Ökol. Vögel (Ecol. Birds) 22, 2000: 119-129

Postbreeding Occurrence of the Marsh Warbler *Acrocephalus palustris* in Reedbed Areas in the Czech Republic and its Migration to Africa

Marcel Honza[1], Ivan Literák[2], Jan Pavelka[3], Jiří Formánek[4]

Postbreeding Occurrence of the Marsh Warbler *Acrocephalus palustris* in Reedbed Areas in the Czech Republic and its Migration to Africa. - Marsh warblers *Acrocephalus palustris* were captured at two sites in the north-eastern part of the Czech Republic. A total of 4,257 birds were captured in reed growths *Phragmites australis* there during their postbreeding migrations in 1979-1990. Migrations of juveniles peaked in the third July decade, adult birds migrated earlier. The number of birds captured over comparable periods in different years varied considerably, and at one of the sites, the minimum was 5.04 times smaller than the maximum. Moderate increases of the fat accumulation were observed on Day 6 of the birds stay at the sites. Marsh warblers from the Czech republic migrate in a south-easterly direction and they winter in Kenya and Malawi. The authors discuss the importance of reedbeds for marsh warblers during their postbreeding migration.

1 - Institute of Landscape Ecology of the ASCR, Květná 8, 603 65 Brno, Czech Republic
2 - University of Veterinary and Pharmaceutical Sciences, Palackého 1-3, 612 42 Brno
3 - District Office, Department of Environment, Horní nám., 31, 755 35 Vsetín
4 - Ringing Station of the National Museum in Prague Hornoměcholupská 34, 110 00 Praha

1. Introduction

The marsh warbler *Acrocephalus palustris* is a small passerine species nesting throughout the entire Palaearctic region. After nesting, it migrates through the Middle East to south-eastern Africa (CRAMP 1992). The only data on the postbreeding migration in Europe of this species come from southern Germany (BAIRLEIN 1981, BERTHOLD et al. 1981) and from Belgium (DOWSETT-LEMAIRE 1981). Some idea of their wintering grounds in Africa is provided by a summary of ringing results (DOWSETT-LEMAIRE & DOWSETT 1987). We studied postbreeding occurrence of birds in reedbeds of *Phragmites australis* at two sites in the Czech Republic between 1979 and 1990. The marsh warbler was a surprisingly frequent species in that environment. We therefore decided to try to analyse some of its migratory characteristics (dynamics of postbreeding occurrence,

bird abundance in different years, accumulation of migratory fat), as we did for *Acrocephalus schoenobaenus* and *A. scirpaceus* (LITERÁK et al. 1994, 1995).
As information on the location of winter quarters of different populations is very scarce (DOWESTT-LEMAIRE and DOWSETT 1987), the present paper also includes results of marsh warbler ringing that relate to the Czech Republic and were recorded by the Ringing Station of the National Museum in Prague.

2. Material and Methods

In 1979-90, mist netting and ringing of marsh 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 region of the Czech Republic. During their postbreeding migration, mist nets were placed there in standard straight lines (150 m, 1 line per site).
Heřmanice (49.52 N, 18.20 E) is a pond lying in an immediate vicinity of the town of Ostrava and its heavily industrialized surroundings. It extends over an area of about 100 ha and it is surrounded by large areas of reedbeds (about 40 ha). Birds were captured there continuously from 1979 to 1990.
Bartošovice (49.40 N, 18.03 E) is a site with two ponds of a total area of 104 ha. In 1986, reedbeds extended over about 40 ha there. During the netting period, their area was gradually reduced to about 2 ha only, located immediately next to the netting line at the Dolní Bartošovický pond.
The length of netting periods varied in individual years. In order to assess the situation at the two sites in different years, a common interval between July 15 and August 28 was selected. The netting in Heřmanice took place in 1983-85, 1989 and 1990 over the same period each year. In Bartošovice, it was carried out regularly every year, i.e. from 1986 to 1990. Birds were always captured during the whole day.
The accumulation of migratory fat was monitored in birds between 1987 and 1990 in Bartošovice. It was expressed as a fat index between 0 and 5 (BUSSE & KANIA 1970). Changes found in retraps were expressed as values from -5 to +5. The aim was to define variations in the fat index in birds staying at the site for some time.

