

## Distribution of *Sylvia* warblers at a stopover site during spring migration

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### Abstract

In this study the vertical and horizontal distribution of four *Sylvia* warblers at a spring stopover site on southernmost Gotland in the Baltic was investigated. The results show that there is some species specificity in micro-habitat choice, though small differences were found concerning the vertical distribution. During the breeding season, *Sylvia* warblers exhibit interspecific interactions to some degree, especially between the Garden Warbler *S. borin* and the Blackcap *S. atricapilla*. No change in habitat choice was noted in the distribution of Blackcaps after the arrival of Garden Warblers. This does not indicate that

there is interspecific competition between these species during migration. However, the birds pass quickly through this stopover site and the situation may be different at a site where they stay longer. Some bird species were concentrated in particular nets, or groups of nets, which could be a warning when interpreting ringing results between years, since removal or addition of critical nets could highly affect the number of birds captured between years.

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### Introduction

It is well known that habitat selection is important for most bird species during the breeding season (eg. Lack 1971, Orians & Wittenberger 1991). Interspecific interactions also influence territory and habitat choice of some species, e.g. Garden Warbler *Sylvia borin* and Blackcap *S. atricapilla* (c.f. Garcia 1983). In several studies it has been shown that birds also have a species specific habitat preference during migratory stopover periods (Bairlein 1983, Moore et al. 1990). Night migrating passerine birds make repeated use of stopover sites during their migration where they either stay for several days and replenish energy reserves or only make a short daytime break between two nights of migratory flights. Long-distance migrants should be flexible in their use of habitat during migration because they meet a wide range of habitats, which differ in vegetation structure, resource quality and quantity, and competition from other migrants or residents (Moore et al. 1990). The aim of this study was to investigate if the distribution

of four species of *Sylvia* warblers differ at a trapping site on the southernmost point of the island of Gotland in the Baltic during spring migration. The four species were the Lesser Whitethroat *S. curruca*, Whitethroat *S. communis*, Garden Warbler *S. borin* and the Blackcap *S. atricapilla*. The first three species are complete trans-Saharan migrants while Blackcaps breeding in northern Europe migrates to East Africa, the Mediterranean area and central Europe (Zink 1977, Fransson in prep.).

### Study site, material and methods

The data were collected in the spring of 1991, during the normal bird ringing programme performed by the Sundre Bird Ringing Group, on the southernmost part of the island Gotland in the Baltic Sea. The ringing was carried out between April 21th, and June 9th. The spring ringing site (Fig. 1) is situated about one km from the Baltic shore, in a valley oriented in

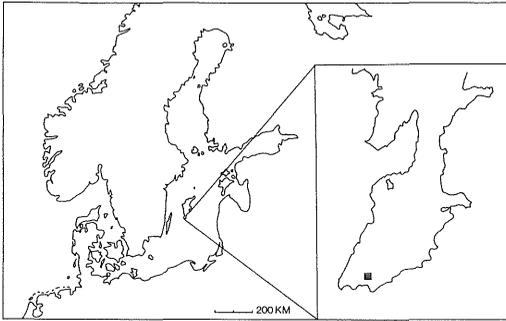


Fig. 1. Map showing the location of the spring ringing site for the Sunde Bird Ringing Group on the southernmost point of the island of Gotland (square).

Karta som visar fångstplatsens läge (kvadrat) på södra Gotland.

a N-S direction (56°55'N, 18°11'E). The mist-nets are placed in small copses of poplars *Populus alba*, aspens *P. tremula*, birches *Betula verrucosa* with a dense understory of willows *Salix spp.*, roses *Rosa spp.*, hawthorn *Crataegus calycina* coll., hazel *Corylus avellana*, juniper *Juniperus communis* and blackthorn *Prunus spinosa*.

In the area 35 mist-nets were used, each nine meters long and 2.7 meters high, with four shelves. Notes were made about in which net, and in which shelf *Sylvia* warblers were caught. In the Blackcap, the sex of the bird was also determined. Information from a total of 361 *Sylvia* warblers was collected (65 Lesser Whitethroats, 59 Whitethroats, 95 Garden Warblers, and 146 Blackcaps) which is almost all of the 364 *Sylvia* warblers ringed during the spring 1991.

For the study of the horizontal distribution, the capturing data are compared area-wise (nets in relatively homogeneous habitats were pooled; see Fig. 2).

