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Autumn migration dynamics of the Sedge Warbler (Acrocephalus schoenobaenus) in Hungary

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More than 3500 Sedge Warblers were trapped at "Actio Hungarica" camps of the Hungarian Ornithological and Nature Conservation Society in 1990. The migration dynamics of the Sedge Warbler is described in this paper. There were significant differences in the timing of migration between the three stopover sites under study. The median dates were: 17 August at Ócsa (47°19'N, 19°13'E), 19 August at Fenékpuszta (46°44' N, 17°14' E), and 16 August in Sumony (45°58'N, 17°56'E). Adults usually migrate earlier than juveniles. The birds were equally likely to be recaptured at each stopover site, but stopover time differed between stopover sites. The northern populations come from Southern Scandinavia and the Baltic region and migrate in largest numbers at the end of August and in early September in the Carpathian Basin.

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1. Introduction

The Acrocephalus Project of EURING (European Union for Bird Ringing) was started in 1981. The Hungarian Ornithological and Nature Conservation Society joined this international research program, which was started to assess the breeding areas, migratory routes dynamics and stopover sites of different migrating populations of Acrocephalus warblers. This work is important to the research of alternative evolutionary strategies of related species as well as to practical nature conservation (Csörgő 1991, Koskimies & Saurola 1985, Spina & Bezzi 1990).

The best-known migration dynamics of European Sedge Warblers is that of the British populations. Their migration is fast and it considerably depends on the presence and quantity of the reed aphid (*Hyalopteris pruni*) considerably (Bibby *et al.* 1976, Bibby & Green 1981, Gladwin 1963, Insley & Boswell 1978, Ormerod 1990, Pepler & Pepler 1972, Shennan 1986, Sitters 1972). We also have information on migrating birds from France (Bibby & Green 1983), Yugoslavia (Gergely 1986), Finnland (Koskimies & Saurola 1985) and Italy (Spina & Bezzi 1990). Dynamics (Gyurácz & Csörgő 1991), direction (Csörgő 1991, Csörgő & Ujhelyi 1991) and the age differences in migration (Gyurácz & Csörgő 1991) were examined in Hungary. Little is known

about the important stopover sites of Sedge Warblers in Central and South-East-Europe. Hungary took the initiative in the research of bird migration in Bulgaria (Burgas), Rumania (Istria), Croatia (Pag), Serbia (Ludas), but the data is yet to be processed.

This paper analyses the spatial differences in autumn migration dynamics of European Sedge Warblers and the age dependence of migration in Hungary.

2. Study area and methods

The birds were caught and ringed in the "Actio Hungarica" camps of the Hungarian Ornithological and Nature Conservation Society in 1990.

The three study sites were: Ócsa (47°19'N, 19°13'E), Fenékpuszta (46°44'N, 17°14'E) and Sumony (45°58'N, 17°56'E). The nets stood both in homogeneous reed beds (in standing water) and in dry bushes at Ócsa and Sumony, while they were only in the reed bed of Lake Balaton at Fenékpuszta. The study was carried out between 15 July and 15 September at Ócsa, between 15 July and 23 September at Fenékpuszta and between 28 July and 9 September at Sumony. Thus, we could compare the three study sites between 28 July and 9 September. The nets were 12 m long and 2,5 m high. The area of nets erected was constant in each area, the overall surface of nets was 1980 m^2 at Ócsa, 300 m^2 at Fenékpuszta, and 900 m^2 at Sumony. The birds were extracted from the net in every hour, with the first net-check at dawn, and the last one after dark. All birds were ringed, sexed, and aged according to Svensson (1984). Of the 3895 Sedge Warblers ringed in 1990, 309 were ringed at Ócsa, 3185 at Fenékpuszta, and 401 at Sumony.

The migration diagrams were calculated from the number of ringed and recaptured birds per day. We calculated the percentage of adults, and juveniles for five-day periods (pentads). The "minimum" stopover time of a bird was calculated from the first capture and the last recapture dates. We only considered birds that were ringed and recaptured at the same study site in 1990.

3. Results

There were significant differences in the timing of migration between the three stopover sites in respect of the same migration period, from 28 July to 09 September. The median date was 17 August at Ócsa, 19 August at Fenékpuszta, and 16 August at Sumony. The differences were: Ócsa–Fenékpuszta $z=7.64$, $P<0.01$, Ócsa–Sumony $z=3.27$, $P<0.05$, Fenékpuszta–Sumony $z=7.28$, $P<0.01$ (Mann–Whitney U-test, Fig. 1)

The migration dynamics of juveniles and adults did not differ significantly at Ócsa (median $pentad_{ad}$=04–08 Aug, $S^2_{ad}=62.88$, median $pentad_{juv}$=09–13 Aug, $S^2_{juv}=26.21$, $F=2.39$, d.f.=9, $P>0.05$), nor did at Fenékpuszta (median $pentad_{ad}$=04–08 Aug, $S^2_{ad}=40.19$, median $pentad_{juv}$=19–23 Aug, $S^2_{juv}=28.40$, $F=1.41$, d.f.=9, $P>0.05$), and nor did at Sumony (median $pentad_{ad}$=09–13 Aug, $S^2_{ad}=42.77$, median $pentad_{juv}$=19–23 Aug, $S^2_{juv}=20.43$, $F=2.09$, d.f.=9, $P>0.05$, Fig. 2).

