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Densities of Birds in Alpine Heaths

By

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Introduction

Quantitative characterizations of bird communities in alpine habitats are almost non-existent. In order to obtain knowledge about the populations within such a community, a multi-year census program was initiated in 1964 by the establishment of two study areas on alpine heaths in the Ammarnäs area of Swedish Lapland. These censuses constitute part of a large-scale program comprising similar investigations in the main habitat types, from the prealpine conifer forest region through the subalpine birch forest region to the alpine region (*cf.* survey by ENEMAR 1966). The project has been financed by the Swedish Natural Science Research Council under Grant No. 2180-13.

The results from the first year have been published previously (ALM, ENEMAR, MYHRBERG & SVENSSON 1965). In that paper the methods used in the study were described, as well as the habitats concerned. Therefore only short comments on these subjects will be given here.

The two study areas are situated on the slopes of the mountain of Kuoltatjåkko (approx. 65°50' N, 16°20' E) about 15 km SSE of Ammarnäs. One area is situated in the low alpine belt (with willow scrubs, *Betula nana* scrubs, and *Carex* bogs) and the other area mainly

within the middle alpine belt (with very poor vegetation or none at all). Each area is one kilometre square. Both areas are exactly the same from year to year. The method used in census taking is that described by ENEMAR (1959), the so-called mapping method. The two areas are called K 1 (low alpine area; Fig. 1) and K 2 (middle alpine area).

In this paper the results from the 1965 census will be submitted and compared with those from 1964. The reason for publishing the results from these two first seasons of a project intended to range over many years is that the results in several respects may serve as a memorandum for investigators working with avian density determinations in general, and especially for those attempting to characterize the composition and density of bird communities on the basis of one single season's work. The same view has been stressed by ENEMAR in his above-mentioned survey.

In total, ten censuses were carried out in area K 1 between June 16th and June 30th and five censuses in area K 2 between June 23rd and July 5th. For both areas the census period coincided with the incubation period and the first part of the feeding period for all species concerned. This could be ascertained from the observations made in the numerous nests found.



Fig. 1. Study area K 1. (*Provyta K 1.*)

Results

The results from the 1965 censuses are given in Table 1 (area K 1) and in Table 2 (area K 2). The figures in the first three columns refer to the maximum number, the minimum number and the mean number of pairs, respectively. The dominance values for each species (expressed in per cent of the total mean number) and the number of nests found are added. The minimum number is the figure obtained from the species maps when only pairs established by nests or distinct groups of observations are counted. The maximum figures are obtained by adding uncertain groups of plots to the minimum figures. According to our opinion and experience, the mean of these two figures is the best possible estimation of the real number of pairs (it is never possible to give the exact number of pairs in this kind of field work). It may be observed, however, that most often the two figures do not differ much, if at all, thus indicating that a very small error is involved.

Table 1. The size of the stationary populations of the different species in study area K 1 in 1965, determined by the mapping method, dominance values of the species (in per cent) and number of nests found. (*Storleken av de enskilda arternas stationära populationer bestämd genom karteringsmetoden i yta K 1 1965, arternas dominansvärden i procent och antalet funna bon.*)

Species (Art)	Maximum number (Maximi- antal)	Minimum number (Minimi- antal)	Mean number (Medel- värde)	Dominance value (Dominans- värde)	Number of nests found (Antalet funna bon)
<i>Anthus pratensis</i>	51	47	49	58	25
<i>Calcarius lapponicus</i>	14	13	13	15	8
<i>Phylloscopus trochilus</i>	4	4	4	5	0
<i>Luscinia svecica</i>	5	4	4	5	0
<i>Oenanthe oenanthe</i>	4	4	4	5	2
<i>Passerinae</i> , total	78	72	74	88	35
<i>Charadrius apricarius</i>	1	1	1	—	1
<i>Charadrius morinellus</i>	1	1	1	—	1
<i>Calidris alpina</i>	2	2	2	—	1
<i>Tringa glareola</i>	1	0	0	—	0
<i>Gallinago gallinago</i>	3	3	3	—	0
<i>Philomachus pugnax</i>	4	3	3	—	3
Non <i>Passerinae</i> , total	12	10	10	12	6
Total	90	82	84	100	41