## Results

### *Distribution in the area*

The distribution in the trapping area shows that the studied species do not have an equal distribution between the different net areas ( $\chi^2=48.22$ ,  $df=15$ ,  $p<0.001$ , Fig. 3 a-d). The differences between groups of nets were smallest for Garden Warblers, while the

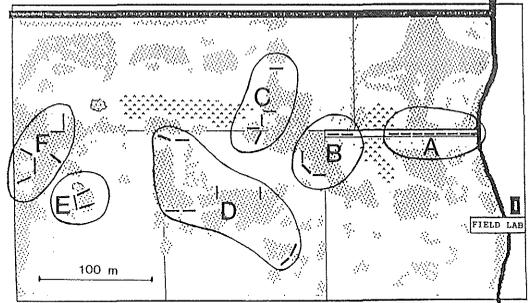


Fig. 2. Map of the ringing site, showing net positions and net areas (A-F), used in the analyses. Dotted areas are copses of trees and bushes.

Karta över nätområdet med de olika nätens placeringar och de olika nätområdena (A-F) markerade. Rastrering markerar träd- och buskbevuxna områden.

differences were largest for Lesser Whitethroats, where more than 40% of the birds were trapped in area A. When looking at single nets, the highest concentration of one species was found in the Whitethroat, with 20.3% of all individuals trapped in one net. The corresponding figures for the other species were, 10.7% for the Lesser Whitethroat, 9.5% for the Garden Warbler and 7.0% for the Blackcap. Three adjacent nets in area A trapped 32% of all Lesser Whitethroats. The pooled distribution for all species was more even and none of the nets trapped more than 6.8% of the total number of *Sylvia* warblers.

The only species which readily can be sexed according to plumage criteria is the Blackcap and comparisons of catching sites for males and females do not show any significant difference in habitat preferences between the two sexes (Fig. 4,  $p>0.05$ , Kolmogorov-Smirnov two sample test). Blackcaps were caught during a longer period than the other species and in order to analyse if there was any effect by the time of the season, in habitat preferences, catches before and after 23 May were compared. No indication was found that Blackcaps preferred different areas in these periods ( $p>0.05$ , Kolmogorov-Smirnov two sample test). Whether Blackcaps and Garden Warblers differ in their distribution at the trapping site was also investigated. All Garden Warblers were trapped after the 23 May and their distribution did not differ from that of Blackcaps ( $p>0.05$ , Kolmogorov-Smirnov two sample tests).

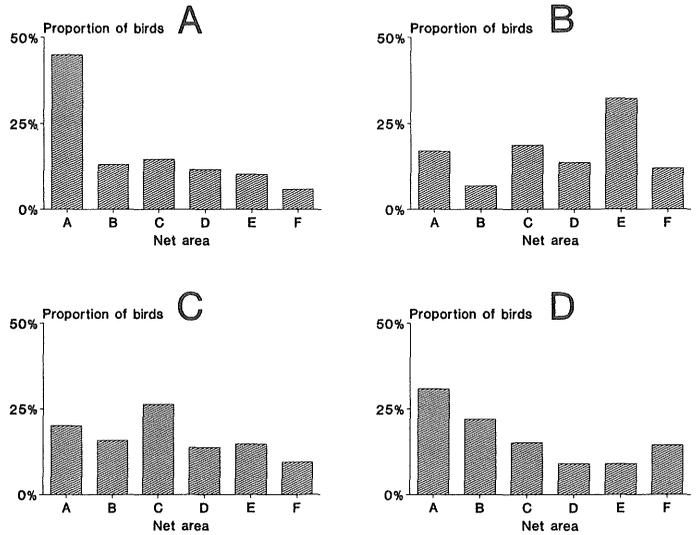


Fig. 3. Relative numbers of *Sylvia* warblers caught in the different net areas (see Fig. 2). A = Lesser Whitethroat, B = Whitethroat, C = Garden Warbler, and D = Blackcap.

Procentuell andel av fångsten i olika nätområden för de olika arterna. A = ärtsångare, B = törnsångare, C = trädgårdssångare och D = svarthätta.

### Trapping heights in the nets

Some differences were found between the species' distribution in the four net shelves, but the total distribution did not reveal any significant difference ( $\chi^2=14.8$ ,  $df=9$ ,  $p>0.05$ , Fig. 5 a-d). Most of the birds were caught at medium heights and in the Lesser Whitethroat, the Garden Warbler and the Blackcap the highest proportion of birds were caught in the

third shelf from the ground. In the Whitethroat, most of the birds were caught in the second shelf from the ground. In the Blackcap, there was no significant difference in trapping heights between males and females ( $p>0.05$ , Kolmogorov-Smirnov two sample test, Fig. 6), although more females were caught in the highest part of the nets. There was no correlation between trapping height and time of the season, either for all species in total ( $r=0.05$ ,  $p>0.05$ ) or for the different species.

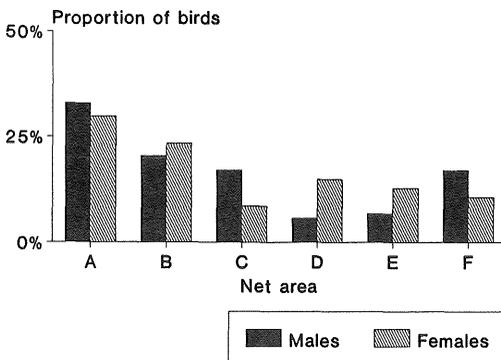


Fig. 4. Relative numbers of male and female Blackcaps, respectively, captured in the different net areas.