In total, 429 individuals were recaptured at least one day after ringing. At Ócsa 44 (14% of total birds ringed), at Fenékpuszta 367 (12%) and at Sumony 18

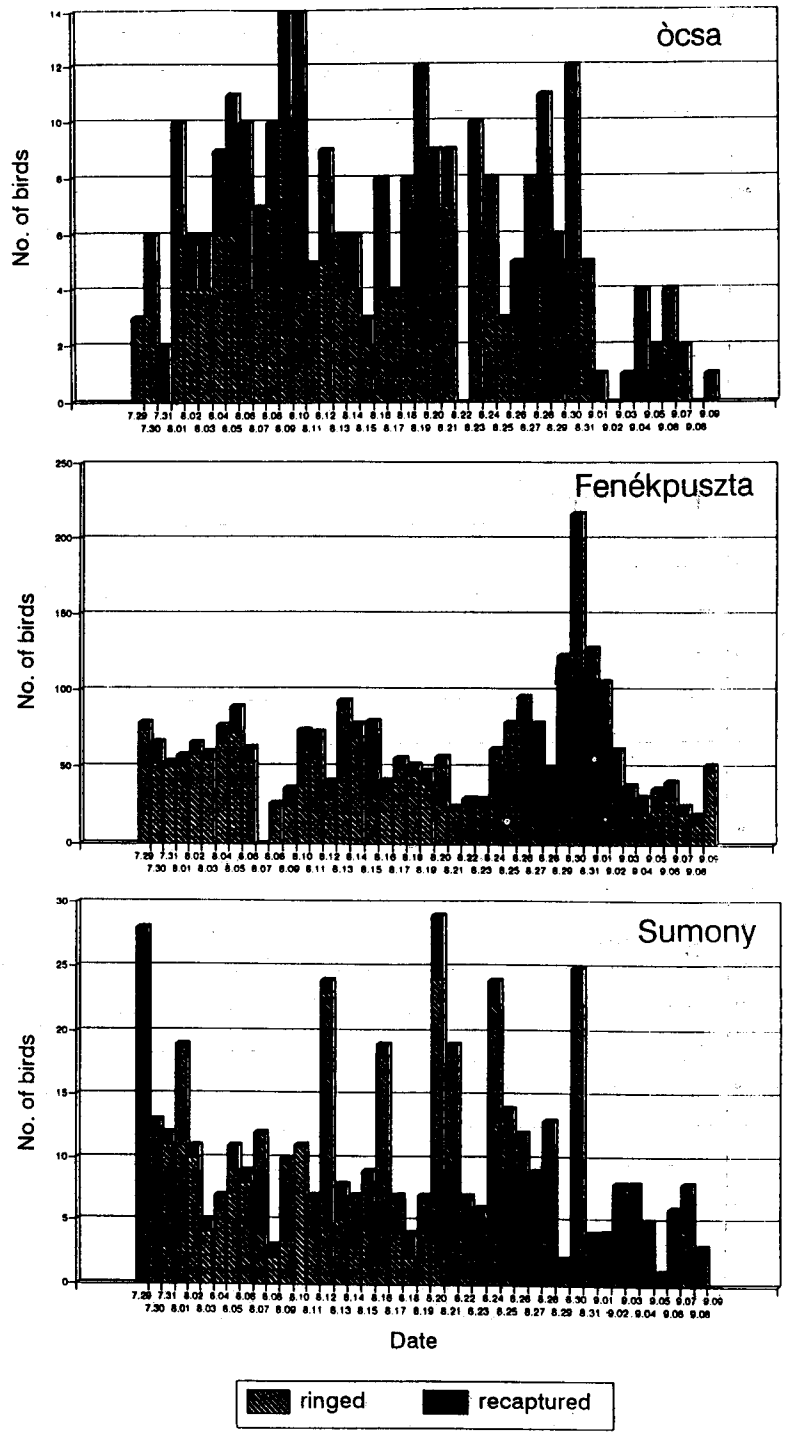

Fig. 1. The timing of migration of the Sedge Warblers at the three study areas.

