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The changes in the nesting bird-fauna of Lake Nurmijärvi during the period 1896—1965 with special reference to the present bird populations

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Introduction

Earlier studies concerning the bird-life of Lake Nurmijärvi are those by KIVIRIKKO (1898 and 1931). There are some additional data on the migration (SUOMALAINEN 1933). But in general these data are very scanty. The development of vegetation is much better known (AARIO 1933).

The main purpose of this study is to summarize the principal changes in the avifauna and to clarify the composition of the present bird population in the area of the former lake basin.

The main source of material is my own observations, which were made annually during the period 1951—1963. The observations concerning the spring migrations during the great floods of 1951 and 1952 proved to be especially useful.

The present populations were counted 1—22.6.1965 and the method used was the line census (MERIKALLIO 1946). The total length of census lines was 18.4 kilometres. The distances between the census lines varied because of the terrain and the positions of canals and cultivated fields. Because it was impossible in some places to distinguish the forest areas above and below the old shore line some three hectares of the former were included the census area. The whole study area was thus some 250 hectares.

In some small areas the number of pairs was determined by direct counting of singing males. These areas comprise seven hectares in all. The principle used was: a singing male = a pair (also when the pheasant in question). The species feeding in the area but nesting outside were excluded. The usual counting time was daily from 03.00 to 09.00 a.m. The weather during the whole census period was excellent.

The most important source of error is the number of single and also polygamous males in the bird populations. But on the other hand some pairs have not been observed (see also JALKANEN 1960).

The changes in bird-fauna

The changes of habitat

In period 1896—1965 there have been two radical changes in habitat. Even before draining vegetation was slowly filling the lake basin and, especially after the coming of waterweed *(Elodea canadensis)*, the open water area was very restricted (see KIVIRIKKO 1931).

The lake was drained in 1923. The water level was lowered 30—40 centimetres, which was really remarkable because the average depht had been only 1—3 metres depending on seasons. But this draining was only partly successful. It was planned to drain the whole basin for agricultural purposes. Now the vegetation quickly invaded the free range and almost the whole basin was soon occupied by marsh plants *(Equisetum, Scirpus, Alisma, Phragmites* and *Typha)* (see AARIO 1933). Very soon the vegetation also filled the connecting canal between the Kyläjoki and Luhtajoki rivers and the water began to rise again slowly. This created the optimum habitat for many bird species (see also SÖDERBERG 1907 and MERIKALLIO 1929).

The final draining of Lake Nurmijärvi began in 1947, but the great floods during the springs of 1951 and 1952 disturbed these activities considerably. For instance, in spring 1951 the water covered more than 150 hectares. Later spring floods have been quite restricted and the area is now for the most part under cultivation. Year after year the area of field has increased as the remains of the willow-sedge meadows are ploughed over. So in summer 1965 the whole middle part of the basin was under cultivation. But there is now limited scope for further extension of the clearings. Accordingly there will be no radical changes of habitat in the immediate future (Fig. 1).

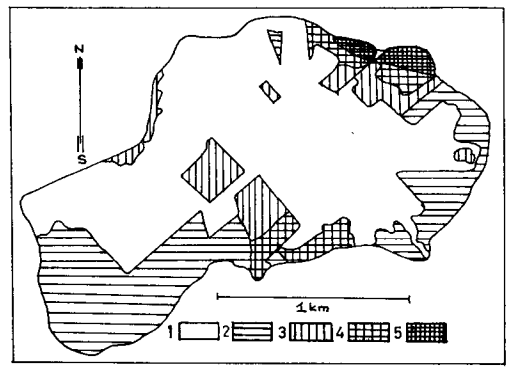

Fig. 1. The principal habitats of the basin of Lake Nurmijärvi; the whole area some 250 hectares. 1. Cultivated fields, 150 ha — 60 %, 2. Fallow, pasture and hay-fields, 65 ha — 26 %, 3. Shrub areas, 20 ha — 8 %, 4. Young dense hardwood stands, 12 ha — 4.8 %, 5. Old mixed stands, 3 ha — 1.2 %.

Kuva 1. Nurmijärven allasalueen tärkeimmät biotoopit; koko alue n. 250 ha. 1. Viljelysmaata 150 ha — 60 %, 2. Kesantoa, laidunja heinämaita, 65 ha — 26 %, 3. Pensaikkoa, 20 ha — 8 %, 4. Nuorta tiheää lehtimetsää, 12 ha — 4.8 %, 5. Vanhempaa sekametsää, 3 ha — 1.2 %.

