dense shrub and high vegetation (even up to 200 cm).

Egg-laying usually takes place in May and can vary according to the year and weather conditions (in some years the first half of May and some years the second). We have also noted the number of eggs laid and hatched. We have observed predation by Fox *Vulpes vulpes* in one case and Carrion Crow in two cases at least. We have noticed a certain delay in egg-laying and a number of eggs have been smaller than in other parts of Italy and Europe (Schipper 1978; Martelli 1984; Pandolfi & Giacchini 1991; Martelli & Sandri 1991). As far as breeding success is concerned, we have observed that only a few pairs and in some particular years have fledged more than one chick. In fact, in most cases only one chick has been able to fledge; this may depend on the degree of prey abundance. We have also several data about hunting and prey. Montagu's Harrier is a good subject for this type of work as it hunts low over open habitat and is easy to observe for relatively long periods (Schipper 1977). We also collected prey remains from certain nests.

According to our observations, in this area the main prey seem to be Field-mouse *Apodemus sylvaticus*. Among birds Skylark *Alauda arvensis*, Corn Bunting *Miliaria calandra* and Cirl Bunting *Emberiza cirlus* and chicks of Pheasant *Phasianus colchicus* are quite frequent, together with some large coleoptera and orthoptera, and Green Lizard *Lacerta viridis* among reptiles.

The vegetation structure may influence prey capture. We observed that in dense and high vegetation Montagu's Harrier hunts especially birds, while in low and open vegetation it hunts mammals and reptiles.

Table 2. Prey remains at two nests (sites B and C) in 1990.

	Number	%		
Mammals	18	38.3		
Birds	15	31.9		
Reptiles	5	10.6		
Insects	9	19.1		
Birds			Mammals	
<i>Alauda arvensis</i>	4		<i>Apodemus sylvaticus</i>	15
<i>Phasianus colchicus</i>	4		<i>Arvicola terrestris</i>	2
<i>Miliaria calandra</i>	2		<i>Sorex</i> spp.	1
<i>Emberiza cirius</i>	2			
Unidentified	3			
Reptiles			Insects	
<i>Lacerta viridis</i>	4		Orthoptera	3
<i>Natrix natrix</i>	1		Coleoptera	3
			Unidentified	3

CONSERVATION

At first we preferred not to spread information on the exact location of this species' nest sites. Then, because of increasing human activity such as tourism, cross-country motorcycling and trekking, together with fires, we decided to inform the public bodies in charge of fauna management.

Consequently, after LIPU action, such sites are now part of more widely protected areas and, with the exception of projects for the reafforestation of some territories, we can say that the Montagu's Harrier population in this area is stable or maybe even increasing.

Summing up, this area differs from the other bordering regions such as Emilia Romagna, Marche and Tuscany, where the protection of Montagu's Harrier nests in cultivated fields may conflict with agricultural interests and involves unskilled people who may spread information on the location of breeding sites (Pandolfi & Giacchini 1991).

ACKNOWLEDGEMENTS

I am very grateful to Loretta Lapini and Guido Tellini for their encouragement and advice on the present work, and to Roberto Bertozzi and Stefano Carresi for field work.

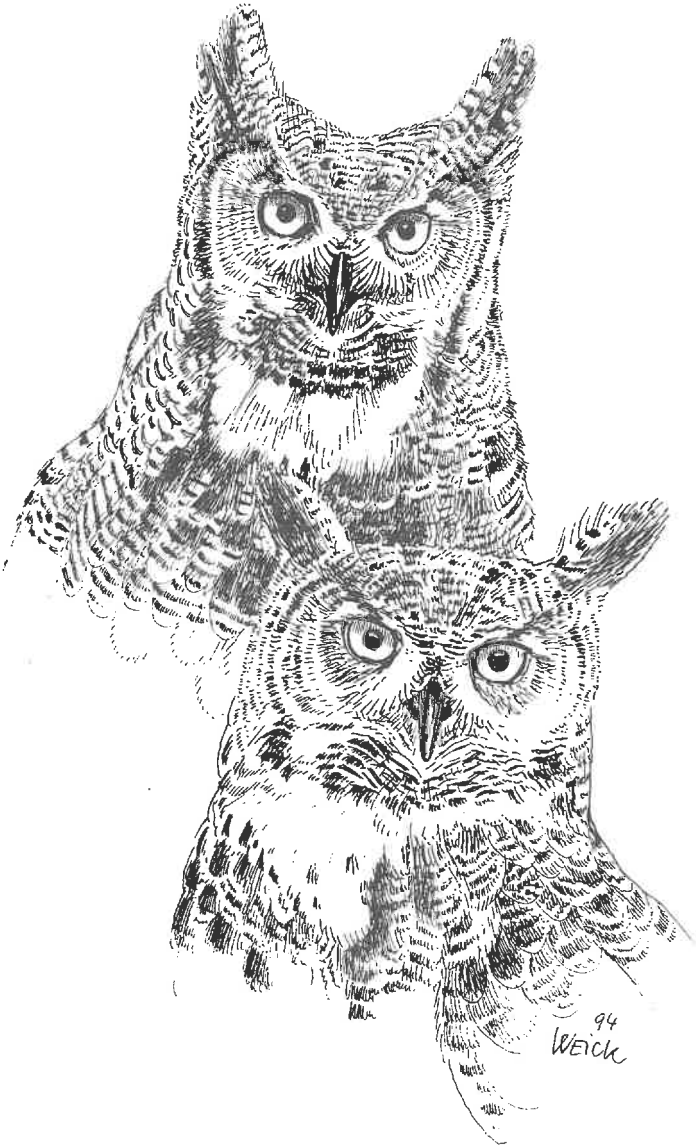
I am very grateful to Marco Lambertini for useful comments and suggestions, to Marco Gustin for his help on references and to Barbara Lombatti for her translation and assistance.

