

Spatial distribution of migrating Sedge Warblers (*Acrocephalus schoenobaenus*) in a Hungarian reed bed

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Data from a ringing program in a south Hungarian reed swamp were used to analyse the horizontal and vertical distribution of juvenile and adult Sedge Warblers during autumn migration. The horizontal spatial pattern of the juvenile birds showed clumped distribution in the reed bed. 492 (35%) juvenile and 59 (20%) adult Sedge Warblers were trapped in three nets. The horizontal distribution of adults was spaced evenly. The vertical spatial distribution of the age classes were significantly clumped. Investigate of food dispersion in a reed bed, vegetation structure and interspecific competition among reed warblers are required for complete comprehension of spatial pattern of migrating Sedge Warblers.



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1. Introduction

The Sedge Warbler is a very common breeding bird in marshlands and swamps of Europe (Cramp 1992). This species prefers reed beds as a stopover habitat during autumn migration (Gyurácz & Csörgő 1994) and spends the winter in Africa, south of the Sahara (Moreau 1972, Dowsett *et al.* 1988).

Habitat selection is one of the most important mechanism in the ecological segregation of bird populations. The spatial distribution of passerine species during the breeding and the wintering seasons has been studied in more detailed than during migration (Baccetti 1985, Pambour 1990).

Food availability and vegetation structure are known to influence the spatial distribution of most breeding and migrating birds (Pearson *et al.* 1979, Haland & Burkjeland 1982, Shennan 1985, Ormerod *et al.* 1991, Morel & Morel 1992, Pearson & Lack 1992, Moskát *et al.* 1993). Competition has always been regarded as an important factor in habitat selection of sympatric warblers (Rolando & Polestrini 1989, Hoi *et al.* 1991, Leisler 1992, Catchpole 1973).

In this study, data from a longterm ringing program in a south Hungarian reed swamp were used to analyse the horizontal and vertical distribution of juvenile and adult Sedge Warblers during postbreeding migration.

2. Study area and methods

The study was carried at Sumony Bird Observatory (Lake Sumony: 45°58' N, 17°56' E). The area is a fish pond surrounding with a large reed bed (Fig. 1). *Scirpeto-Phragmitetum* with *Typha* is the dominant plant association. The data were collected during autumn migration, from 1989 to 1993 (30 July - 10 September, 1989; 28 July - 09 September, 1990; 27 July - 08 September, 1991; 26 July - 13 September, 1992; 17 July - 19 September, 1993). The birds were caught in reed bed, using 18 mist-nets 12 m in length, with four 50 cm high shelves. There was 20-25 cm between the ground and the first shelf. Four line of mist-nets (6 + 4 + 4 + 4 mist-nets) were on a raised path 20-30 cm above the water level in homogenous area of

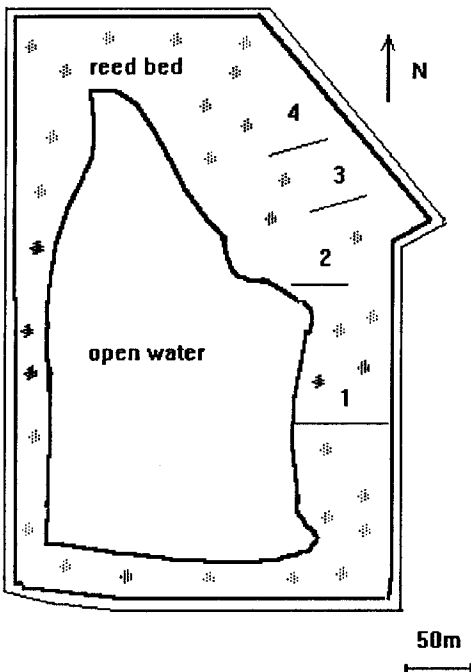


Fig. 1. Location of the mist-nets (line 1: 6 nets, lines 2-4: 4-4 nets) at Lake Sumony.

Phragmitetum. The net and shelf number were recorded for each bird trapped. Birds were ringed, weighed and measured.

The index of clumping (I) was used to analyse the spatial distribution of birds (Southwood 1978): $I = s^2/D$, where s^2 = variance and D = mean number of trapped birds by net. The distribution can be random ($I = 1$), spaced ($I < 1$) or clumped ($I > 1$). We used the χ^2 test to estimate the relationship between number of birds caught and location of capture (net number). The statistical analyses were performed with the Statgraf and Windows Excel 5.0 softwares.