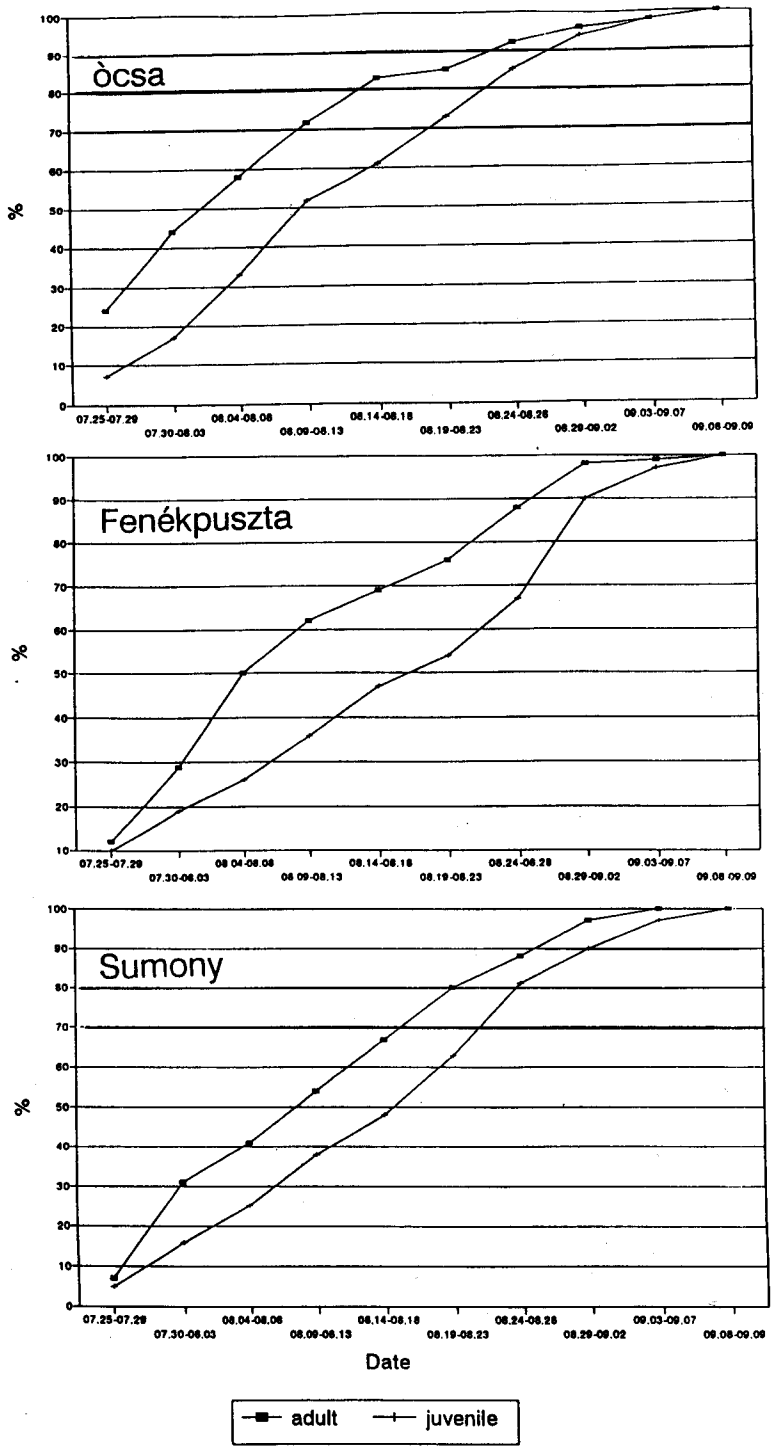

Fig. 2. Migration curve of adult and juvenile Sedge Warblers at the three study areas.

(5%) birds were recaptured. The birds were equally likely to be recaptured in each stopover site (χ^2=4,33, d.f.=2, P>0.05).

Stopover time (birds not recaptured were excluded from the calculations) differed between stopover sites. The average length of stopover was 7.72±6.08 days at Ócsa (N=44), 5.66±4.46 days at Fenékpuszta (N=367), and 7.50±5.2 days at Sumony (N=18). There was a significant difference between Ócsa and Fenékpuszta (one-way ANOVA, F=5.31, d.f.=4.26, P<0.05).

4. Discussion

The majority of Sedge Warblers usually pass through Hungary at the end of August and in early September. Hungarian results are in accordance with the foreign findings. The migration is fast and continues for a long time, similar to that of West-European populations (Pepler & Pepler 1972, Sitters 1972). Mainly birds from Southern Scandinavia and the Baltic region migrate through the Carpathian Basin in addition to smaller numbers of Central European populations in the second half of August and in early September. The median capture date was 15 August for adults and 24 August for juvenile birds arriving from northern areas of Hungary (Csörgő & Ujhelyi 1991). The peak of the migration of Sedge Warblers is in early August in Finland (Koskimies and Saurola 1985). According to Bibby *et al.* (1976), the migration of more southern populations starts gradually earlier, because of the early senescence of reed. This statement relates to local breeding populations, too, which migrate earlier than more northern populations (Zwicker 1982).