Procentuell fördelning av fångsten av svarthättehanar och honor i de olika nätområdena (males = hanar, females = honor).

### Discussion

The results suggest that species-specific differences in the distribution exist. The Whitethroats and the Lesser Whitethroats were found to be very concentrated in the net area and twenty percent of the Whitethroats were indeed caught in one net, furthermore one third of the Lesser Whitethroats were caught in the three easternmost nets. Lesser Whitethroats have earlier been found to be highly concentrated to particular parts of trapping areas, and in Germany up to 30% of the birds were trapped in one out of 52 nets during autumn migration (Bairlein 1983). Blackcaps and Garden Warblers were more evenly distributed in the area, with no tendencies for the two species to avoid each other. If competition for space was strong, a habitat shift would be expected for Blackcaps at the arrival of

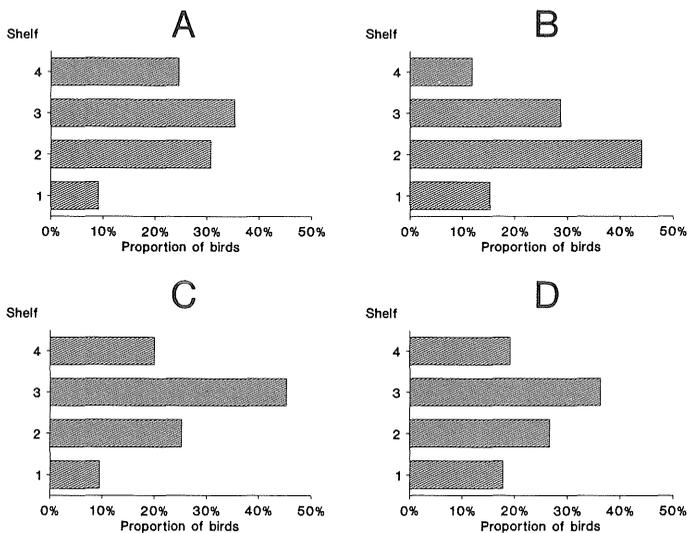


Figure 5. Relative numbers of *Sylvia* warblers caught at different heights in the nets. A = Lesser Whitethroat, B = Whitethroat, C = Garden Warbler, and D = Blackcap.

*Fångstens procentuella fördelning i olika nivåer (höjder). A = ärtsångare, B = törnsångare, C = trädgårds-sångare och D = svarthätta.*

Garden Warblers to the area, since Garden Warblers are interspecifically dominant towards Blackcaps, and both species occur in the same habitat (Berglund in prep.). Similar results, with hardly any habitat segregation, were obtained in a study in Switzerland, during autumn migration (Turrian & Jenni 1989) where Blackcaps and Garden Warblers occurred in almost the same habitat, whereas Whitethroats differed in habitat preference from these two species. With the exception of the Whitethroat, most

birds were trapped in the third (and second highest) shelf. The surrounding vegetation is mostly higher than the nets and it is therefore probable that these *Sylvia* warblers mainly move through the area at relatively lower heights. The Blackcap and the Garden Warbler show a similar distribution, which is in accordance with a study of vertical distribution of these two species made in Italy during autumn migration (Spina et al. 1985). No changes in the height distribution were recorded during the spring, although during the period the foliage of the trees and bushes in the area developed.

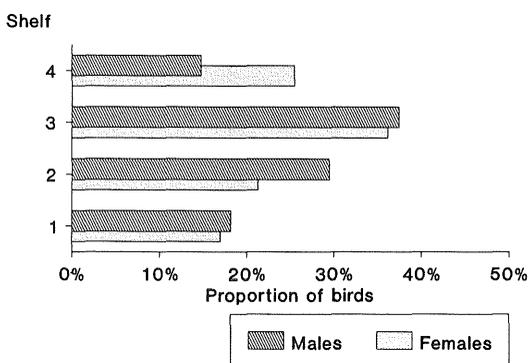


Fig. 6. Relative numbers of male and female Blackcaps, respectively, caught at different heights in the nets.

*Procentuell fördelning av hanar och honor hos svarthätta fångade i olika nivåer (höjder) (males = hanar, females = honor).*

It is important to notice that the study site is not an area where the birds seem to stay and forage for a longer period, but merely an area which they pass through quickly. During 1988-91 only four percent of nearly 1700 trapped *Sylvia* warblers were retrapped one day or more after ringing (Sundre Bird Ringing Group, unpubl.). This indicates that they either pass on to some more profitable feeding area, or that they do not need to stop over. Despite this, the birds in the study area maintain some species-specific habitat preferences, even during a temporary stopover. The concentrations of Whitethroats and Lesser Whitethroats to specific net areas, or even specific nets, is interesting. It strongly emphasizes the need to be aware of maintaining net sites, if the purpose is to follow population trends, or comparing ringing sums between years. Even changing the position of one net, or adding or removing nets between years, might change capture results substantially in some species.

