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Territoriality in the Willow Warbler *Phylloscopus trochilus* in its winter quarter in Lesotho

Revirhållande lövsångaren Phylloscopus trochilus *i vinterkvarteret i Lesoto*

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Abstract

Territorial behaviour of the Willow Warbler *Phylloscopus trochilus* was studied in an urbanised habitat in Lesotho, southern Africa, in three consecutive wintering seasons (November–March 1999–2002). Contrary to expectation, the Willow Warblers were holding territories. As many as 34% of all territories were held permanently throughout the wintering season, and 33% were located at the same site for the three consecutive years. The intensity of territoriality (singing) tended to increase as spring migration was approaching (February–March). This was assumed to be a response to an increasing need to defend food resources required for fat deposition before departure. The birds showed a strong preference for feeding in *Salix babylonica* and *Acacia dealbata*.

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Introduction

The Willow Warbler *Phylloscopus trochilus* is one of the most abundant bird species in the boreal zone of the Palaearctic Region. The whole population winters in the sub-Saharan Africa and southern Asia (Snow & Perrins 1998). In southern Africa the wintering Willow Warblers are common and highly adaptable to forest and savanna habitats and various kinds of secondary growth (Cramp & Brooks 1992). The first birds arrive in September and the last ones depart from this subregion in early May (Maclean 1993). In this region, most wintering birds belong to the subspecies *P. t. acredula* (Schönfeld 1984). Their breeding range extends over a large area from northern Fennoscandia and eastern Europe eastwards to Ob and Jenisey rivers (Cramp 1992).

In the breeding range, the Willow Warbler is territorial and actively advertises its territory throughout the breeding season. Some males are polyterritorial, others are only temporary territorial, but most males hold all-purpose territories which vary in size from 0.1 to 2.4 ha, with most being smaller than 1 ha (Cramp 1992). In the winter quarters, the Willow Warbler has been regarded as being rather non-territorial and silent, a bird that moves about in small loose groups or join mixed-species flocks (Urban et al. 1997). In this note, I report on territorial behaviour of this species wintering in Lesotho.

Study area and methods

The study was carried out on the National University of Lesotho (NUL) campus, with an area of 82 ha. The campus is situated at Roma, 32 km E of Maseru, Lesotho, southern Africa (29°28'S; 27°44'E) at the altitude of 1650 m a. s. l. The town Roma is nestled against foothills of the Moloti/Drakensberg in a wide valley surrounded by sandstone cliffs. The campus began as an open grassland but at present it represents a kind of urbanised parkland well timbered with mainly exotic trees (Ambrose & Maphisa 1999, Kopij 2001, Talukdar & Ambrose 2003). For monthly rainfall during the years 1998–2001 and long term (1970–2000) average in Roma see Kopij (2004).

Studies were carried out in three consecutive wintering seasons (November–March) during the years 1999–2002. Territories have been identified and plotted by means of the mapping method (Bibby et al. 1992). The campus was divided into

two parts: northern and southern. Counts were conducted in the morning in one part and next morning in the other part of the campus. Each count lasted about two hours. Seven counts were conducted in the 1999/2000 summer, five counts in the 2000/2001 summer, and six counts and in the 2001/2002 summer. Singing males were plotted on a map and special attention was paid to simultaneously singing birds.

Two types of territories were distinguished: temporary (sites with single record of simultaneously singing males or with a few records made in less than two-week intervals) and permanent (sites with at least two records made in at least two-week intervals). Arrival and departure dates were based on the first and the last record of singing males in a given austral summer. Territorial activity was measured as the number of singing males recorded per day.