Table 2. The size of the stationary populations of the different species in study area K 2 in 1965, determined by the mapping method, dominance values of the species (in per cent) and number of nests found. (*Storleken av de enskilda arternas stationära populationer bestämd genom karteringsmetoden i yta K 2 1965, arternas dominansvärden i procent och antalet funna bon.*)

Species (Art)	Maximum number (Maximi- antal)	Minimum number (Minimi- antal)	Mean number (Medel- värde)	Dominance value (Dominans- värde)	Number of nests found (Antalet funna bon)
<i>Anthus pratensis</i>	16	14	15	56	5
<i>Oenanthe oenanthe</i>	4	4	4	15	1
<i>Calcarius lapponicus</i>	2	2	2	7	1
<i>Eremophila alpestris</i>	2	2	2	7	1
<i>Passerinae</i> , total	24	22	23	85	8
<i>Charadrius apricarius</i>	2	1	1	—	1
<i>Charadrius hiaticula</i>	1	1	1	—	0
<i>Calidris alpina</i>	1	1	1	—	1
<i>Calidris temminckii</i>	1	1	1	—	0
Non <i>Passerinae</i> , total	5	4	4	15	2
Total	29	26	27	100	10

Comparison between the 1964 and 1965 results

In Table 3 the mean numbers of pairs are given from the two years 1964 and 1965 in the two study areas K 1 and K 2 for all species established as stationary within the areas. Their dominance values are also given, together with the change in absolute number and in per cent of the 1964 figures.

It can be clearly seen from Table 3 that the qualitative composition of the bird population within the areas is almost the same for both years. The same species group is dominant (the Passerines) and the same species is without rivalry the most common one (the Meadow Pipit). On the other hand it is equally obvious that remarkably great changes in the densities of the populations have occurred from one year to the next, especially affecting the majority of the Passerines. The changes are mostly of a decreasing nature, resulting in a total decrease from 106 pairs to 84 pairs in area K 1 and from 54 pairs to 27 pairs in area K 2. Thus decreases have been established for the passerine species with the exception of the Lapland Bunting in K 1 (which remained almost constant), the Wheatear in K 1 and the

Shore Lark in K 2 (the figures, however, are too small to serve as a basis for certain judgement). The waders may not have been involved in these changes, but the figures are too small for these species also.

Table 3. Comparison between the size of the stationary populations and dominance values in the two seasons 1964 and 1965 for the two study areas K 1 and K 2. (*Jämförelse mellan de stationära populationernas storlek samt mellan dominansvärden under 1964 och 1965 i ytorna K 1 och K 2.*)

Area K 1 (*yta K 1*):

Species (Art)	Number of pairs (Antal par)		Changes in abs. numbers (Förändring i antal)	Changes in per cent (Förändring i procent)	Dominance values (Dominansvärden)	
	1964	1965			1964	1965
<i>Anthus pratensis</i>	69	49	-20	-29	65	58
<i>Calcarius lapponicus</i>	12	13	+ 1	+ 8	11	15
<i>Phylloscopus trochilus</i>	8	4	- 4	-50	8	5
<i>Luscinia svecica</i>	6	4	- 2	-33	6	5
<i>Oenanthe oenanthe</i>	2	4	+ 2	+100	2	5
<i>Passerinae</i> , total	97	74	-23	-24	92	88
<i>Charadrius apricarius</i>	3	1				
<i>Charadrius morinellus</i>	0	1				
<i>Calidris alpina</i>	2	2				
<i>Tringa glareola</i>	2	0				
<i>Gallinago gallinago</i> ¹	0	3				
<i>Philomachus pugnax</i>	2	3				
Non <i>Passerinae</i> , total	9	10	+ 1	+11	8	12
Total	106	84	-22	-21	100	100