3. Results

Of the total of 1,768 birds trapped in Heřmanice, 8.7 % were retraps. Of the total of 2,489 birds trapped in Bartošovice, 11.5 % were retraps. The difference in the number of retraps at the two sites is significant (χ-square = 8.78 ; d.f. = 1 ; $p < 0.005$).
Of the total of 1,614 newly ringed marsh warblers in Heřmanice, 11.1% were adults and 88.9 % were juveniles. Of the total of 2,201 birds ringed in Bartošovice, 5.6 %

were adults and 94.4 % were juveniles. The difference between the number of adult and juvenile birds at the two sites was statistically significant (χ-square = 38.67 ; d.f. = 1 ; $p < 0.001$).

Tab. 1: Total numbers of Marsh 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	502	585	245	x	x	x	241	116
Bartošovice	xx	xx	xx	406	465	852	305	455

The number of birds captured in individual years between 15/7 and 28/8 is shown in Table 1. Data from the years studied showed marked differences. The number of marsh warblers in Heřmanice varied by a factor of 5.04 with a peak of 585 birds in 1984, and by a factor of 2.8 in Bartošovice, with a peak of 852 birds in 1988. When netting was carried out simultaneously in 1989 and 1990, the number of birds captured was significantly different, 241 and 116 (Heřmanice), and 305 and 445 (Bartošovice) respectively.

Pooled data describing the characteristics of marsh warblers occurrence at the two sites are shown in Fig. 1. The migration peak of adult birds was not very prominent. Approximately the same number of adults was present at the two sites from mid-June to the end of the first decade in August. From then on, a marked decrease in the number of trapped adults was recorded. Very prominent, on the other hand, was the migration peak of juveniles in the last third of July. The size of juvenile population in reedbeds grew rapidly in the second half of July with a peak in the third decade. In August, the number of juveniles gradually decreased.

Tab. 2: Changes in migratory fat accumulation of recaptured Marsh Warblers in Bartošovice (data were pooled, 1987-1990, changes are expressed as median)

	Day of occurrence at the site				
	2nd	3nd	4nd	5nd	6nd
No. of specimens	52	44	30	23	46
Changes in fat accumulation	0	0	0	0	+1