The effect of changes on the bird-fauna

KIVIRIKKO (1898) mentions that the bird-fauna of Lake Nurmijärvi was not very rich at the end of the last century. He mentions the number of nesting species as eleven and records a total forty species observed in the area. Later he remarks that some new nesting species appared along with the increase of vegetation (KIVIRIKKO 1931).

In 1896 the Mallard and the Teal were the most abundant waterfowl in Lake Nurmijärvi. The number of nesting pairs was estimated as 150 in all (KIVIRIKKO 1898). When the waterweed began to fill the area of open water the Coot, the Pochard, the Wigeon and two species of Grebe found suitable habitat there.

The number of wading birds was six; the Common and the Wood Sandpiper,

the Great Snipe, the Snipe and the Curlew. The Lapwing nested in the area for the first time in 1898. The Corncrake and the Spotted Crake also nested on the marshy shores. For the Sedge Warbler and the Reed Bunting there were also large areas of suitable habitat. The nesting and migrating species of this period are summarized in Table 1.

After the draining the relative amounts of open water and dense vegetation were the most favourable for many species. The peak of abundance of species and individuals was reached during this period, from 1923 to 1947. Two new species were observed, the Garganey and the Black-headed Gull, which had a colony of more than a hundred pairs in 1928.

As the draining proceeded waterfowl and waders disappeared. Nest-

Table 1. The bird-fauna of Lake Nurmijärvi during the different stages of development 1896—1965. o = nesting, + = migrating.

Taulukko 1. Nurmijärven linnusto eri kehityskausien aikana vv. 1896—1965. o=*pesivä*, + = *muuttava.*

1 = 1896—1923,, 2 = 1924—1947, 3 = 1948—1952, 4 = 1953—1965.

	1	2	3	4
Gavia arctica	+	—	—	—
G. stellata	+	—	—	—
Podiceps cristatus	o	o	+	—
P. griseigena	+	—	—	—
P. auritus	o	o	+	—
P. ruficollis	+	—	—	—
Anas platyrhynchos	o	o	o	+
A. crecca	o	o	o	+
A. querquedula	—	o	+	—
A. penelope	o	o	+	—
A. acuta	+	+	+	—
Spatula clypeata	+	o	+	—
Aythya fuligula	+	o	+	—
A. ferina	o	o	+	—
Bucephala clangula	+	+	+	—
Clangula hyemalis	+	—	—	—
Melanitta nigra	+	—	—	—
Mergus serrator	+	+	—	—
M. albellus	—	+	—	—
Anser sp. (fabalis)	+	+	+	—
Cygnus cygnus	—	+	+	—
Lyrurus tetrix	—	—	—	o
Perdix perdix	—	—	—	o
Phasianus colchicus	—	—	—	o
Grus grus	+	+	+	—
Porzana porzana	o	o	—	—
Crex crex	o	o	—	o
Fulica atra	o	o	+	—
Vanellus vanellus	o	o	o	o
Charadrius dubinus	+	—	—	—
Capella gallinago	o	o	o	o
C. media	o	o	+	—
Lymnocryptes minimus	+	—	—	—
Numenius arquata	o	o	o	o
N. phaeopus	+	—	—	—
Tringa ochropus	+	+	+	o
T. glareola	o	+	+	+
T. hypoleucos	o	o	o	+
T. erythropus	+	+	+	—
T. nebularia	+	+	+	—
Calidris temminckii	+	—	—	—
C. ferrugineus	+	—	—	—
Philomachus pugnax	+	+	+	+
Larus fuscus	—	+	+	—
L. argentatus	—	+	+	—
L. canus	+	+	+	—
Larus ridibundus	—	o	+	+
Chlidonias niger	+	—	—	—
Sterna hirundo	+	—	—	—
Columba palumbus	—	—	o	o
Alauda arvensis	—	—	o	o
Hirundo rustica	+	+	—	—
Delichon urbica	+	+	—	—
Pica pica	—	—	o	o
Turdus pilaris	—	—	o	o
T. ericetorum	—	—	+	o
T. musicus	—	—	o	o
T. merula	(o)	—	o	o
Oenanthe oenanthe	—	—	o	o
Saxicola rubetra	o	o	o	o
Erithacus rubecula	—	—	o	o
Acrocephalus schoenobaenus	o	o	o	o
Hippolais icterina	—	—	—	o
Sylvia atricapilla	—	—	—	o
S. borin	—	—	o	o
S. communis	—	—	o	o
S. curruca	—	—	o	o
Phylloscopus trochilus	—	—	o	o
P. sibilatrix	—	—	—	o
Anthus pratensis	o	o	o	o
A. trivialis	—	—	o	o
Motacilla alba	+	+	o	o
M. flava	o	o	o	o
Lanius collurio	—	—	+	o
Carpodacus erythrinus	—	—	—	o
Fringilla coelebs	—	—	o	o
Emberiza citrinella	—	—	o	o
E. hortulana	—	—	—	o
E. schoeniclus	o	o	o	o
Nesting/*pesivät*	20	23	27	36
Migrating/*muuttavat*	28	18	25	6
Number of species *Lajeja yhteensä*	48	41	52	42