REFERENCES

- ARCA', G. 1991. La conservazione dell'Albanella minore (*Circus pygargus*) nelle aree agricole della Maremma toscano-laziale. In SROPU (ed.) Atti V Conv. Ital. Ornit., *Ricerche di Biologia della Selvaggina*. Vol. XVII: 287-291.
- ARCA', G. & G. SAMMURI 1983. Biologia riproduttiva dell'Albanella minore *Circus pygargus* nella Maremma toscano-laziale, dati preliminari. Atti II Conv. Ital. Ornit. (in press).
- BRICHETTI, P., P. DE FRANCESCHI & N. BACCETTI (eds.) 1992. *Fauna d'Italia*. Aves I. Gaviidae-Phasianidae. calderini, Bologna.

- BUSCHE, G. 1990.** Brutvorkommen der Wiesenweine *Circus pygargus* in Schleswig-Holstein 1981-88. *Corax* 13: 326-331.
- CHIAVETTA, M. 1981.** *I rapaci d' Italia e d' Europa*. Rizzoli, Milano.
- CHISCANO, J.L.P. & M. FERNANDEZ CRUZ 1971.** Sobre *Grus grus* y *Circus pygargus* en Extremadura. *Ardeola*, vol. esp.: 509-574.
- DEMENTIEV, G.P. & N.A. GLADKOV 1951.** (Birds of the Soviet Union).
- MARTELLI, D. 1984.** L' Albanella minore nell' Appennino bolognese. Grafos, Bologna.
- MARTELLI, D. 1987.** Dati sull' ecologia dell' Albanella minore (*Circus pygargus*) in Emilia-Romagna. Nota preliminare. In N. Baccetti & M. Spagnesi (eds.), *Rapaci Mediterranei III, Ricerche di Biologia della Selvaggina*. Vol. XII: 125-137.
- MARTELLI, D. & V. SANDRI 1991.** Status ed ecologia dell' Albanella minore (*Circus pygargus*) in Emilia Romagna. Analisi conclusiva. In SROPU (ed.) *Atti V Conv. Ital. Ornit., Ricerche di Biologia della Selvaggina*. Vol. XVII: 49-52.
- PANDOLFI, M. & P. GIACCHINI 1991.** Censimento e successo riproduttivo dell' Albanella minore (*Circus pygargus*) nella fascia pedeappenninica adriatica. Indicazioni per la gestione. In M. Spagnesi & S. Toso (eds.), *Atti I I Conv. Naz. Biol. Selvag., Ricerche di biologia Selvaggina*. Vol. XIX: 125-134.
- PANDOLFI, M. & P.R. PINO D'ASTORE 1990.** Analysis of breeding behaviour in Montagu's Harrier *Circus pygargus* in a site of Central Italy. *Avocetta* 14: 97-102.
- RUFINO, R., A. ARAUJO & M.V. ABREU 1985.** Breeding raptors in Portugal: distribution and population estimates. In I. Newton & R.D. Chancellor (eds.), *Conservation Studies of Raptors*, ICBP Tech. Publ. 5: 15-28.
- SCHIPPER, W.J.A. 1977.** Hunting in three European Harriers (*Circus*) during the breeding season. *Ardea* 65: 53-72.
- SCHIPPER, W.J.A. 1978.** A Comparison in breeding ecology in three european harriers *Circus*. *Ardea* 66: 77-102.
- ZIJLSTRA, M. & F. HUSTINGS 1992.** Teloorgang van de Grauwe Kiekendief *Circus pygargus* als broedvogel in Nederland. *Limosa* 65: 7-18.

Ugo Faralli
LIPU
Nature Conservation Dept.
Vicolo S. Tiburzio 5,
Parma, Italy.



Great Horned Owl *Bubo virginianus* - male & female