

Postbreeding migration of the Sedge Warbler *Acrocephalus schoenobaenus* in the Czech Republic

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In 1979–1990, postbreeding migration of the Sedge Warbler *Acrocephalus schoenobaenus* was monitored at two sites in the northeastern part of the Czech Republic. The study area was used by a local population, and populations from southern Finland and the eastern Baltic, which then continued in their flight to suitable sites in Austria, Hungary and Slovenia. A total of 8456 Sedge Warblers were captured, of which 17% were retraps. The number of birds captured over a comparable period (15/7–28/8) in different years varied considerably, and at one of the sites, the minimum was 6.6 times smaller than the maximum. Differences were also found between the two sites. Migration of adult and juvenile Sedge Warblers peaked during the second half of July and the first or second ten day period of August, respectively. At the site where fat accumulation measurements were taken during different years, moderate increases were not observed before Day 4.

1. Introduction

In 1981, the European Union for Bird Ringing (EURING) started an all-European research programme on the migration of the Sedge Warbler *Acrocephalus schoenobaenus* (Koskimies & Saurola 1985). The EURING's Acroproject proposed to study the dynamics of postbreeding occurrence, bird abundance in different years, direction of movements of ringed birds, and accumulation of migratory fat.

The present paper analyses these migration characteristics of Sedge Warbler populations during the postbreeding period in two locations in the northeastern part of the Czech Republic. Local populations are changed by migratory birds that originate in Finland and the eastern Baltic region.

2. Material and methods

In 1979–1990, mist netting and ringing of Sedge Warblers in reedbeds was carried out in Heřmanice and Bartošovice. The two sites lie along the upper reaches of the Odra river in the northeast section of the Czech Republic. During the postbreeding migration, mist nets were placed in standard straight lines (150 m, 1 line per site).

Heřmanice (49.52 N 18.20 E) is a pond lying in the immediate vicinity of the town of Ostrava and its heavily industrialized surroundings. It extends over an area of about 100 ha and is surrounded by large areas of reedbeds (about 40 ha). Birds were captured continuously from 1979 to 1990.

Bartošovice (49.40 N 18.03 E) is a pond about 30 km southwest of Heřmanice. Its area is 16 ha.

During the time the study was conducted, its surrounding reedbed area shrank from the original 6 ha to only 2 ha. Continuous netting took place here from 1986 to 1990.

The length of the netting periods varied during different years. In order to assess the situation at the two sites during different years, a common interval between July 15 and August 28 was selected. At that time, netting in Heřmanice took place during 1983–1985, 1989, and 1990; in Bartošovice it was carried out regularly every year, i.e., from 1986 to 1990. Birds were always captured during the whole day.

To complement the data on migration, reports on recoveries of birds ringed in the upper Odra reaches on other occasions were also used.

The accumulation of migratory fat in birds was monitored between 1987 and 1990 in Bartošovice. It was expressed as a fat index of 0 to 5 (Busse & Kania 1970). The aim was to define the variations in the fat index in birds staying at the site for some time.

3. Results

Of the total of 5178 birds trapped in Heřmanice, 17.3% were retraps. Of the total of 3275 birds trapped in Bartošovice, 17.2% were retraps.

Of the total of 4282 newly ringed Sedge Warblers in Heřmanice, 17.8% were adults and 82.2% were juveniles. Of the total of 2713 of birds ringed in Bartošovice, 7.4% were adults and 92.6% were juveniles. The percentage of adult birds in Heřmanice was significantly higher than that in Bartošovice.

The number of birds captured during different years between 15/7 and 28/8 are shown in Table 1. Data from the years studied show marked differences, with the largest variations having been recorded in Heřmanice, where the number

of Sedge Warblers ringed dropped 6.6 times, from the peak of 1049 birds in 1984, to 158 birds in 1990. In 1989 and 1990, when netting was carried out simultaneously at both sites, the number of birds captured were substantially different: 516 and 158 in Heřmanice, and 290 and 665 in Bartošovice, respectively.