ing Mallards and Teals were observed only occasionally after 1950. Only the Lapwing and the Curlew became more abundant during these last years (see O. KALELA 1955). The change of habitat were favourable for them. The birds of open land and brush biotopes rapidly invaded the area. On the canal sides some Yellow Wagtails and Reed Buntings are still nesting. But the most typical bird species in the area are those of open land and brush habitats (see JALKANEN 1960 and HAAPANEN 1965). We may here consider the Lapwing and the Curlew as belonging to this category (O. KALELA 1938 and 1955).

There have been no remarkable changes in the migrating fauna during the period 1896—1952, i.e. the period the basin was flooded during spring and autumn migrations. Since 1947 the autumn migration has been quite limited. These changes are presented in detail in Table 1.

The invasion of open land and shrub birds began during the first summers of the final draining as soon as the basin area was wholly dry. Nowadays the number of nesting species is greater than ever before. But the composition differs completely from the fauna of the lake period. Only eight species have maintained themselves from the beginning of the century. The development of the nesting fauna is also summarized in Table 1.

The recent bird-fauna

The different habitats and their areas

There are three principal habitats in the census area, open land, shrub areas and forest. The open land may be divided into two subtypes according to utilization. There are also two subtypes of forest, younger almost pure deciduous and older mixed forest (Fig. 1). Although the area is very heterogenous it is possible to some extent to observe the selection of habitat among the bird species (see PALMGREN 1935, PALMGREN, AHLQUIST & LUTHER 1938 and FRITZÉN & TENOVUO 1957).

The open lands

The total area is 215 hectares or 86 per cent of the whole observation range. The figures include cultivated fields, fallow and pasture, and also the idle lands on the banks of many canals. These are occupied by willows and tall grasses. The effect of these impurities is seen in the occurrence of some typical shrub-birds in this habitat. The main area of open land is divided into two by a shrub wedge (Fig. 1) Cultivated fields are in the middle and in the NW-corner of the basin. The fallow and pasture are mainly in the E- and SW-parts. The crops cultivated during summer 1965 were oats, turnip rape, fodder plants and wheat, which was the most important.

The shrub areas

The willows grow mainly in the still untouched parts of the basin. In some places the sedges make up the field stratum, which is full of grassy hummocks. In general these shrubs are situated on the sides of the census area but there is one area of five hectares in the middle of the cultivated fields. The total area of this habitat is 20 hectares, eight per cent of the lake basin.

Different species of *Salix* are the most important. Some of them are really small trees e.g. great sallow and bay willow. In the field stratum the tall grasses like *Filipendula, Thalictrum* and *Cirsium* etc. are the most common. In some places there are *Salix*-mead-

ows with undergrowth made up of sedges. The mean height of shrubs is 2—3 metres, but some individual trees may be a little higher.

The forests

The forests of the census area, 15 hectares, six per cent, are quite young and according to the studies of HAAPANEN (1965, p. 155) they may be regarded as the second and third phases of forest succession. The age of these forests is from ten to forty years. This biotope consists of two subtypes. The younger part has grown on both sides of the former shore-line and is pure deciduous *(Alnus* and *Betula).*

There are in some places remnants of an old willow belt as a shrub stratum. The mean height of these forests is usually less than five metres. The undergrowth is here and there made up of tall grasses as in the shrub areas.

In the NE-corner of the census area the forest has always been above the high water mark. The stand is mixed but the deciduous trees are clearly dominant. This part was included in the observation area for technical reasons. The total area of this habitat is only three hectares — 1.2 %. The important tree species are chokecherry and gray alder. The shrub stratum is very luxurious *(Lonicera, Ribes* etc.). The field stratum is poorly developed especially in the thickets and also the moss layer is not continuous. In the open and sunny places the tall grasses predominate (*Urtica, Artemisia* etc.). The other trees to be mentioned are pine, spruce, maple and common ash.