3. Results

We trapped 1398 juvenile and 290 adult Sedge Warblers during the five years of the study. Four hundred and ninety-two (35%) juvenile Sedge Warblers were caught in the three external nets of the first line of mist-nets (Fig. 1), which represents only 16% of the nets. These 3 nets are standing in the 30-40 m wide littoral edge of the reed bed. The number of juveniles caught decreased significantly from open water to shore in the 1st line of mist-nets ($r = 0.95$, $t = 6.2$, $d.f. = 5$, $p < 0.05$) (Fig. 2). The horizontal pattern of juveniles was spatially clumped in the reed bed ($I = 24$, $\chi^2 = 413.39$, $d.f. = 17$, $p < 0.01$). Fifty nine (20%) adult Sedge Warblers were trapped in the same three nets standing in the edge of reed bed near open water. There was no significant trend in the number of adult birds along the shore - open water gradient ($r = 0.34$, $t = 0.73$, $d.f. = 5$, $p > 0.05$) (Fig. 2). Adult birds' distribution was random in the reed bed ($I = 0.89$, $\chi^2 = 15.39$, $d.f. = 17$, $p > 0.05$).

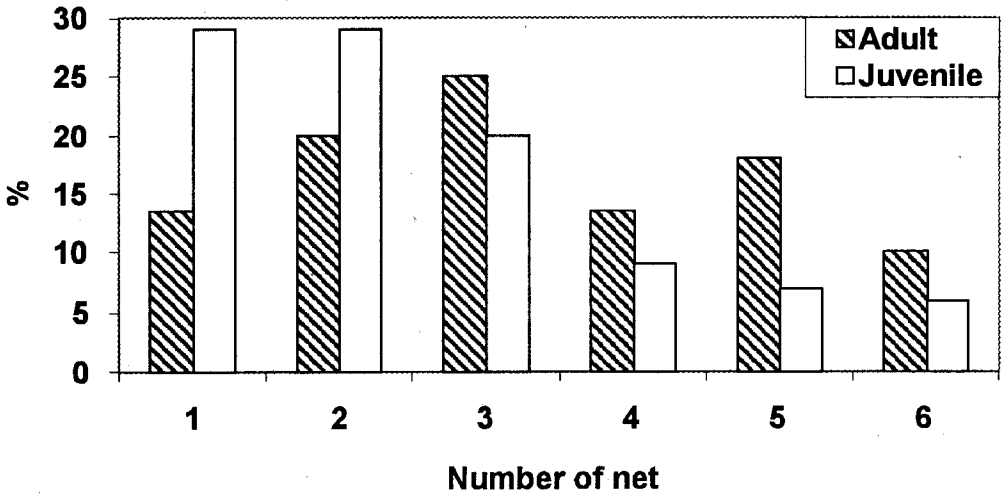


Fig. 2. Capture rate of Sedge Warblers from open water (net 1) to shore (net 6) at the first line of mist-nets.

Fivehundred and fifteen (36%) juvenile and 113 (38%) adult Sedge Warblers were caught in the third net shelf, about 2,5 m above the ground. The vertical distribution of the birds was significantly clumped for both age classes (juvenile: $I = 25$, $\chi^2 = 75.12$, d.f. = 3, $p < 0.01$; adult: $I = 10.06$, $\chi^2 = 30.41$, d.f. = 3, $p < 0.01$) (Fig. 3).

4. Discussion

Our results showed that juvenile Sedge Warblers preferred the edge of the reed bed near open water during autumn migration. According to Pambour (1990) most individuals of Sedge Warblers and other passerine species occurred near the lake