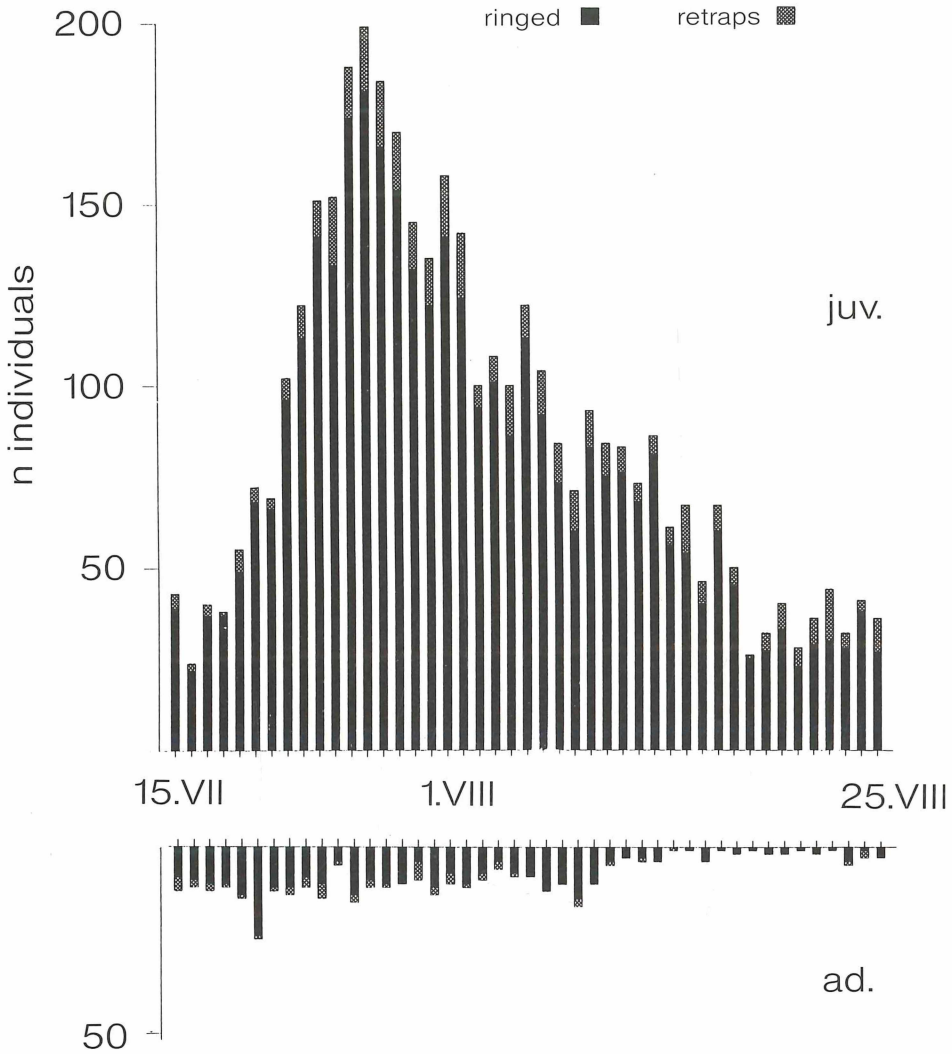

Fig. 1: Dynamics of postbreeding occurrence of Reed Warblers in Heřmanice and Bartošovice. Pooled results from 1983-1985,1989 and 1990 (Heřmanice) and from 1986-1990 (Bartošovice), n = 4172.

A case three pull. ringed at the Heřmanický pond might serve as a proof of the fact that the juveniles that were exceptionally born at the two sites studied could be present

there also at the time of their migration peak. Two siblings T 415 685 and T 415 686 were ringed on 26/06/1986 and controlled repeatedly. The last control of the two birds was on 21/07/86. Another nestling, T 443 350, ringed on 29/06/86 in a different nest, was also controlled several times, with the last control on 23/07/86.

The accumulation of migration fat was recorded in 195 ringed and controlled birds. On average, birds retrapped 2 to 5 days after ringing showed no change in accumulated fat (Tab. 2). From Day 6, birds regularly showed an increase in accumulated fat, with the main gain of +1.

The number of birds retrapped at the same site 1, 2 and 3 years after ringing was 4, 1 and 1 birds respectively. With one exception, they were birds that were ringed as juveniles (birds born that year).

Records of the Ringing Station of the National Museum in Prague list a total of 59 918 marsh warblers ringed between 1934 and 1994. A total of 15 reports on retraps from abroad has been received to date (Tab. 3). Marsh warblers captured in the Czech Republic migrate in the south-easterly direction and they winter in Kenya and Malawi (Fig. 2).

Tab. 3: A list of recoveries of Marsh Warbler from the Czech Republic

1. N. Museum Praha M 586 437		
+ 1st y	03.05.1970	Nákří (49.07 N 14.20 E), CZ
controlled	24.11.1971	Kariobangi (01.15 S 36.53 E), Kenya
2. Radolfzell BJ 43 835		
1st y	02.09.1974	Illmitz (47.46 N 16.48 E), Austria
reringed	21.07.1975	Úvaly, (50.05 N 14.43 E), CZ
3. N. Museum Praha M 707 385		
1st y	30.07.1976	Zahrádky (50.38 N 14.32 E), CZ
controlled	19.11.1979	Ngulia Safari Lodge (03.00 S 38.13 E), Kenya
4. Nairobi J 118 525		
1st y	03.12.1976	Ngulia Safari Lodge (03.00 S 38.13 E), Kenya
controlled	04.06.1978	Ostrava (49.52 N 18.20 E), CZ
5. N. Museum Praha M 615 757		
f.g.	07.08.1977	Ražice (49.45 N 14.06 E), CZ
+ 1st y	15.11.1979	Ngulia Safari Lodge (03.00nS 38.13 E), Kenya

Tab. 3 (cont.):