The bird-fauna of different habitats

The results of the line census are summarized in Table 2.

Discussion

The result of the census was 416 pairs and 36 species (the male pheasants were considered as pairs). The average density is thus 166 pairs/km². The mean of SOVERI's (1940) sample areas (1—300 hectares) is 186 p/km². The significance of buildings as nesting places is the most remarkable reason for these differences. SOVERI's sample areas make 1059 hectares in total, and in every area there was at least one farm-house. If the whole area of this study is compared with the agricultural and meadow habitats studied by JALKANEN (1960), the mean bird density of this study would be higher despite the courtyards with denser populations in the material presented by JALKANEN.

The bird density of open lands, 93 p/km², is very near the figures given by Jalkanen, 84 p/km², and when the courtyards were included 102 p/km², being the mean of these and also the same as those MERIKALLIO (1946) presents. The corresponding census areas are 89.0 (JALKANEN) and 69.5 hectares (MERIKALLIO). The total range of open land habitat in the basin area is 215 hectares. The figure SOVERI (1940) gives, 185 p/km², is already higher than the general bird density of my study area. But we must here again note the significance of buildings as nesting places (e.g. *Passer domesticus* 33.4 and *Hirundo rustica* 36.2 p/km²).

The differences in the abundance of individual species are caused by local peculiarities of habitat. There are some birds which may be considered as relicts. That is why for instance the Lapwing is more common in the basin area than in the surrounding fields.

In the shrubs the most important species are the Whinchat and the Whitethroat. In general there are no remarkable differences with e.g. PALM-

Table 2. The bird-fauna of different habitats in 1965. D=dominant (frequency more than 5 %).

Taulukko 2. Eri biotooppien linnusto v. 1965. D=*dominantti.*

	Open lands *Avomaat*	Shrubs *Pensaikot*	Forests *Metsät*	Total *Yhteensä*
Alauda arvensis	53 D	1	—	54 D
Phylloscopus trochilus	4	8 D	35 D	47 D
Vanellus vanellus	40 D	—	—	40 D
Fringilla coelebs	3	6 D	27 D	36 D
Saxicola rubetra	15 D	18 D	1	34 D
Sylvia communis	9	15 D	9 D	33 D
Numenius arquata	19 D	—	—	19
Anthus trivialis	3	3	9 D	15
Sylvia borin	—	—	15 D	15
Phasianus colchicus	6	5 D	3	14
Turdus pilaris	—	3	9 D	12
Anthus pratensis	10 D	—	—	10
Emberiza hortulana	10 D	—	—	10
Emberiza schoeniclus	3	3	3	9
Motacilla flava	8	1	—	9
Pica pica	1	3	3	7
Emberiza citrinella	2	1	3	6
Perdix perdix	2	3	—	5
Turdus musicus	2	—	3	5
Erithacus rubecula	—	1	4	5
Sylvia curruca	—	—	5	5
Turdus merula	—	—	4	4
Lanius collurio	1	2	—	3
Capella gallinago	2	—	—	2
Acrocephalus schoenobaenus	2	—	—	2
Motacilla alba	2	—	—	2
Carpodacus erythrinus	—	2	—	2
Turdus ericetorum	—	1	1	2
Columba palumbus	—	—	2	2
Crex crex	1	—	—	1
Tringa ochropus	1	—	—	1
Oenanthe oenanthe	1	—	—	1
Lyrurus tetrix	—	—	1	1
Phylloscous sibilatrix	—	—	1	1
Sylvia atricapilla	—	—	1	1
Hippolais icterina	—	—	1	1
Species/pairs, *lajeja/pareja*	24/200	17/76	21/140	36/416
Areas (hectares), *pinta-alat (ha)*	215	20	15	250
Density pairs/km², *tiheys p./km²*	93	380	933	166

GREN's (1935) observations from the agricultural areas of Åland. The high average density, 380 p/km², is caused by the edge effect and also by the small material. Of those 20 hectares of shrubs some 14 are closely connected with the forest (see PALMGREN, AHLQUIST & LUTHER 1938 and FRITZÉN & TENOVUO 1957).