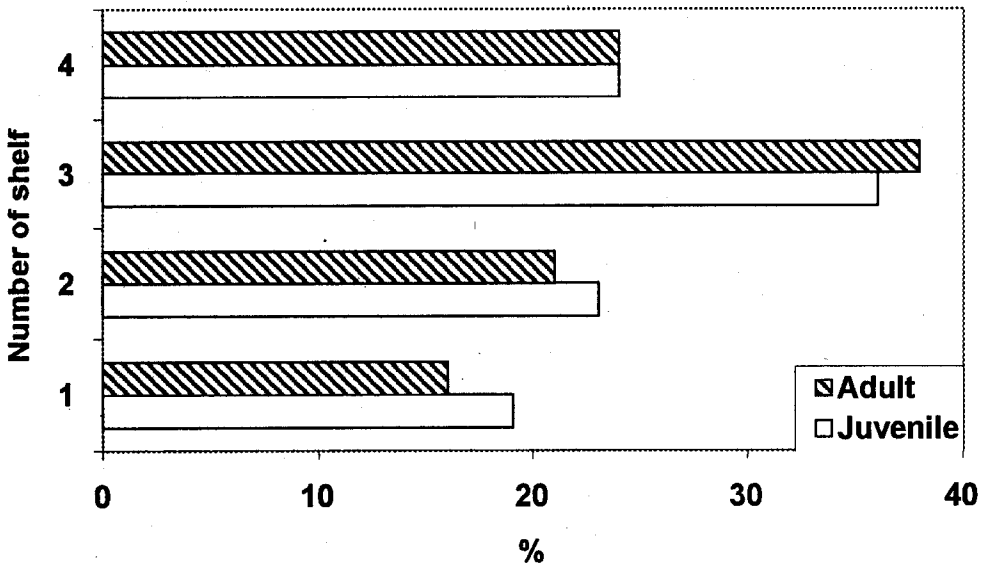


Fig. 3. Capture rate of Sedge Warblers from the lower to the upper net shelf.

shore during the postbreeding migration period in a reed bed of the Camargue, France. Migrating adult birds, however, selected the stopover habitat uniformly. Differences in spatial pattern by age classes may reflect their different feeding sites, techniques and social status. Probably food abundance is higher and prey diversity is greater in the zone near open water than at the littoral edge of the reed bed. The reed aphids, other insects and spiders occur in large number near open water (Vásárhelyi 1995). It could influence the spatial distribution of juveniles in particular, because they are inexperienced and less efficient than adults in gathering food (Alatalo *et al.* 1983, Koskimies & Saurola 1985). Considering that the migration of adult birds started and ended earlier than that of juveniles at Sumony (Gyurácz & Bank 1995), the different horizontal distribution of adults and juveniles could result from temporal variations in spatial distribution of food resources. The inter- and intraspecific territoriality may also play an important role in habitat selection by Sedge Warblers during the breeding, stopovering and wintering seasons (Moreau 1972, Aidley & Wilkinson 1986, Ormerod 1990, Hoi *et al.* 1991). The dominant adult birds divide the reed bed approximately in an equal proportion.

The vertical distribution of juvenile and adult birds did not differ significantly from each other, birds preferred the third shelf. This result from Sumony is similar to other studies (Berthold & Schlenker 1975, Pambour 1990). According to niche breadth and comorphological investigations, the Sedge Warbler is the most specialist among reed warblers, as a consequence of its strong specialization in vertical distribution (Catchpole 1973, Bibby & Green 1983, Rolando & Palestini 1989).

Investigate of food dispersion, vegetation structure and interspecific competition among reed warblers within the reed habitat is required for a better understanding of the spatial distribution of Sedge Warblers during migration.

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Összefoglalás

A vonuló foltos nádiposzták (*Acrocephalus schoenobaenus*) térbeli eloszlása egy dél-magyarországi nádszegélyben

Az őszi vonulási időszakban befogott 1398 fiatal és 290 öreg foltos nádiposzták horizontális és vertikális eloszlását vizsgáltuk. Vizsgálatainkat 1989 és 1993 között végeztük a Sumonyi-halastavak nádszegélyében. 492 (35%) fiatal példányt a vízhez közeli, vízben álló három hálósával (hálók 16%-a) fogtuk be. Ugyanezzel a három hálósával csak 59 (20%) öreg madarat fogtunk. A fiatalok horizontális eloszlása aggregált, míg az öregeké nem. A korosztályok vertikális eloszlásában szignifikáns különbséget nem találtunk, az alulról számított harmadik hálózsebben volt a legtöbb egyed megfogva. Eredményeink hasonlóak a vonuló foltos nádiposzták más európai nádasokban tapasztalt térbeli eloszlásához.

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