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# Nest site selection of Montagu's Harrier *Circus pygargus* breeding in natural habitats in eastern Poland

**Jarosław Wiącek**[1]



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Nest site selection of the ground-nesting Montagu's Harrier was studied in a natural habitat in eastern Poland, the Chełm Calcareous Marshes (850 ha). All nests in the study area were placed in the sedge community *Cladietum marisci*. The water at nest sites was deeper, and the vegetation was higher, denser and broader-leaved than found at random points. Distance to the nearest meadows did not differ between nest sites and random points; all nests were placed over water, though. These data suggest a preference for nesting in wet places with older and higher vegetations growing in high density.

Key words: *Circus pygargus*, nest site selection, natural habitat, Poland

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Marshes and grasslands are typical breeding areas of Montagu's Harriers (Simmons 2000). The primeval breeding habitat of Montagu's Harrier used to be steppe and marshland, but cereal crops and alfalfa fields have become main breeding habitats in western Europe in the second half of the 20th century (Arroyo *et al.* 2004). However, in Poland most harriers still nest in their natural habitat (Tomiałojć & Stawarczyk 2003), as in my study area in Chełm's Calcareous Marshes (Wiącek 2008).

Vegetation height is a main criterion determining the nest location in cereal crops (Arroyo *et al.* 2003), as it is in the choice of the exact location of nests within a vegetation patch in natural shrubland in Castellón in Spain (Limiñana *et al.* 2006). In this study, I evaluate the influence of vegetation height, depth of water, density of the vegetation near the nest and leaf structure on the nest site selection of Montagu's Harriers.

## Study area and methods

The data were collected in the calcareous marshes of the Chełm region near the Polish-Ukrainian border in the nature reserves of 'Bagno Serebryskie' and 'Roskosz' in 2007 (Fig. 1A). The combined surface area encompassed 850 ha (51°10'N, 23°37'E). The marshlands are dominated by the sedge community *Cladietum marisci*. For a more detailed description of the study area, see Wiącek & Niedźwiedź (2005).

The field work was based on the methods described by Tyler *et al.* (1998), with modifications when necessary. Vegetation height, depth of water and vegetation density were measured at 19 observed nests from 28 pairs breeding in the area and at 25 random control points. Vegetation heights were measured (above water level) during the incubation period between 15 May and 14 June. Mean vegetation height was calculated from eight measurements with an accuracy of 1 cm at a distance of 1 m from the nest. The same focal points were used to measure water depth. Width of the sedge leaves was measured at eight points around the nest with an accuracy of 1 mm, at 0.5 m above the water level (dominant plant species around the nests). The vegetation density was measured near the nest (at a distance of 0.5 m from the nest) in plots of 0.1 $m^2$ at a height of 0.5 m above the water level. The distance of the nest to nearby meadows was measured with a measuring tape to the nearest meter. The random control points were placed irrespective of nests in semi-

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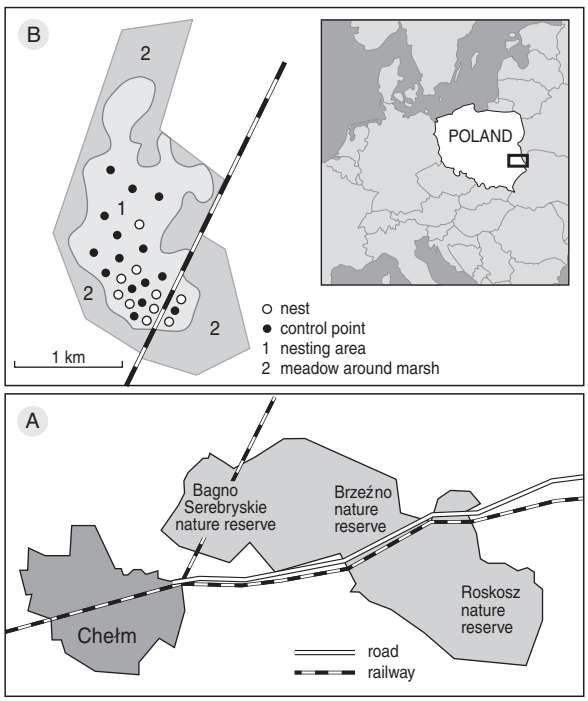



**Figure 1.** A. Special bird protection area near Chełm in eastern Poland, showing study sites. B. Nests and random points in the 'Bagno Serebryskie' nature reserve.

