comprises the market town of Rovaniemi (66° 30′ N, 25° 44′ E) and its immediate surroundings. The average temperature in January is — 14.1°, and in February — 13.0° C. The snow cover remains for 200 days with an average annual thickness of 77 cm.

15 species (p. 55, group I) winter regularly within the area investigated, whilst 3 species (group II) are occasional winterers. Additional 5 species (*Pyrrhula pyrrhula, Emberiza citrinella* etc., p. 55) have wintered more or less probably. 4 species (p. 55, group I) are regular winter visitors. In total 55 species have been observed during the winter period (October 1st—March 31st).

Table 2 illustrates the occurrence of the different species during the winter months at Rovaniemi as well as in some other areas, whose situation is seen from table 1. × = regular winterers, — = occasional winterers, o = temporary or casual visitors.

Densities of the willow warbler, *Phylloscopus trochilus* (L.), doubled in a year.

LAURI SIIVONEN

(2nd report of the census work on birds made by the Game Research Institute, Helsinki).

In the following a preliminary account is presented of the census work on birds in the summer of 1950, comprising the whole of Finland and begun by the Game Research Institute in summer 1949. The purpose, scope and technique of this census work have been explained in the previous report (SIIVONEN 1949).

The survey was carried out in summer 1950 at 15 control stations of the Game Research Institute. The results obtained support in a convincing way the results previously presented by the author (SIIVONEN 1948 b and 1949) on the surprisingly great yearly fluctuation in the composition of the bird fauna in these latitudes. They also show how necessary it is to take into account this fluctuation in all ornithological research work and how corresponding census work should be started also in the other northernmost regions of the northern hemisphere in order to establish the extent, regularity,

structure, causalities and significance of the changes occurring yearly in the bird fauna.

Since in the previous report the composition of the bird fauna in the summer of 1949 was compared with the estimations made by MERIKALLIO (1946) in summer 1942 in the eastern half of South and Central Finland, the preliminary report of the census work in summer 1950 is also limited to this area in the present paper.

In this area are situated the control stations of Imatra, Leppävirta, Suomu, Haapajärvi and Kuhmo. Suomu station corresponds to Ilomantsi station of the previous year. It is situated 30 km. further north than Ilomantsi station, at the Game Research Institute's newly-founded Game Research Station of East Finland. At Kuhmo station, the survey could only be made along two lines of 5 km. on account of unsuitable weather. In summer 1950 the total length of the transects estimated at these stations was 70 km., corresponding to an area of 280 ha. When therefore the results of the present years's survey are here compared with those of the previous year, for Kuhmo only estimations made along these two transects are dealt with from the previous year's census too. In calculating the dominance values of this as well as of the previous year, *Carduelis spinus* also, in addition to the crossbills (*Loxia*), has not been taken into account. For both these reasons the previous year's values, as presented here, differ somewhat from those given in the previous report. As the surveyors and the fixed survey lines marked in the terrain have been the same during both summers, except for the Suomu station (in the summer of 1949 T. Lampio, M. A., and in the summer of 1950 T. Sovinen, M. A., were the surveyors), and as the survey has been made at all stations in both summers at the same periods of summer and times of day and under similar weather conditions, the results presented here may be regarded as being based on real changes that have taken place in the bird fauna. This is supported by the fact that at all these and also other southern and central Finnish stations the changes observed have been almost without exception in the same direction.

The evident increase in the willow warbler population is perhaps the most conspicuous and interesting phenomenon in the comparison between the summer of 1949 and the summer of 1950 (cf. also for instance AMANN 1949 and GEISSBÜHLER 1950). The willow warbler density in mixed and spruce forest of OMT and MT types — the fixed transects are situated in these types — at the control stations in the eastern half of South and Central Finland in the summer of 1949 was on an average 5.7 brace/sq. km., but in the summer of 1950 12.1 brace, i. e. doubled. The corresponding dominance values were 4.6 and 11.5 %. The willow warbler dominance

in the summer of 1949 was only $^1/_5$ of the corresponding dominance in the summer of 1942 (23.9 %, cf. MERIKALLIO 1946 and SIIVONEN 1949, p. 91). In 1950, on the other hand, this ratio was $^1/_2$. The willow warbler, having occupied only the 7th place in order of commonness in the summer of 1949, held the second place in the summer of 1950.

Nor has the change been so remarkable in the willow warbler alone, as the following comparison of the density and dominance values from the summers of 1949 and 1950 shows. In the table all species have been taken into account which have been dominant or influent (dominance at least 2 %) either in both or at least one of the summers mentioned.

	Density (brace/sq. km.)		Dominance (%)	
	1949	1950	1949	1950
Fringilla coelebs	37.1	22.9	29.9	21.7
Regulus regulus	9.7	10.9	7.8	9.5
Turdus ericetorum	7.9	5.7	6.3	5.4
Parus atricapillus	7.5	2.5	6.0	2.4
Muscicapa striata	7.1	2.5	5.7	2.4
Erithacus rubecula	6.1	7.5	4.9	7.1
Phylloscopus trochilus	5.7	12.1	4.6	11.5
Muscicapa hypoleuca	5.7	5.3	4.6	5.1
Parus cristatus	4.3	2.5	3.5	2.4
Phylloscopus collybita	4.3	2.1	3.5	2.0
Dendrocopos major	2.9	1.4	2.3	1.4
Anthus trivialis	2.1	3.6	1.7	3.4
Phylloscopus sibilatrix	1.1	3.6	0.9	3.4
Tetrao urogallus	1.4	3.2	1.1	3.1

The coefficient of increase (the value for summer 1950 divided by the value for summer 1949) and decrease (the value for summer 1949 divided by the value for summer 1950) of the species markedly increased or decreased is as follows.