The characteristics of Sedge Warbler occurrence in Heřmanice and Bartošovice are shown in Fig. 1 and 2 respectively. In Heřmanice, the situation is clearly documented. The passage of adult Sedge Warblers peaks there in the second half of July, followed by a marked drop in the number of adult birds. The passage of juvenile Sedge Warblers peaks in the first half of August. In Bartošovice, no single migration peak of adult Sedge Warblers was observed. The peak of juvenile Sedge Warblers seems to occur in the second ten day period of August.

Sedge Warblers captured along the upper reaches of the Odra River move through a narrow corridor in a south-southwesterly direction (Fig. 3). In addition to birds nesting at the two sites studied, birds from coastal regions of southern Finland, Estonia, Latvia, Lithuania, and north-eastern Poland were also found. During the autumn passage, local, as well as transient birds, then moved on to suitable sites in Austria, Hungary, and Slovenia.

We were able to demonstrate that birds ringed in Heřmanice as pullus on 26/6/88 were still at the same site on 4/8 the same year, when birds from north-northeast regions (e.g., GDANSK KD 96 725: ringed on July 10, 1980, at 53.48 N 21.43 E, and recovered on August 2, 1980, in Heřmanice) had already arrived there. This is evidence that the populations from different areas along the migration route overlapped.

Accumulation of migration fat was recorded in 453 ringed and controlled birds. Changes in the values found in the retraps, expressed as val-

Table 1. Total numbers of Sedge Warblers captured between 15 July and 28 August. x = netting did not extend over the entire period, xx = no netting.

	1983	1984	1985	1986	1987	1988	1989	1990
Heřmanice	600	1049	200	x	x	x	519	158
Bartošovice	xx	xx	xx	456	1071	363	290	665

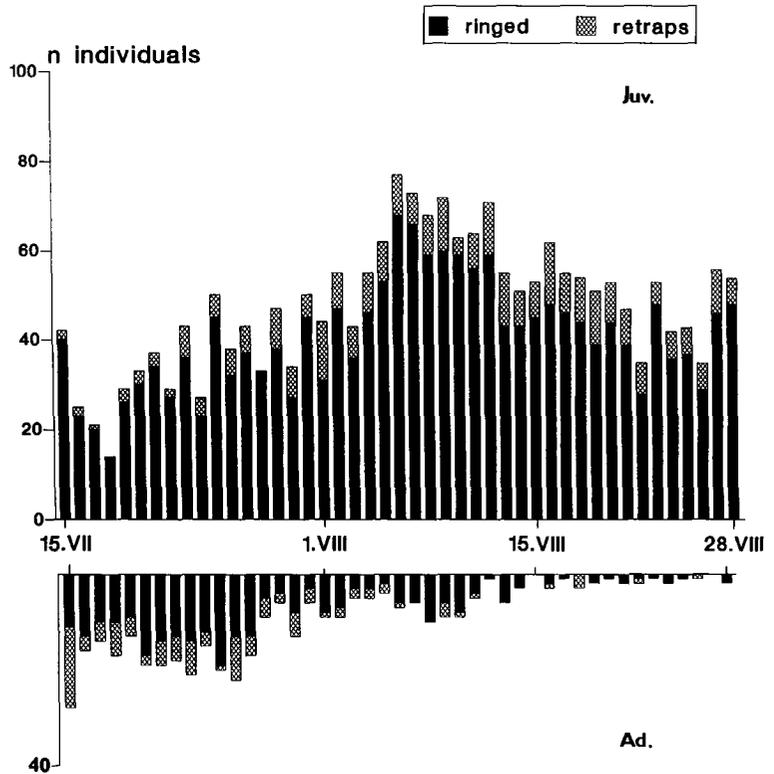


Fig. 1 Dynamics of postbreeding occurrence of Sedge Warblers in Heřmanice (pooled results from 1983–85, 1989 and 1990; n = 2523).