This is Contribution no. 29 from the Sundre Bird Ringing Group.

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## Sammanfattning

*Fördelningen av Sylvia-sångare på en rastplats under vårflyttningen*

Syftet med denna studie var att undersöka om fyra *Sylvia*-sångarter uppträdde i olika områden och på olika höjder i vegetationen då de rastade på södra Gotland under vårflyttningen. Materialet insamlades under våren 1991 i samband med Sundregruppens kontinuerliga vårfångst vid Skoge (56°55'N; 18°11'E). Fångstområdet ligger ca 1 km från södra udden på Gotland (se Fig. 1) och består av frodiga buskmarker med bitvis tät undervegetation. Under våren används 35 fasta nätplatser vilka här slagits samman till sex skilda nätområden (Fig. 2). För samtliga nyfångster av ärtsångare *Sylvia curruca* (n=65), törnsångare *S. communis* (n=59), trädgårdssångare *S. borin* (n=95) och svarthätta *S. atricapilla* (n=146) noterades dels i vilket nät och dels i vilken våd de fångades. För svarthätta noterades dessutom uppgift om kön. Uppgifter insamlades från i stort sett samtliga av de 364 *Sylvia*-sångare som ring-

märktes under våren. Fångstens fördelning i området visade att arterna skiljer sig åt i förekomst ( $\chi^2=48.22$ ,  $df=15$ ,  $p<0.001$ ). Trädgårdssångaren visade minst skillnader mellan de olika nätområdena, medan ärtsångaren uppvisade de största skillnaderna. I tre nät i område A fångades sammanlagt 32% av alla ärtsångare. Den största koncentrationen i ett av de totalt 35 näten observerades dock hos törnsångaren, där 20.3% av alla individer fångades i ett nät (i område E). Svarthättans fördelning av hanar och honor visade ingen större skillnad mellan olika områden (Fig. 4). Hos svarthättan, som fångades under en lång period, kunde inte heller någon skillnad i uppträdande före och efter 23 maj konstateras. Alla trädgårdssångare fångades efter 23 maj och deras fördelning skilde sig inte från svarthättans, varken före eller efter 23 maj. Fångstens fördelning mellan olika nätvåder visade inte någon signifikant skillnad mellan de olika arterna ( $\chi^2=14.8$ ,  $df=9$ ,  $p>0.05$ , Fig. 5a-d). Med undantag för törnsångaren fångades flest fåglar i den tredje nätvåden från marken (Fig. 5a-d). Honor av svarthätta fångades oftare något högre än hanarna men skillnaden var inte signifikant (Fig. 6). Någon förändring av fångsthöjden kunde inte fastställas under vårens lopp.

De funna resultaten visar att fåglarna till viss del har arts specifika habitatval och uppträder i olika områden när de rastar på södra Gotland. Detta överensstämmer med resultat funna i en omfattande studie utförd i Tyskland under höstflyttningen (Bairlein 1983). Även i denna studie visade ärtsångaren en mycket stark koncentration till vissa områden och närmare 30% av alla fåglar fångades i ett av totalt 52 nät. Att trädgårdssångare och svarthätta har ett likartat habitatval under flyttningen har tidigare visats i Italien och Schweiz (Spina et al. 1985, Turrian & Jenni 1989). Om dessa båda arter konkurrerar om utrymmet borde man hitta skillnader i svarthättans uppträdande före och under den period då trädgårdssångaren uppträder. Att några sådana effekter inte kunde konstateras i Skoge kan bero på att fåglarna snabbt passerar fångstplatsen under vårflyttningen. Bara 4% av närmare 1700 fångade *Sylvia*-sångare återfångades mer än en dag efter märkningen under våarna 1989-91 (Sundregruppen opubl.). Eftersom vegetationen i området i de flesta fall är högre än näten antyder fångstens fördelning att fåglarna rör sig på relativt låg höjd i vegetationen. Eftersom vegetationen utvecklas under våren kunde en förändring av fångsthöjd ha

förväntats, men någon sådan förändring observerades dock inte. Koncentrationen av ärtsångare och törnsångare till speciella nät visar hur viktigt det är att upprätthålla fasta nätplatser om man vill

jämföra fångstsiffror insamlade i ett område mellan olika år. Att ändra en nätplats, ta bort eller sätta upp ett nytt nät, kan ge stora förändringar av fångstsiffrorna för vissa arter.