Results

The number of established Willow Warbler territories on the NUL campus ranged annually from 9 to 16. Their density varied therefore from 11.0/100 ha to 19.5/100 ha (Table 1). The most preferred tree species in the Willow Warbler territories was the weeping willow *Salix babylonica*. All places on the campus with these trees were within the Willow Warbler territories, while 47.4 % of all territories established during the years 1999–2002 included weeping willows. *Pyracantha angustifolia* and *Acacia dealbata* bushes and young eucalypt *Eucalyptus camaldulensis* plantations were also preferred. Single territories were temporarily established also in sites with trees such as *Quercus spp., Acacia robusta, Robinia pseudoacacia* and other trees (Table 2). During the three consecutive summers, 46.2% of all permanent and 24.0% of all temporary territories were established around dams (N = 38); 28.6% of all permanent and 52.0% of all temporary territories included buildings and gardens (N = 38). Overall, the preferences (or no preferences) for all tree species listed in Table 2 were found to be at high level of statistical significance (χ^2 value ranged from 19.5 to 56.1 at 1-degree of freedom).

The percentage of permanent territories varied from year to year slightly from 30.8% to 37.5% (Table 1). On average, 34.2% territories were established for a period longer than two weeks: singing males were heard at eight sites (21.1%) for a period of 3–4 months, at two site (5.3%) for a period of 2–3 months and at three sites (7.9%) for a period of 1–2 months. Territories were held at six sites (33.3%) in each of the three summers (four of them included willows), in seven other sites (38.9%) in two summers and in five other sites (27.8%) in one summer only (there were no willows and no water bodies in these territories).

The Willow Warbler started singing at the beginning of November and ceased at the beginning of April, probably because they departed. For four consecutive years, the mean date of first singing was 10 November (range 3–16 November) and of last singing 26 March (range 15 March–2 April). After arrival, the birds showed rather low territorial activity throughout November, December and January. A sudden increase in singing activity was noticeable from the beginning of February and lasted till the end of March (65.9% of all records), with a conspicuous peak in the first half of March (Figure 1). The highest number of simultaneously singing males was recorded on 12 March 2000 (11 males) and 21 March 1999 (7 males).

It is interesting to note that during the study no other congeneric species were recorded on the NUL campus or at Roma Valley at large (Kopij 2001). The only other Palaearctic passerine wintering in this area was the Spotted Flycatcher *Muscicapa striata*.

Discussion

Contrary to what is usually believed, I found that the Willow Warbler held territories in its winter quarters, and that the intensity of territoriality tended to increase as spring migration was approaching. It seems likely that the Willow Warbler is territorial throughout its wintering period, but its territorial activity is manifested by more intensive territorial behaviour only late in this season. I suggest that the explanation for this increase with the advancement of the season is that the birds' energy demand increases as the day of their departure for Europe is coming closer. As birds need more food to accumulate fat reserves for their long migration, they start to defend the food resources within their territories more intensively against other conspecifics.

Observations from various parts of Africa suggest that the Willow Warbler does not show site tenacity in its wintering grounds (Urban et al. 1997). As recorded in this study, territories were held for several weeks in some sites, while in others for a few days only. Some territories were thus probably temporary, while others were permanent. It was, however, not possible to individually identify the males in any of the territories since they were not individually marked. Therefore, it can not be ex-

Table 1. Density of Willow Warbler winter territories.
Tätheter för lövsångarens vinterrevir.

Season	Permanent territories *Permanenta revir*			Temporary territories *Tillfälliga revir*			Total	
	N	N/100 ha	%	N	N/100 ha	%	N	N/100 ha
1999/2000	6	7.3	37.5	10	12.2	62.5	16	19.5
2000/2001	3	3.7	33.3	6	7.3	63.7	9	11.0
2001/2002	4	4.9	30.8	9	11.0	69.2	13	15.9
Total/mean	13	5.3	34.2	25	10.2	65.8	38	15.4

Table 2. Site tenacity and habitat selection (number of occupied territories) in the Willow Warbler in its winter quarter in Lesotho.
Platstrohet och biotopval (antal besatta revir) hos lövsångaren i dess vinterkvarter i Lesoto.