¹) Probably also present in 1964 - 1-3 singing males. (*Fanns troligen även 1964 - 1-3 spelande hanar.*)

Area K 2 (*yta K 2*):

<i>Anthus pratensis</i>	28	15	-13	-46	51	56
<i>Oenanthe oenanthe</i>	13	4	- 9	-69	24	15
<i>Calcarius lapponicus</i>	9	2	- 7	-78	17	7
<i>Eremophila alpestris</i>	1	2	+ 1	+100	2	7
<i>Passerinae</i> , total	51	23	-28	-55	94	85
<i>Charadrius apricarius</i>	2	1				
<i>Charadrius morinellus</i>	1	0				
<i>Charadrius hiaticula</i>	0	1				
<i>Calidris alpina</i>	0	1				
<i>Calidris temminckii</i>	0	1				
Non <i>Passerinae</i> , total	3	4	+ 1	+33	6	15
Total	54	27	-27	-50	100	100

Discussion

The purpose of this investigation is in the first place to characterize the »normal» densities of the species concerned in alpine heaths and to obtain a measure of the fluctuations within the bird population between different years. Secondly, we hope that the investigation will make it possible to establish a basis for future analyses of different population and community mechanisms.

It is impossible to draw any conclusions of a general nature about the changes in the size of the populations and the causes to which these can be ascribed from material based on two seasons only. It should be noted, however, that the snow conditions at the beginning of the normal breeding-season (in late May and early June) were quite different in the two years. Thus, in 1964 both areas were almost completely bare at the end of May, while in 1965 the area K 1 was snow-covered to 50% (Fig. 2) and K 2 to nearly 100% on June 9th. The importance of this is perhaps indicated by the fact that the heaviest decrease hit the upper area (K 2) and that most species were



Fig. 2. Study area K 1, June 9th 1965. About 50 % of the area was covered with snow.
(Provyta K 1 den 9 juni 1965, då ungefär halva ytan var snötäckt.)

concerned. In this area the decrease amounted to 50%, while the corresponding figure for K 1 was about 20%. Other proximal factors, of course, may also have been involved as well as ultimate factors.

In conclusion, it may be said that the big numerical differences between the density figures obtained for the two years clearly stress the importance of the following remarks:

(1) The range of fluctuation seems to be very wide and the present results give no clue to what may be called the »normal» range of fluctuation. The question »Are the observed densities within the »normal» range, or does one of the years or both constitute exceptional years?» cannot be answered yet.

(2) It is impossible to give a reliable density figure, intended to generally characterize the habitat in question, on the basis of observations made during one season only or even over a few seasons. This applies at least to alpine habitats.

(3) »Which causes (density-dependent or density-independent factors) are mainly involved in determining the number of pairs establishing territories during different years in this special habitat?» is another question which can be answered only by a census program covering a long sequence of years.

Summary

With the aid of the mapping method, the bird population of two study areas, one kilometre square each and situated in the low and middle alpine regions in the Ammarnäs area, Swedish Lapland, was determined over two years (1964—1965). The qualitative composition of the bird population was found to be almost the same in both years. The Meadow Pipit was the dominating species in both areas and constituted well above 50 % of the total bird population. The density of the bird population, however, was quite changed in the second year. The density of birds in the study area of the low alpine region had decreased about 20%, while the corresponding figure for the study area extending into the middle alpine region was 50%. The decrease was noted for most of the passerine species. One main reason may be the fact that in 1965 the study areas were still to a large extent covered with snow at the beginning of June.

LITTERATURE

- ALM, B., ENEMAR, A., MYHRBERG, H., & SVENSSON, S. 1965. The density of birds in two study areas of the alpine region in southern Lapland in 1964. — Acta Universitatis Lundensis II, No. 4.
- ENEMAR, A. 1959. On the determination of the size and composition of passerine bird population during the breeding season. A methodological study. — VF, suppl. 2.
- 1966. Ornitologisk populationsekologi i alpina och subalpina miljöer. Något om fältarbetets metoder och problem. — Svensk naturvetenskap 1966, pp. 169—184.