6. Nairobi J 124753		
1st y	12.12.1977	Ngulia Safari Lodge (03.00 S 38.13 E), Kenya
+ 1st y	27.05.1980	Praha (50.07 N 14.21 E), CZ
	27.06.1980	Praha (50.07 N 14.21 E), CZ
7. Helgoland SA 62 991 !		
	19.07.1977	Hamburg (53.28 N 10.06 E), Germany
controlled	17.05.1978	Řikovice (49.52 N 16.15 E), CZ
8. N. Museum Praha M 827 301		
+ 1st y	23.05.1979	Lanškroun (49.55 N 16.37 E), CZ
found dead	04.06.1980	Beder (56.04 N 10.13 E), Denmark
9. N. Museum Praha T 151 969		
+ 1st y	03.08.1980	Strpí (49.08 N 14.14 E), CZ
	02.08.1981	Ramsdorf (51.06 N 12.23 E), Germany
10. N. Museum Praha M 864 831		
1st y	26.07.1982	Unhošt (50.05 N 14.08 E), CZ
trapped,subsequently died	13.12.1983	Thyolo Distr. (16.15 S 35.09 E), Malawi
11. N. Museum Praha M 915 144		
+ 1st y	16.07.1982	Horka (49.53 N 15.55 E), CZ
08.08.1982		Acrotiri Lake (34.35 N 32.57 E), Cyprus
12. N. Museum Praha T 282 149		
1st y	29.07.1983	Dolní Čermná (49.59 N 16.34 E), CZ
found dead	07.02.1984	Zomba Distr. (15.10 S 35.30 E) , Malawi
13. N. Museum Praha M 897 727		
1st y	12.08.1983	Sopreč (50.05 N 15.34 E), CZ
controlled	12.07.1987	Berlin (52.30 N 13.35 E), Germany
14. N.Museum Praha T 222 882		
1 st y	29.07.1983	Sedlec (48.47N 16.42E), CZ
caught and released	00.12.1983	Mulanje Distr. (16.06 S 35.30 E), Malawi
15. N.Museum Praha T 716 078		
+ 1st y	25.07.1993	Ražice (49.15N 14.06E), CZ
controlled	08.12.1993	Ngulia, Tsavo National Park, (03.00 S 38.13 E), Kenya