Tree/shrub species *Art av träd/buske*	Random *Slumpvis*		Territory at sam e site for *Revir på samma plats under*				Territory occupied *Reviret besatt*					
			3 years	2 years	1 year	mean	permanently		temporary		total	
	N	%	N	N	N	N	N	%	N	%	N	%
Salix babylonica	9	15.0	4	6	1	2.4	8	61.5	10	40	18	47.4
Acacia dealbata	8	13.3	1	7	0	2.1	7	53.8	11	44	18	47.4
Eucalyptus camaldulensis	16	26.7	0	2	2	1.5	4	30.8	4	16	8	21.1
Acacia robusta	1	1.7	0	0	1	1.0	0	0	5	20	5	13.2
Robinia pseudoacacia	0	0.0	0	2	0	2.0	0	0	4	16	4	10.5
Quercus robur	4	6.7	1	1	1	2.0	0	0	3	12	3	7.9
Pyracantha angustifolia	11	18.3	0	1	0	2.0	1	7.7	1	4	2	5.2
Cedrus atlantica	10	16.7	0	0	1	1.0	0	0	1	4	1	2.6
Prunus persica	2	3.3	0	0	1	1.0	0	0	1	4	1	2.6
Populus spp.	8	13.3	0	0	0	0	0	0	0	0	0	0
Pinus spp.	8	13.3	0	0	0	0	0	0	0	0	0	0
Melia azedarach	3	5.0	0	0	0	0	0	0	0	0	0	0
Cupressus sp.	2	3.3	0	0	0	0	0	0	0	0	0	0
Treeless vegetated field	6	10.0	0	0	0	0	0	0	0	0	0	0
Treeless built-up field	5	8.3	0	0	0	0	0	0	0	0	0	0
Ponds	2	3.3	0	0	0	0	0	0	0	0	0	0
Total number of sites	60		6	7	5	2.1	13		25		38	

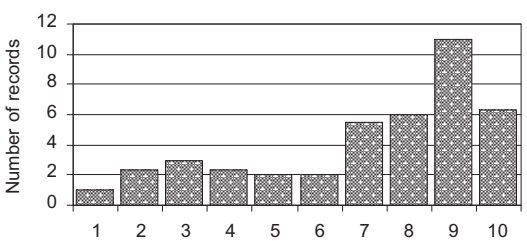

Figure 1. Territorial activity of the Willow Warbler (number of singing males) in the Lesotho winter quarter. Half month periods: from first half of November (1) to second half of March (10).
Reviraktivitet hos lövsångaren (antal sjungande hanar) i vinterkvarteret i Lesoto. Halvmånadsperioder: första halvan av november (1) till sista halvan av mars (10).

cluded that the permanent territories were held successively by more than one male. Whether held by one or a few males, these territories were probably of optimal quality, while the sites occupied temporarily could have been sub-optimal or even marginal habitats. The closely related Greenish Warblers *Phylloscopus trochiloides* maintain territories throughout their 7–8 months stay in the tropical deciduous forests in eastern Ghats, southern India. Food was there critically short and territories varied several-fold in their quality (Price 1981).

Breeding densities in the Willow Warbler vary considerably throughout its Palaearctic range (Schönfeld 1984). One of the highest densities (10–20 pairs/10 ha) has been recorded in *Fraxino-*

Ulmetum and *Alno-Ulmetum* forests in Central Europe and in subalpine birch forests in Lapland (Schönfeld 1984). In eastern and western Africa, densities of wintering Willow Warblers may reach even higher figures (Cramp & Brooks 1992). Densities recorded in the wintering grounds in Lesotho are therefore comparatively low and are probably limited by the amount of available food. It appears that only a small fraction of Willow Warblers reach the southern part of Africa, and their main wintering grounds lay further north (Schönfeld 1984).

In the Western Palaearctic region, the Willow Warbler appears to be well adapted to live in habitats such as forest clearings, bushy or shrubby areas, second growth and young forest plantations (Schönfeld 1984, Cramp & Brooks 1992). It appears that it prefers those trees, which bear most accessible insect food, i.e. birches *Betula* spp. and willows Salix spp. In places in southern Africa, where weeping willows occur, the Willow Warbler is probably predisposed to occupy areas with that tree species and similar secondary shrubby vegetation. In Lesotho, it prefers willows and black wattles in a close proximity to water bodies, streams and rivers. The preference has been recorded not only in the study area. In the Maloti/Drakensberg region, Willow Warblers are almost entirely limited to areas where stream and river banks are covered by *Salix suberecta*, a common native species of a shrubby willow (own observations).