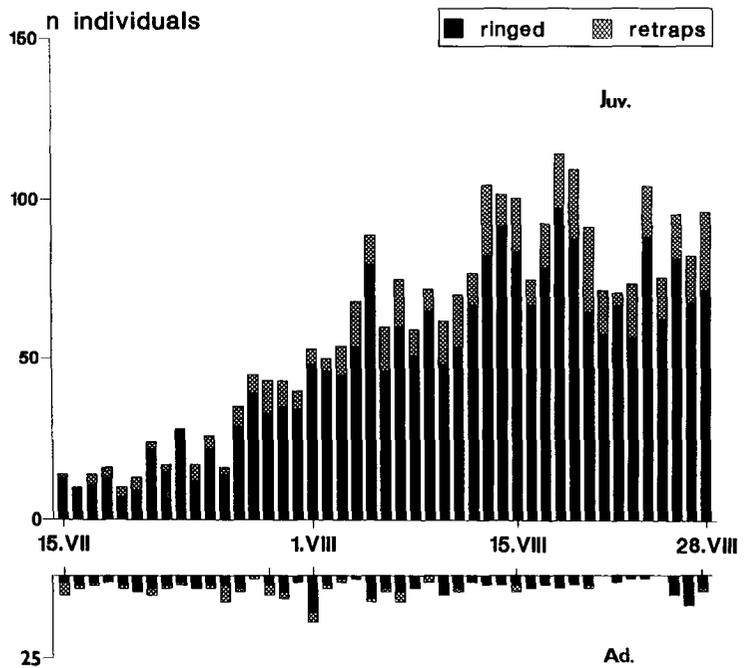


Fig. 2 Dynamics of postbreeding occurrence of Sedge Warblers in Bartošovice (pooled results from 1986–90, n = 2854).

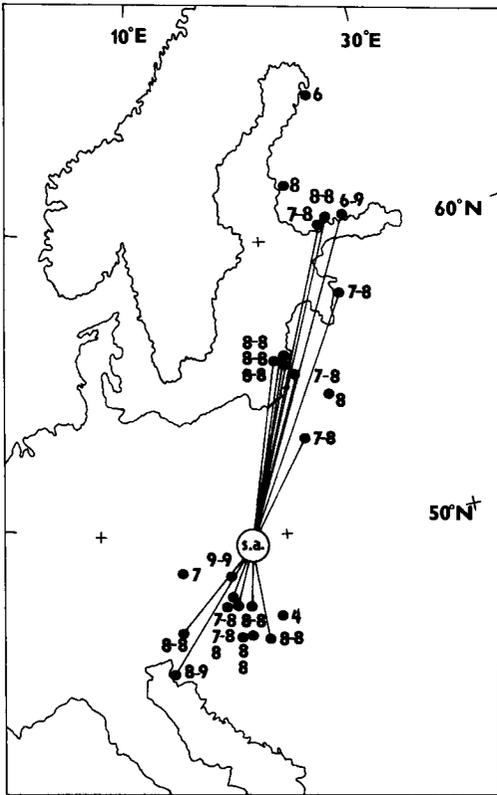


Fig. 3 Recoveries of Sedge Warblers trapped in northeastern area of the Czech Republic (s.a. = study area with two sites investigated, the full line represents a straight passage in one season, numbers at occurrence sites indicate the month of capture, a single figure at finding sites represents the month when the bird was found, in other cases, two figures are shown: one is the month of ringing, the other is the month of control in straight passage).

ues from -5 to +5, are given in Table 2. On average, birds retrapped on Day 2 or 3 after ringing showed no change in accumulated fat.

Table 2 Changes in migratory fat accumulation of recaptured Sedge Warblers in Bartošovice.

