

TERRITORY AND HOME RANGE OF THE BLACKCAP (*SYLVIA ATRICAPILLA*) AND SOME OTHER PASSERINES, ASSESSED AND COMPARED BY MAPPING AND CAPTURE-RECAPTURE

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ABSTRACT.—Capture-recapture by netting of banded breeding birds permits an estimate of individuals' home ranges. For five territorial species, these ranges were much larger (from two to twelve times) than their territories, estimated simultaneously by a mapping plot.

The question of the relationship between territory (the defended area) and home range (total occupied area) of a breeding bird has not been adequately addressed by ornithologists. In this paper we report on a first approach to studying this question.

MATERIAL AND METHODS

In the 1976 breeding season, the bird community was censused simultaneously by capture-recapture and by a mapping plot in an area of oak (*Quercus pedunculata*) forest (Fig. 1). The capture-recapture study used 127 nets equally spaced over 51 ha of forest (Fig. 2). Eight 4-day sessions of netting were carried out between May 17 and July 31. One-quarter of the nets were in use on each of the four days, so that each net was in use eight times. During netting days, an

average of 90 min elapsed between the successive checks of each net. All the netted birds were banded on their first capture, and a record was kept of subsequent recaptures.

The mapping plot covered 14 ha inside the netting area. This plot was censused ten times in April and May. Applying the I.B.C.C. technique (International Bird Census Committee 1969) we obtained density estimates for 17 species of birds. The average area of each species territory was assessed by dividing 14 ha by the number of identified territories; this is a maximum value. We assumed that the territories of each species covered the whole 14-ha area.

To estimate the home range of birds, we used the intercatch distances of recaptured, banded individu-

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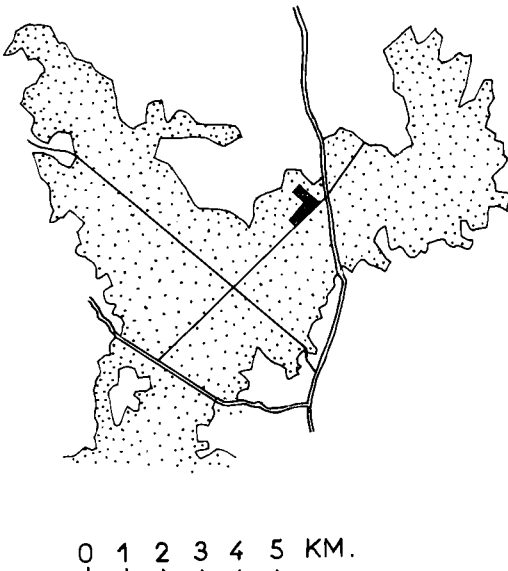


FIGURE 1. Map of the "Forêt de Citeaux," 20 km south of Dijon (Burgundy), with the netting plot (shaded area).

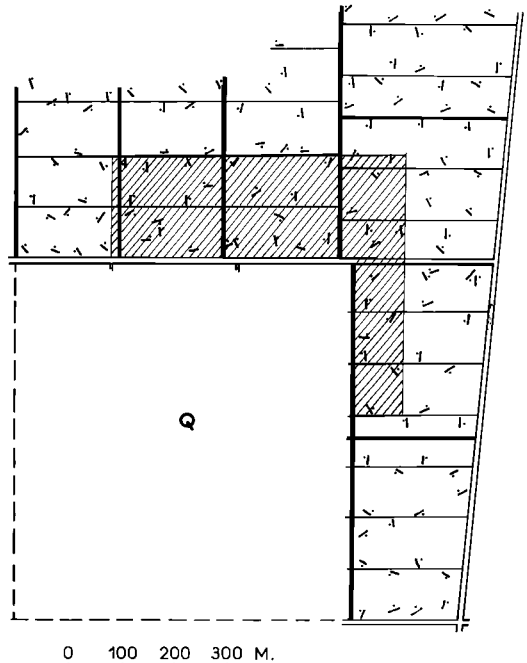


FIGURE 2. Map of netting plot (shaded and unshaded areas) and mapping plot (shaded only). Net locations are designated by the symbol (./). These areas are surrounded by vast expenses of forest of the same type; the part Q was excluded from the present study because the forest there is older.

TABLE 1
DISTRIBUTION OF 121 RECAPTURE DISTANCES OF
BANDED MALE *Sylvia atricapilla*

Inter-catch distance (m)	Number of recaptures
0-50	16
50-100	28
100-150	34
150-200	20
200-250	7
250-300	4
300-350	1
350-400	5
400-450	2
450-500	3
500-550	1

als. This calculation was possible only for those species which yielded enough recaptures. Two theoretical approaches permit this estimation (Luu-mau Thanh 1962, Taylor 1966). Both conclude that the quadratic mean of intercatch distances (x) is the best estimation of the home range radius (R) by the formula:

$$R = \sqrt{\frac{\sum x^2}{N}}$$

where N equals the number of recaptures.

RESULTS

We had the most recaptures for the Blackcap (*Sylvia atricapilla*). Table 1 shows the distribution of the 121 recaptures of 34 males. From this we can estimate a mean home range radius of 154 m, thus a home range area of 7.4 ha. In this species we determined 12.5 territories on 14 ha, for an average territory size of 1.12 ha. Thus the

estimated home range was more than six times larger than the estimated average territory.

Four other passerine species gave enough recaptures to make the same calculations for the males home range compared to their estimated territories (Table 2). We see that the size ratios of home ranges to territories vary from two to twelve.

The above estimates of home ranges are derived from recaptures from May to July. We had enough recaptures for three species to calculate the home range size for May alone, the month of maximum territoriality. We obtain the following ratios of home range to territory size: Blackcap 4.6, robin 2.2, and Chiff-chaff 14.6. For all species, home ranges of conspecifics overlapped substantially, and the home ranges also overlapped into adjacent territories.

We were also able to estimate the home ranges of the females of the same three species for the period May to July. In each case it was much larger than the home range of the males: varying between 3 to 4 times the male's home range area.

CONCLUSIONS

This first approach shows that for five territorial species the estimated home ranges of the males were much larger than their estimated territories in all cases. The same conclusion holds for the females of three studied species. Furthermore, territory sizes we undoubtedly smaller than our estimates, because it is unlikely that all available space within our mapping plot would be defended by males of any given species. Thus the actual ratios of home range to territory size are likely greater than suggested by our analysis.

TABLE 2
RATIO OF HOME RANGE SIZE TO TERRITORY SIZE

Species	Territory size (ha)	Home range of adult males			Ratio
		Size (ha)	No. of indiv.	Recaptures per indiv.	
Blackcap (<i>Sylvia atricapilla</i>)	1.1	7.5	34	3.26	6.8
Chiff-chaff (<i>Phylloscopus collybita</i>)	0.8	9.9	18	2.56	12.4
European Robin (<i>Erithacus rubecula</i>)	2.1	7.6	16	3.50	3.6
European Blackbird (<i>Turdus merula</i>)	4.7	10.0	11	2.45	2.1
Wren (<i>Troglodytes troglodytes</i>)	5.1	12.6	9	4.22	2.4