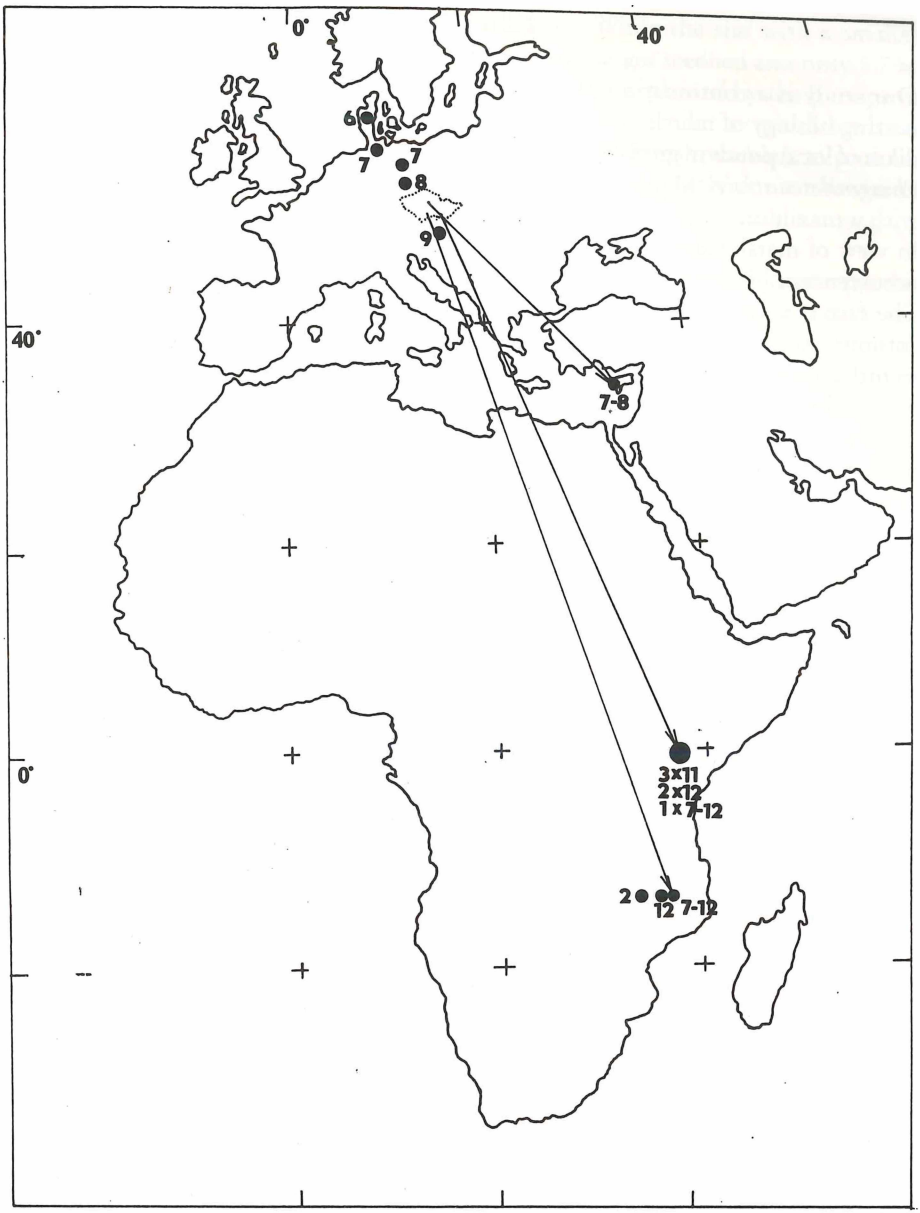

Fig. 2: Recoveries of Marsh Warblers related the Czech Republic
(the full line represents a straight passage in one season, numbers at occurrence sites indicate the month capture, a single figure at finding sites represents the month when the bird was found, in other cases, two figures are shown: one is the month of ringing, the other is the month of control in straight passage)

4. Discussion

Our study is a continuation of research carried out by PETŘÍK (1983), who studied nesting biology of marsh warblers in the same area in 1970-77. This species nests on dikes of local ponds in growths of nettles *Urctica dioica* and along the edges of reedbeds *Phragmites australis*. Marsh warblers begin to lay eggs here in the second half of May, with a maximum in June.

In view of marsh warblers nesting requirements, the question of their postbreeding occurrence at high concentrations in almost clean reedbeds is particularly interesting. The fact that marsh warblers were common in reedbeds in southern Germany in autumn was pointed out by SPRINGER (1960). DOWSETT-LEMAIR & DOWSETT (1987) recorded postbreeding concentrations of marsh warblers in willow trees in the Meuse river valley in Belgium.

It is a well-known fact that nesting requirements of marsh warblers differ significantly from those of other species of the genus *Acrocephalus* (LEISLER 1981, CRAMP 1992). We nevertheless found some similarities in postbreeding requirements between marsh warblers and other *Acrocephalus* species. The fact remains that marsh warblers clearly preferred dry areas of reed growths, i.e. the environment which resembled their nesting environment most (HONZA & LITERÁK 1997).

We assume that individual *Acrocephalus* species chose different nesting environments in the course of their phylogeny as a result of strong interspecific competition. The influence of habitat selection and segregation on specialization and adaptive radiation of closely related species was studied by LACK (1944) and the effect of interspecies competition on habitat segregation was described in other bird species (UDVARY 1951, TERBORGH & WESKE 1975).

It is, however, very difficult to explain why marsh warblers choose reedbeds in the postbreeding period so frequently. A possible explanation might be that they return to the environment where their species probably used to nest in earlier stages of its evolution.

Our next hypothesis on the importance of reedbeds for marsh warblers in their postbreeding period is based on the theory presented by DOWSETT-LEMAIRE & DOWSETT (1987). These authors pointed out the existence of autumn quarters in the northeast of Africa (south-western Ethiopia and neighbouring Sudan). This innete character of the two-step, or biphasic, migration pattern was successfully tested by BERTHOLD & LEISLER (1980) in birds bred in captivity. We think that similar quarters might also exist in Europe and that reedbeds might play the role of „summer quarters". This theory is supported by results obtained in monitoring fat accumulation in birds prior to migration, when their physical fitness improves before they set out on their journey. The existence of such quarters would fit in a theory of a multistage postbreeding migration to Africa. It would be in compliance with an observation that marsh warblers reach the Red Sea coast in August - September (DOWSETT-LAMEIRE & DOWSETT 1987), which, in our view, is a relatively short period of time corresponding to a incoming wave.

Retrap ratios at the two site studied were different. While the site with a smaller reedbed area recorded 11.5% of retraps, the site with a larger reedbed area only 8.7%. The higher percentage of retraps at a smaller area can be explained by the biotope in the immediate vicinity of the reedbed area, which is very similar to marsh warblers nesting habitat (*Urctica*), and may have stimulated some marsh warblers to prolong their stay there. It is also probable that the higher ratio was partly due to the size of reedbed areas in question, because the smaller the area the more probable retrapping is.