The peak of the Sedge Warbler migration avoids Ócsa, therefore this area is not an important stopover area for migrating northern populations. Most Sedge Warblers were ringed at Fenékpuszta. The reason for this is that the reed belt of Lake Balaton is very narrow at the mistnetting site, and it packs the birds together, that otherwise would move in the wide reed bed, an area not studied. There were not researches during migration in similar extensive reed beds, for instance at Lake Fertő and Lake Velence in Transdanubia, or at the fish ponds of Hortobágy in Eastern Hungary. We do not know what is the role of these large reed beds as of the migrating Sedge-Warblers in Hungary. Reed beds can be found in the Great Hungarian Plain at the same latitude as Fenékpuszta and Sumony. We suppose that these reed beds also have an important role in the migration of the northern populations of Sedge Warbler.

The direction of migration averaged 182°, almost exactly southward to the birds arriving from the Baltic region to Hungary (Csörgő & Ujhelyi 1991). It is possible that a smaller part of the Baltic population of Sedge Warbler migrates East of the Carpathians and has a stopover site in Dobrudzsa near the Black Sea (the first Estonia-ringed Sedge Warbler was found at Istria in 1992). The role of the reed beds in the migration of European Sedge Warblers is still unknown in South and East-Europe. The simultaneous application of the orientation cage (Spina & Bezzi 1990) is necessary at more sites for exact assessment of the migration directions in Hungary. The comparative analysis of morphological features (wing length, wing shape) of birds trapped at different latitudes would be important in order to know the sites of origin of the migrating populations.

The adults leave the breeding area about one or two weeks earlier than juveniles do (Gyurácz & Csörgő 1991, Insley & Boswell 1978, Koskimies & Saurola 1985, Spina & Bezzi 1990). This difference may have morphological, physiological and evolutionary reasons. (1) The adults have longer wings than juveniles. The longer wing makes faster flight possible for adults (Albu 1983). The juveniles' shorter wings increase the ability of manoeuvreing, so they help in feeding. The adults compensate for the decreased ability of manoeuvreing by experience (Alatalo *et al.* 1983). (2) The wing and tail of juveniles grow even after leaving the nest and as they are inexperienced as well as less efficient than adults in gathering food, they need a longer period for developing fat reserves before migration (Koskimies & Saurola 1985). (3) This species occupy territories in the wintering area (Moreau 1972). The earlier arriving birds may be able to occupy better territories and can increase their fitness. The earlier arrival does not always imply a shorter migratory route. The reason for this may be that they reach the sufficient fat level earlier (arriving-time hypotesis: Ketterson & Nolan 1983). Hussel (1991) examined an *Empidonax* species in North-America and argues that the dependence of migration on age can also be explained by competition for wintering territories. The juveniles cannot occupy territories in the wintering area, therefore earlier migration is not advantageous for them. (4) The decrease in food abundance influences migration of the juveniles in the breeding area.

The conservation of the breeding habitats, stopover sites and wintering areas of Sedge Warbler populations is very important because the sizes of breeding populations have decreased all over Europe during the last decades (Haland 1982, Marchant *et al.* 1990, Spina & Bezzi 1990). The preservation of reed beds in Hungary is necessary not only for the protection of Hungarian breeding populations, but for the protection of Scandinavian and Baltic populations over Hungary.

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Összefoglalás

A foltos nádiposzáta (*Acrocephalus schoenobaenus*) őszi vonulásdinamikája Magyarországon

A Magyar Madártani és Természetvédelmi Egyesület "Actio Hungarica" madárgyűrűző táboraiban (Ócsa, Fenékpuszta, Sumony) 1990-ben gyűrűzött több mint 3500 foltos nádiposzáta adatai alapján vizsgáltuk a faj vonulásának dinamikáját. A vonulás csúcs ideje (a befogott madarak 50%-hoz tartozó időpont) alapján megállapítottuk, hogy Fenékpusztán és Sumonyban augusztus végén, szeptember elején is intenzív a vonulás. Ennek oka, hogy ebben az időszakban vonulnak át legnagyobb számban a Dél-Skandináviából és a Baltitenger térségéből származó populációk Magyarországon. Ócsán ezt kevésbé lehet tapasztalni, mert ott nem, vagy csak kis számban pihennek meg az északi madarak. Az öreg madarak előbb vonulnak mint a fiatalok. A megpihenő madarak átlagos tartózkodási ideje Fenékpusztán volt a legrövidebb.

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