

Breeding Ecology of Montagu's Harrier *Circus pygargus* on natural and reclaimed Marshes in Poland and France

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Montagu's Harrier is one of the raptors still decreasing in numbers in most European countries. There are now relatively large populations only in France, Spain, Portugal and Poland. Since 1985 we have studied the breeding ecology of this species on marshes with the two highest concentrations of Montagu's Harrier in Europe. One is on natural, calcareous marshes located in south-east Poland (near Lublin, 51° N, 23° 30' E). The other is on reclaimed saltmarshes and wet pastures in western France (near Rochefort/Mer, 46° N, 0° 55' W).

In Poland, where the total population is lower (200-300 and 3000-4000 pairs in France, in Gensbol, 1984), *Circus pygargus* concentrates only on certain marshes suitable for breeding. Surrounding areas, consisting mostly of meadows, pastures and fields, remain unoccupied. In western France the birds are dispersed over a wide area, with some concentration in the most suitable habitats, where they reach the highest density noted for Europe. In one 22ha marsh at Cire in 1990 28 pairs were recorded. On the study area, the Marais de Rochefort, totalling 200km², 54 pairs were noted the same year. On the neighbouring Marais de Brouage on 100km² 43 pairs bred (42-43 censused in 1985-86). The density in these areas reached 2.7 - 4.3 pairs per 10km².

In Poland on 14km² of marshes over the four years (1985-1988) 32-42 pairs were recorded, depending on the year, with a range of action of ca.330 km². This gave a density of 1.0 to 1.3 pairs per 10km².

Due to the different distributions of harriers in the two landscapes the comparison of densities is incompatible but give us information about the relative concentration in the two study areas. As Montagu's Harrier is not a typical territorial breeder, comparison between larger study plots should include areas of total home ranges. According to the literature (in Leroux, 1987) the hunting distance of the male usually reaches 5km (exceptionally 10-12km). So for true comparison between different areas we should look at at least 100km².

Taking only density on breeding sites, we can compare concentration of nests in colonies which reach in Cire 12.7 pairs per 10ha. In the largest colony in Poland density reached 1 pair per 10ha. The nearest neighbour distance recorded in France was 20m, in Poland 42m. The mean distance between nearest neighbours was 122m in France and 160m in Poland. In such colonies distances between nests have not exceeded 600m.

Unlike some other raptors, there were no differences in mean near neighbour distances between poor and rich vole years in both countries. Montagu's Harrier is not a territorial bird and breeding dispersion is shaped by pluriannual mean food availability in a large territory and, locally, by suitable undisturbed nest sites at the beginning of the breeding season.

The population number on French marshes fluctuated markedly between years. In poor vole years (1985 & 1991) 22-25 pairs were noted on the Marais de Rochefort. In good vole years (1987 & 1990) 43 to 54 pairs bred there. In poor vole years there was a large proportion of non-breeders (over 50%).

In comparison, the Polish population was more stable: 32 to 42 pairs. The number of pairs has not changed markedly with vole density in individual years.

On marshes in both countries harriers breed in rank vegetation. The height of plants surrounding nests was between 80 and 100cm. At the beginning of the nesting period females choose vegetation tall enough to hide them during incubation. On balance it should not be too high to prevent the female leaving easily upon the approach of a predator or arrival of the male with food. In France in places where natural vegetation still remains Montagu's Harriers choose this first. The increasing area of crops is now used by 15% of pairs. This could be related to loss of natural vegetation at certain sites. Although the same phenomenon has been noted in Poland for the last three years, there has been no change in the area of natural marshes (they are protected).

Montagu's Harrier in certain regions of its range is, like many other raptors, strongly dependent on a diet of microtines. In France during poor vole years, *Microtus* voles were only 5% of the diet (84% was insects). In years of peak density, voles and other small mammals form up to 80% of the adult diet. In Poland dependence on microtines is less marked and their proportion in the diet has not fluctuated markedly between years. As an alternative prey passerines are extensively used. *Microtus* form here 34% of all food and birds 26%. Other prey are insects and reptiles.

The diet components have a considerable impact on the breeding parameters of harriers. In France mean yearly clutch size oscillated between 2.8 and 3.7 (n=115), dependent on the food supply. In Poland clutch size was generally larger (3.9-4.4; n=125) and did not fluctuate significantly between years.

Hatching success was similar in both countries at 73% in Poland and 77% in France. It was again relatively constant on Polish marshes and fluctuated markedly on the Marais de Rochefort (59%-84%).

The final output of reproduction - fledging success - was linked with vole numbers in particular years in both countries, but in France the differences were more extreme. In poor vole years the harriers produced 0.7 fledglings per pair in France and 1.1 in Poland. In years when rodents were abundant they produced 2.3 and 2.2 fledglings per pair. The mean fledging success for France and Poland over the four years (1985-1988) was similar at 1.62 and 1.72 young per breeding pair respectively.

The main reason for losses in both countries was predation, the rates of which were similar on natural marshes (30%) and on French reclaimed marshes (24%). In France additional reasons for losses were of human origin (9%) - cattle, changes in water level and persecution.

To conclude, the differences between both populations studied were linked with latitude and with habitat. Clutch size was larger in Poland as being a more northerly country. This often showed up in the laying of 6-egg clutches, which was never recorded in over 200 nests monitored in France.

Other differences were more related to habitat. In Poland there is a more natural and complex habitat; marshes are surrounded by a mosaic of meadows, pastures and fields which are extensively managed. French marshes, reclaimed from polders, consist more of simple habitat with a poorer spectrum of potential prey and more marked fluctuation in rodents. As a result, Montagu's Harriers in France are more dependent on a single prey - voles.

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