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Sammanfattning

Lövsångaren är en av de allmännaste fåglarna i den paläarktiska regionen och alla övervintrar i Afrika söder om Sahara. I södra Afrika övervintrar de i många typer av skog och savann samt i sekundär vegetation. De första anländer i september och flyttar bort i början av maj. De flesta fåglar i denna region tillhör den nordliga rasen *acredula*. Under häckningstid håller lövsångaren revir, men i vinterkvarteret anses den vara rörlig och dra runt i små lösa grupper eller ansluta sig till de blandflockar av flera arter som drar runt i terrängen när de inte häckar.

I denna uppsats redogör jag för en studie som visar att lövsångarna också kan hålla revir i vinterkvarteret. Undersökningen gjordes under fyra år på universitetsområdet i Roma i Lesoto. Området är 82 ha och har karaktären av urban park med välvuxna träd av mestadels exotiska arter.

Jag karterade reviren vid sju, fem respektive sex tillfällen de tre säsongerna. Fåglarna var inte individuellt märkta så jag kan inte säkert säga att det var samma individer som fanns i varje revir hela eller delar av säsongen, men jag tror att så ofta var fallet. Det fanns både permanenta och temporära revir. Antalet permanenta revir varierade från 9 till 16 de tre åren (11–19 revir/100 ha). Lövsångarna föredrog att vistas i tårpilar *Salix babylonica*. Andra omtyckta arter var luddeldtorn *Pyracantha angustifolia* och silverakacia *Acacia dealbata* samt unga planteringar av *Eucalyptus camaldulensis*.

De permanenta reviren var besatta olika långa perioder: 21% var besatta 3–4 månader, 5% under 2–3 månader och 8% under 1–2 månader. En tredjedel av reviren var besatta av lövsångare alla tre somrarna och 39% var besatta två av de tre somrarna.

Lövsångarna började sjunga i början av november och slutade i slutet av april, varefter de flyttade bort. Efter ankomsten var reviraktiviteten ganska låg genom november, december och januari. I början av februari skedde en plötslig ökning av aktiviteten med en topp i slutet av mars (Figur 1). De högsta antalen samtidigt sjungande hanar noterades 12 mars 2000 (11 st.) och 21 mars 1999 (7 st.).

Noterbart är att ingen annan art av lövsångarsläktet iakttogs under de tre somrarna; den enda paläarktiska tätting som övervintrar i området är grå flugsnappare.

Mot vad som var förväntat kunde jag alltså registrera revirhållande lövsångare genom hela övervintringsperioden. Den ökade aktiviteten i revirhållandet mot slutet av perioden berodde antagligen på att fåglarnas födobehov då ökade i samband med fettupplagringen inför avflyttningen. Vikten av att försvara ett födorikt revir var då stor. Oberoende av om reviren hölls av samma eller flera fåglar under sommaren var det helt uppenbart att reviren i rumslig mening till mycket stor del var permanenta både under en given sommar och mellan åren. Lövsångarens nära släkting lundsångaren håller revir helt igenom den 7–8 månader långa vistelsen i södra Indien. Här rådde födobrist och reviren varierade mycket i kvalitet varför det var viktigt att kunna försvara ett bra revir.

I häckningsområdet kan lövsångaren nå upp till tätheter om 10–20 par per tio hektar. I både västra och östra Afrika har ännu högre tätheter rapporterats under övervintringen. De tätheter som jag fann i Lesoto är därför låga, vilket sannolikt beror på att biotoperna är fattiga på lämplig föda. Såväl inom mitt område som annorstädes i Lesoto har jag observerat att lövsångaren föredrar vegetation nära stränder och vattendrag. Förutom tårpil uppehåller den sig ofta i områden som är bevuxna med *Salix suberecta*, en allmän inhemsk videbuske.