A comparison of pooled data shows that the number of marsh warblers retrapped is much smaller than the number of reed warbler or sedge warbler retraps from the same period and the same sites (about 17 % and 21 % respectively) (LITERÁK et al. 1994, 1995) . We believe that this documents a much shorter stay of marsh warblers in reedbeds in their postbreeding period compared to reed warblers and sedge warblers. The proportion of adults in Heřmanice and Bartošovice was different (11.1 % and 5.6 % respectively). Our findings more or less correspond to the data ascertained for sedge warblers (17.8% and 7% respectively) but they differ completely from those ascertained for reed warblers (19.1% and 32.4% respectively) (LITERÁK et al. 1994, 1995). The fact that the number of areas suitable for nesting at the Bartošovice site is much higher than at the Heřmanice site might be significant in this respect. We might then argue that a smaller number of adult birds in Bartošovice was due to a higher proportion of juveniles in the local population which, at least at the beginning of migration, influenced the juveniles-to-adults ratio of the birds trapped.

In spite of the fact that no prominent migration peak was ascertained for adult birds, Fig. 1 clearly shows that they begin to leave before the juveniles do. Adult marsh warblers will probably leave the breeding grounds at least two weeks before young birds (DOWSETT-LEMAIRE 1981). The migration peak of juvenile birds falls within the second half of July. In Belgium, most juvenile birds leave in August (DOWSETT-LEMAIRE 1981), in southern Germany the migration peak is between July 20 and August 20 (BAIRLEIN 1981). The earlier departure of marsh warblers from the sites surveyed compared to the situation in some areas in western Europe may be partly due to trophic conditions.

The amount of fat is an indicator of energy reserves for migration. Our results indicate that reedbeds function as a good trophic source. We found that marsh warblers get one degree fatter on Day 6 of their stay at the site. Similar situation was found in sedge warblers, which got fatter on Day 5 of their stay at the same site (LITERÁK et al. 1994).

West European populations typically chose a constant south-eastern route to Africa via Middle East (DOWSETT-LEMAIRE & DOWSETT 1987). On the basis of control trapping in Austria and Cyprus (Fig.2), we concluded that it was also true about Central European populations.

DOWSETT-LEMAIRE & DOWSETT (1987) summarized their findings from wintering grounds of the marsh warbler in Africa. They reported 5 recoveries in eastern Africa

(Sudan and Kenya) and 4 recoveries in south-eastern Africa (Malawi and Mosambique). A total of six of the birds were identified as coming from the Czech Republic. In view of the fact that the Ringing Station of the National Museum in Prague have recorded another three cases, we can state that the wintering grounds of Central European birds is in eastern and south-eastern Africa. It is interesting that 5 recoveries of birds from the Czech Republic were reported from a single place, namely Ngulia Safari Lodge in Kenya. This may be due to the fact that the passage of marsh warblers over East Africa appears to be mostly confined to a narrow front about 250 km wide across central and south-east Kenya (PEARSON 1982), and that Ngulia Safari Lodge is a place where marsh warblers were intensively trapped (KELSEY et al. 1989).

5. Zusammenfassung

Nachbrutzeitliches Auftreten von Sumpfrohrsängern (*Acrocephalus palustris*) in Schilfgebieten Tschechiens und deren Zug nach Afrika. – Wir untersuchten den Wegzug von Sumpfrohrsängern (*Acrocephalus palustris*) anhand von Fangzahlen in zwei Schilfgebieten an der Oder im nordöstlichen Tschechien.
Zwischen 15. Juli und 28. August 1979-1990 wurden in den beiden Gebieten 4257 Vögel gefangen.
Altvögel ziehen vor den Jungen ab/durch. Das Fangmuster der Jungvögel zeigt einen Gipfel in der dritten Juli-Dekade.
Die Anzahl der Fänglinge variiert in den einzelnen Jahren stark (in einem Gebiet um den Faktor 5).
Erst bei längerer Verweildauer (6 Tage) stellten wir eine mäßige Fettzunahme fest.
Nach Kontrollfängen und Ringfunden ziehen Sumpfrohrsänger aus Tschechien nach SE ab und überwintern in Kenia und Malawi.
Die Bedeutung von Schilfgebieten als Rastplätze bei nachbrutzeitlichen Bewegungen der Art wird diskutiert.

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