In the forests the most interesting feature is that the Willow Warbler is more abundant than the Chaffinch. The abundance relations of these two species are considerably affected by the age of

the forests. Young dense deciduous forest makes up 80 % of the area of this habitat (see also FRITZÉN & TENOVUO 1957, p. 32). Consequently the Chaffinch is a little more numerous in the older and more open park-like forest in the NE-corner of the census area (see PALMGREN et. al. 1938, p. 121).

The mean bird density of the forest habitats is 933 p/km², in which we can see the significance of the edge effect. When the forest belt is near the cultivated areas birds are concentrated into this optimum range. The material is also scant because of the small area of this habitat.

In the older part of the forest (3 hectares) the bird density is 1200 p/km². JALKANEN (1960) studied an area of four hectares and found 75 nesting pairs which will give the mean density of 1875 p/km². If we exclude the Starling, the Swallow and the House Martin which usually nest in buildings and man-made bird-houses the density will be 925 p/km². This figure is very near the mean density of the forest areas of my study, 933 p/km².

Summary

The principal changes in the bird-fauna of Lake Nurmijärvi during three periods of development (1896—1965) are summarized in this study. The number of species was already increasing before the draining. KIVIRIKKO (1931) supposes that the main reason was the waterweed *(Elodea canadensis)* which appeared in the lake in the beginning of this century. The migratory birds visited the lake regularly and were very abundant.

Draining was done in 1923 (AARIO 1933) and the water level was lowered 30—40 cms. The normal depht has varied from one to three metres depending on the seasons. The Luhtajoki and Kyläjoki rivers were linked with a canal through the lake basin. The lush vegetation which soon occupied almost the whole basin also filled this canal and the water began to rise slowly. This created the optimum habitat for many birds. Two new nesting species were observed, the Garganey and the Block-headed Gull. When the basin was flooded the water covered more than 150 hectares and many migrating species of waterfowl were observed e.g. swans and geese.

Mechanical draining began in 1945 and the first action was the clearing of the Luhtajoki river. The new connecting canal which bypassed the lake basin was completed in 1946. The waterfowl and many waders disappeared rapidly. Only the populations of the Lapwing and the Curlew began to increase. In spring 1951 the basin was flooded and an unusual number of migrating waterfowl and waders were observed.

Nowadays the cultivated area of the basin is some 150 hectares and 65 hectares are utilized as pasture. The avifauna is typical of the cultivated areas. The Skylark (54 pairs) is the most abundant. The population of the Lapwing is also remarkable (40 p). In the shrub areas the Whinchat and the Whitethroat (34 and 33 p) are the dominant species. The Corncrake (1 p) and the Snipe (2 p) are still nesting in the area. There are also some other relict species, the Sedge Warbler (2 p), the Reed Bunting (9 p) and the Meadow Pipit (10 p). All of these have become infrequent during the last few years.

In the census, during the period 1—22.6. 1965, 36 species and 416 pairs were counted. The average bird density of the area, 250 hectares in all, is thus 166 pairs/km².

The little forests represent the early stages of the forest succession. There are no remarkable faunal differences between these forests and shrub areas. In the park-like older part of the forest there are some bird species which are not seen elsewhere, e.g. the Wood Warbler and the Icterine Warbler.

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Selostus: Nurmijärven pesimälinnuston muutoksista 1896—1965

Tässä työssä on suoritettu yhteenveto Nurmijärven linnustossa tapahtuneista muutoksista kolmen kehitysjakson aikana vv. 1896—1965. Lajien määrä oli jo lisääntymässä ennen järven laskua, ja KIVIRIKKO (1931) arvelee vesiruton *(Elodea canadensis)* ilmestymisen järveen joskus vuosisadan alussa olleen tärkeimmän tähän vaikuttaneita tekijöistä. Muuttoaikoina järvessä oleskeli runsaasti vesilintuja ja kahlaajia.

Järvi laskettiin v. 1923 (AARIO 1933), ja vedenpinta aleni tällöin 30—40 cm. Kun järven aikaisempi syvyys oli ollut vain 1—3 m vuodenajasta riippuen, muutos oli todella huomattava. Kylä- ja Luhtajoki yhdistettiin kanavalla järvialtaan kautta. Rehevä kasvillisuus, joka nopeasti valtasi paljastuneen järvenpohjan, tukki myös tämän yhdyskanavan, ja vesi alkoi jälleen hitaasti nousta. Tässä vaiheessa alue tarjosi monille lajeille lähes ihanteellisen pesimäympäristön. Uusina lajeina mainitaan naurulokki ja heinätavi. Kun järvi tulva-aikoina oli edelleen lähes entisen kokoinen, muuttajia tavattiin etenkin keväisin runsaasti.