Year	Day of occurrence at the site			
	2nd (n)	3rd (n)	4th (n)	≥5th (n)
1987	0 (71)	0 (57)	0 (29)	+1 (79)
1988	0 (15)	0 (8)	0 (6)	+1 (18)
1989	0 (8)	0 (10)	0 (5)	+1 (13)
1990	0 (44)	0 (36)	+1 (13)	+1 (41)

From Day 5 on, the majority of birds regularly showed an increase in accumulated fat, with a mean gain of +1. A moderate increase in accumulated migration fat in Sedge Warblers was not observed before Day 5 (in one year, from Day 4) of their stay at the site.

4. Discussion

European populations of Sedge Warblers migrate, broadly dispersed, in the southwestern to east-southeastern directions. Scandinavian populations, however, migrate to the south along a much straighter route. Finnish populations fly south to central Europe (Sauola 1981) and from there to northern Italy and Malta (Cramp 1992). Our two sites are situated directly along their resulting south-southeastern migration route. Results of our ringing provide important data on the origin of bird populations that migrate over the northeast of the Czech Republic. We demonstrated that the birds come from the east Baltic, and the results of other studies (Koskimies & Sauola 1985, Kostepõld & Kostepõld 1988) allow us to deduce what route these birds take in their passage to Africa, and the location of their winter grounds in Africa.

The first postbreeding movements of Sedge Warblers are recorded immediately after the young become independent. In mid-August, when the movement of juveniles in Bartošovice and probably also in Heřmanice seems to peak, typical "migration nights" take place in central Europe (Grüll & Zwicker 1982). The majority of birds passing through the sites studied by us probably come from the eastern Baltic region. Their migration in the northeast part of the Czech Republic should, therefore, peak after the maximum migration in the eastern Baltic. This is most likely the case, because in Finland and Lithuania migration of Sedge Warblers peaks between the third ten day period in July, and the first ten day period in August (Koskimies & Sauola 1985, Papatavichius & Jusys 1987a, b, Papatavichius et al. 1988, Celminsh 1989). In mid-August, migration of the Sedge Warbler also peaks in Italy (Spina 1989).

Migration of adult Sedge Warblers peaks 14 to 22 days before the migration peak of the ju-

veniles (Bibby et al. 1976, Isley & Boswell 1978, Koskimies & Saurola 1985, Røstad 1986). Our results at one of the sites were similar, while no clearly defined peak was observed at the other site, which was probably due to a smaller number of adult Sedge Warblers.

The age structure of Sedge Warbler populations at the two sites, as expressed by the adults-to-juveniles ratio, differed. A question remains, why in Heřmanice adults formed almost 18% of the population, while in Bartošovice it was only 7%. We believe that an answer to that question may be in a larger number of birds that nested in Heřmanice thanks to a larger area of suitable nesting territory. Thus, the local adults captured before migration may have distorted the overall ratio between adult and juvenile populations of Sedge Warblers. At sites frequented by migrating birds only, the percentage of adults is lower than expected from the adults-to-juveniles ratio after breeding, because it is a well-known fact that the passage of adult Sedge Warblers is straighter and they make fewer stops along their migration routes (Insley & Boswell 1978). On the southern coast of England, e.g. of, adult Sedge Warblers make up about 14% of the population during their autumn migration (Insley & Boswell 1978).

During a four-year study in Bartošovice, a noticeable increase in fat content from Day 4 was found for in one year only, while in the three remaining years, it was not found before Day 5 of the birds' stay at the site. At sites that are probably more important for the accumulation of fat, weight gains were already recorded after 2.4 days (Røstad 1986). It is interesting to note that the percentage of retraps at that site (Nesseby, in the north of Norway) was higher than that of newly ringed birds. Aphids *Hyalopterus pruni* are the main trophic source for fat accumulation before and during the postbreeding migration of the Sedge Warbler, and the marked differences in the abundance of Sedge Warblers in individual years are usually directly proportional to the densities of these aphids in the reedbeds (Bibby et al. 1976, Bibby & Green 1981).

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