Coefficient of increase:	Density	Dominance
Phylloscopus sibilatrix	3.3	3.8
Tetrao urogallus	2.3	2.8
Phylloscopus trochilus	2.1	2.5
Anthus trivialis	1.7	2.0

Coefficient of decrease:		
Parus atricapillus	3.0	2.5
Muscicapa striata	2.9	2.4
Phylloscopus collybita	2.0	1.8
Dendrocopos major	2.0	1.6
Parus cristatus	1.7	1.5
Fringilla coelebs	1.6	1.4

Of the dominant and influent species only *Erithacus rubecula, Regulus regulus, Muscicapa hypoleuca* and *Turdus ericetorum* have remained approximately constant as regards their numbers (increase or decrease of the population at most 40 %) in both these summers. In all other species the increase or decrease of the population has, on the other hand, been at least 60 % and in exactly half of the species mentioned above at least 100 %, i. e. as great as in the willow warbler.

An interesting feature to be noted is that side by side with the willow warbler *Anthus trivialis, Phylloscopus sibilatrix* and *Sylvia borin* have now increased, i. e. the same species whose populations in summer 1949 were observed to be most markedly smaller than in the censuses carried out by MERIKALLIO (1946) in summer 1942 (cf. SIIVONEN 1949, p. 93). This would seem to indicate that the recent failure of the willow warbler should not be considered as a separate phenomenon, but that it is associated with a wider group of phenomena, which are to be observed simultaneously also in other species. This opinion seems also to be supported by the fact that the population of almost all species whose density in summer 1949 was higher than in Merikallio's censuses, was in 1950 again reduced. These included species such as *Carduelis spinus, Parus cristatus, Aegithalos caudatus, Muscicapa striata, Phylloscopus collybita* and *Turdus ericetorum* (cf. SIIVONEN, op. c., p. 94).

The most uniform group among the decreased species was formed by the tits. Their density (brace/sq. km.) and dominance (%) in summers 1949 and 1950 and coefficients of reduction for density and dominance were as follows.

	Density		Dominance		Coefficients of	
	1949	1950	1949	1950	Density	Dominance
Aegithalos caudatus	2.1	—	1.7	—	∞	∞
Parus major	1.4	0.4	1.1	0.3	4.0	3.7
P. atricapillus	7.5	2.5	6.0	2.4	3.0	2.5
P. cristatus	4.3	2.5	3.5	2.4	1.7	1.5

It is possible that the coldness of the winter 1949/50 may have been partly responsible for so common a reduction in tits. It is to be noted, however, that *Regulus regulus*, which is known to be still more sensitive to severe winters but which, it is true, in part migrates, did not, on the other hand, show any reduction.

In the previous report it was already established that the composition of the bird fauna in mixed and spruce forest of OMT and MT types in the eastern half of South and Central Finland in summer 1949 differed very sharply from the composition of the bird fauna in summer 1942 according to censuses carried out by MERIKALLIO (1946). With the exception of the general reduction in tits, the composition of the bird fauna in summer 1950 was, on the other hand, considerably nearer to the composition of the bird fauna in summer 1942. In the summer of 1950 the willow warbler was already the second commonest species, as in 1942. The population of *Anthus trivialis,* a dominant species according to Merikallio, also doubled from summer 1949 to summer 1950. If the population of both these species should still grow in the same ratio as has occurred now within a single year, then the composition of the dominant species complex would already be almost the same as that found by MERIKALLIO (1946, I., p. 59) in summer 1942. The only notable differences then to remain would be on the one hand in *Regulus regulus* and *Erithacus rubecula,* which were lacking in Merikallio's censuses, but occurred as dominants both in summer 1949 and 1950, and on the other in *Sylvia borin,* which in summer 1942 was almost a dominant, but in summers 1949 and 1950 occurred only in small numbers. Of these the absence of *Regulus regulus,* at least, in Merikallio's censuses may be regarded as an exceptional case, apparently causally related to the hard winters of 1939—42 (cf. for instance SIIVONEN 1948 a).

Literature cited: AMANN, F., 1949, Starke Schwankungen im Bestande des Waldlaubsängers. Ornith. Beob. 46: 148. — GEISSBÜHLER, W., 1950, Bestandesschwankungen beim Weiden- und Waldlaubvogel. Ibid. 47: 4—7. — MERIKALLIO, E., 1946, Über regionale Verbreitung und Anzahl der Landvögel in Süd- und Mittelfinnland. I & II. Ann. Zool. Soc. Zool.-Bot. Fenn. Vanamo 12, 1: 1—143 & 2: 1—119. — SIIVONEN, L., 1948 a, Decline in numerous mammal and bird populations in north-western Europe during the 1940s. Papers on Game Research 2: 1—26. — 1948 b, Quantitative bird survey and the short-term fluctuations in numbers. Ornis Fennica 25: 37—56. — 1949, Does the willow warbler, Phylloscopus trochilus (L.), belong to those species of birds fluctuating greatly in number. Ibid. 26: 89—97.