Koneelliset kuivatustyöt aloitettiin v. 1945 Luhtajoen perkauksella. Uusi yhdyskanava, joka tällä kertaa johdettiin altaan ohitse, valmistui v. 1946. Vesilinnut ja useimmat kahlaajat hävisivät alueelta nopeasti. Vain töyhtöhyypän ja kuovin kannat alkoivat vahvistua. Kun keväällä 1951 suurtulva peitti alleen n. 200 ha, alueella tavattiin poikkeuksellisen runsas ja monipuolinen muuttajalajisto.

Nykyisin on altaan alueesta viljeltyä n. 150 ha sekä osittaisessa käytössä laitumina ja kesantoina 65 ha. Linnusto koostuu tyypillisistä avomaiden ja pensaikkojen lajeista. Kiuru on selvästi yleisin (54 paria). Myös töyhtöhyypän kanta on huomattava (40 p.). Helposti havaittavia ovat myös pensastasku ja pensaskerttu (34 ja 33 p.). Ruisrääkkä (1 p.) ja taivaanvuohi pesivät niin ikään vielä alueella. Eräänlaisina reliktilajeina voidaan viimeksi mainittujen lisäksi pitää ruokokerttusta (2 p.), pajusirkkua (9 p.) ja niittykirvistä (10 p.). Näiden pesinnässä on viime vuosina esiintynyt epäsäännöllisyyttä.

Alueella tavattiin laskennassa 1—22.6.1965 kaikkiaan 416 paria ja 36 lintulajia. Yleislintutiheys oli täten 166 paria/km². Havaintoalueen vähäiset metsiköt edustavat metsäsukkession alkuvaiheita, joten merkittäviä eroja ei pensaikkojen ja metsiköiden lajistoissa ole. Tosin puistomaisessa metsän vanhemmassa osassa asustaa lajeja, joita ei tavat muualla, esimerkiksi sirittäjä ja kultarinta.

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Tunturimittarin joukkoesiintymisen vaikutuksesta linnustoon Utsjoella 1964—1966

(Changes in the bird populations in Utsjoki, Finnish Lapland in 1964—1966, caused by the mass-occurrence of the caterpillar Oporinia autumnata)

TORSTEN SILVOLA

Utsjoen pitäjässä sijaitseva Kevon luonnonpuisto koki kesinä 1964 ja 1965 tunturimittarin *(Oporinia autumnata)* joukkoesiintymisen. Kesällä 1964 lajin toukat söivät suurilta alueilta koivun ja osittain myös vaivaiskoivun lehdet. Toukkia oli tällöin heinäkuun alussa maassakin niin paljon, että niitä jäi jalan alle joka askeleella. Kesällä 1965 tuho toistui samalla alueella, mutta ulottui myös edellisenä kesänä säästyneisiin koivikkoihin. Kesän 1966 havaintojen mukaan luonnonpuiston lähes kaikki *regio subalpinan* koivikot olivat tuhoutuneet.

Kesällä 1964 laskin linja-arviointimenetelmää käyttäen runsastoukkaisessa *Empetrum-Vaccinium*-tyypin metsässä lintutiheydeksi 194 paria/km², joka on huomattavasti korkeampi kuin kesän 1964 keskimääräinen lintutiheys *EV*-tyypin metsissä, 107 paria/km², mikä puolestaan on sama kuin 10-vuotiskaudella 1955—64 havaittu keskitiheys (Taulukko 1) (ks. SILVOLA 1967). Tänä aikana minimitiheys oli 74 ja maksimitiheys 182 paria/km². On todennäköistä, että runsastoukkaisen ja jo silloin suureksi osaksi lehdettömäksi syödyn *EV*-tyypin korkeaan tiheysarvoon on muitakin syitä kuin parantunut havaittavuus laskentahetkellä. Valtalajien, järripeipon *(Fringilla montifringilla)* ja uunilinnun *(Phylloscopus trochilus)*, tiheysarvot olivat 10-vuotisjaksoon verrattuna kaksinkertaiset, mutta näiden lajien keskinäinen runsaussuhde oli pysynyt ennallaan.

Seuraavan kerran suoritin lintulaskentaa samalla alueella kesäkuun 1966 lopussa, jolloin havaitsin Kevon luonnonpuistoa kohdanneen synkän kohtalon. Kymmenien kilometrien matkalla tunturikoivikko oli täysin kuollut ja