**Table 1.** Vegetation found near Montagu's Harrier nests ($n$ = 19) and at random points ($n$ = 25). (+ = single plants).

| Plant species | Plant cover (%) | |
|---|---|---|
| | near nests | random points |
| *Cladium mariscus* | 76–100 | 70–100 |
| *Phragmites communis* | 5–25 | 0–30 |
| *Filipendula ulmaria* | + | |
| *Frangula alnus* | + | + |
| *Lysimachia vulgaris* | + | + |
| *Lythrum salicaria* | + | |
| *Galium uliginosum* | + | + |
| *Thelypteris palustris* | 2–15 | + |
| *Cirsium palustris* | + | |
| *Lathyrus paluster* | + | |
| *Potentilla erecta* | + | |
| *Campanula patula* | + | + |
| *Salix cinerea* | + | + |
| *Salix rosmarinifolia* | + | + |
| *Origanum vulgare* | + | |
| *Convolvulus arvensis* | | + |

colonies and randomly across the study area (Fig. 1B). Percentage plant cover near nests and random points was estimated in five categories: + single plants, 1–25%, 26–50%, 51–75%, 76–100%. Analyses were made with nonparametric statistics (Mann–Whitney test). Analyses were performed with Statistica 6.1. Data are presented as means and medians.

## Results

Harriers built their nests mainly in Saw Sedge *Cladium mariscus* dominated vegetations (Table 1). Nests were situated in vegetations standing in deeper water than found at random points. Harriers also preferred higher, denser and broader-leaved vegetation (Table 2). Birds built nests near meadows but differences with random points were not statistically significant.

## Discussion

Montagu's Harriers preferred high vegetations with older, broad-leaved sedges. Vegetation height at nests in the study area was higher than found at nests in natural habitats in France and Kazakhstan or in cereal crops in western Europe (Arroyo *et al.* 2004). The opposite was found in Castellón province in Spain, where the dense Mediterranean shrubland necessitated nest-building in small patches of shorter vegetation to allow

**Table 2.** Variables measured at nests of Montagu's Harriers and random points.

| | Nests ($n$ = 19) | | | Random points ($n$ = 25) | | | Mann–Whitney test | |
|---|---|---|---|---|---|---|---|---|
| | Average ± SD | Median | Range | Average ± SD | Median | Range | $Z$ | $P$ |
| Water depth (cm) | 18.5 ± 13.1 | 19 | 1–40 | 15.1 ± 12.8 | 8 | 0.5–36 | 2.96 | 0.003 |
| Vegetation height (cm) | 112 ± 11.4 | 115 | 86–122 | 104.2 ± 11.6 | 104 | 81–120 | 2.51 | 0.01 |
| Vegetation density (in 0.1 $m^2$) | 128 ± 26.3 | 118 | 95–192 | 67 ± 13.4 | 63 | 48–95 | 5.61 | 0.001 |
| Width of leaves (mm) | 12.3 ± 0.7 | 12 | 11–13.5 | 9.2 ± 1.1 | 9 | 7–11.5 | 5.53 | 0.001 |
| Distance to meadows (m) | 80.4 ± 50.8 | 63 | 11–165 | 60.4 ± 28.7 | 65 | 15–125 | 0.17 | 0.86 |

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for safe take-offs and landings (Limiñana *et al.* 2006). High vegetations may deter predators from approaching the nest, and from spotting the nest from the air. Local predators known to occur in eastern Poland include Red Fox *Vulpes vulpes*, American Mink *Mustela vison*, Eurasian Marsh Harrier *Circus aeruginosus*, Hooded Crow *Corvus cornix* and Common Magpie *Pica pica* (Kitowski 1998, Polak 2007, Wiącek unpubl. data). All nests in the study area were built over water, and water depth was found to influence nest site selection. Water probably increases nest safety against mammals predators, although absence of water does not deter Montagu's Harriers from nesting in dry habitats (Arroyo *et al.* 2004). Most nests in the study area were situated within 100 m from the border of the marsh (Table 2). This trend to build nests near the meadow's border could be the result of a trade-off between better take-off conditions for fledglings during food transfers and risks from ground predators. Young birds from nests situated near meadows start hunting earlier, possibly because of a higher risk from ground predators (Krogulec 1992, Wiącek 2006a).

The older patches of vegetation, i.e. the nest sites preferred by Montagu's Harriers, are illegally burned sometimes. Burning has a strong, negative impact on breeding numbers of this species in the study area (Wiącek 2006b). After burning, it takes almost five years before the habitat again attracts breeding Montagu's Harriers, probably because the regrowth is at first slender-leaved and has a low density, offering little protection to the nest against predators. A similar situation was described in the Bittern *Botaurus stellaris* where density and age of the vegetation near the nest were found to be important factors limiting nest safety and breeding success (Polak 2007).

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## Samenvatting

Tegenwoordig broeden in West-Europa de meeste Grauwe Kiekendieven *Circus pygargus* in landbouwgewassen. In Polen is dat nog niet het geval. Daar zijn natuurlijke habitats het meest in gebruik als broedplaats, zo ook in het onderhavige onderzoek in een moeras in Oost-Polen. Een vergelijking tussen variabelen gemeten bij nesten en op willekeurige punten in het moeras leerde dat Grauwe Kiekendieven een voorkeur aan de dag legden voor zeggenvegetaties in water, waarbij de vegetatie dichter, hoger en ouder (dat laatste afgeleid uit de bredere bladeren van zeggen) was dan op de willekeurig gekozen punten. Deze voorkeur voor de oudere vegetatie zou een anti-predatiestrategie kunnen zijn. (RGB)

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