S a m m a n f a t t n i n g: Fågelinventeringar på alpin hed.

För att erhålla en kvantitativ karaktäristik av fågelfaunan inom alpina biotoper påbörjades 1964 inventeringsarbeten, avsedda att fortlöpa flera säsonger, inom två provytor på Koulattjåkko nära Ammarnäs i Lycksele lappmark. Vardera ytan täcker 1 km² och omfattar exakt samma område varje år. Den ena ytan (K 1) ligger inom den lågalpina regionen och är ganska rikligt bevuxen med dvärgbjörk och andra ris. Stora delar av ytan täcks av *Carex*-kärr och här och var av begränsade videsnår. Den andra ytan (K 2) är belägen inom den mellanalpina regionen. Till största delen är denna yta täckt av ett tunnt och relativt glest växttäckte. Vissa delar består av blockmark.

I denna uppsats redogörs för resultaten av inventeringsarbeten under 1965. Jämförelser med de annorstädes publicerade resultaten från 1964 görs också. Sammanlagt gjordes under 1965 10 inventeringar av yta K 1 mellan 16.6. och 30.6. och 5 inventeringar av yta K 2 mellan 23.6. och 5.7. Inventeringarna gjordes enligt den s.k. karteringsmetoden.

Resultaten redovisas i tab. 1, 2 och 3. Tab. 1 visar sammansättningen av den stationära fågelfaunan i yta K 1 år 1965 och tab. 2 motsvarande värden för yta K 2. Med minimiantalet avses antalet otvetydiga och klara punktsvärmar, som framträder på artkartorna vid sammanställandet av resultaten från de enskilda inventeringarna, samt de par som verifierats genom bofynd. Maximiantalet har erhållits genom att till minimiantalet lagts det antal punktsvärmar, som inte med säkerhet ansetts representera ett stationärt par. Som mest sannolikt verkligt antal har medelvärdet av dessa tal valts. I tab. 1 och 2 anges dessutom respektive arters dominansvärden samt antalet funna bon.

I tab. 3 jämförs åren 1964 och 1965 med avseende på de stationära populationernas storlek och de olika arternas dominansvärde. Förändringarna har angivits dels i absoluta tal och dels i procent av bestånden 1964. Ett studium av tabellen visar att fågelpopulationerna i båda ytorna kvalitativt sett i huvudsak varit de samma de båda åren. Samma fågelgrupp (tättingarna) dominerar och bland dessa samma art (ängs-*piplärkan*). Kvantitativt sett har emellertid stora förändringar skett för flera arter. Sålunda har totaltätheten sjunkit från 106 till 84 par i yta K 1 och från 54 till 27 par i yta K 2. Tillbakagången har framförallt drabbat tättingarna. Vadarna förekommer inom ytorna i alltför ringa antal för att kunna ge någon reell uppfattning om eventuella täthetsförändringar. En anledning till denna nedgång i antalet stationära par kan vara den mycket försämrade snösituationen i början av juni 1965, dvs. början av den normala häckningssäsongen.

Observationerna av de i flera fall mycket markanta förändringarna av numerären mellan de båda åren ger anledning till följande anmärkningar.

1. Fluktuationerna i populationstätheten på fjällheden tycks kunna vara mycket stora och det är inte möjligt att dra någon slutsats om hur stor den «normala» tätheten är på detta tidiga stadium.

2. Det är inte heller möjligt att på grundval av enstaka års inventeringar, åtminstone i alpina biotoper, ge tillförlitliga täthetsvärden avsedda att allmänt karaktärisera biotopen i fråga.

3. Frågan om vilka väsentliga orsaker (täthetsberoende eller icke täthetsberoende) som reglerar artantalet under olika år i denna biotop kan inte besvaras utan att motsvarande undersökningar gjorts inom samma område under en följd av år.

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