

Observations on some taiga forest birds with respect to forest fragmentation

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Many species of birds inhabiting the old taiga forests of Northern Finland have decreased in numbers during recent decades (e.g. O. Järvinen et al. 1977, Väisänen 1983). Although these species exhibit a wide variety of habits, for instance in respect of migration and nesting, the most obvious reason for the decline of the populations is the fragmentation of virgin conifer forests caused by modern forestry. In the 1970s the population of the Siberian Tit *Parus cinctus* amounted to one-ninth of that in the 1940s; the corresponding figure for the Crested Tit *P. cristatus* was one-seventh, for the Willow Tit *P. montanus* one-half and for the Siberian Jay *Perisoreus infaustus* one-third. The fragmentation of old forests is thought to cause the decline of their populations by limiting the possibility of their overwintering, since they are assumed to need large continuous areas of virgin forest in order to survive the northern winter (O. Järvinen et al. 1977). This hypothesis can thus explain why the populations of these species have decreased more than the area of old forests itself. The area of suitable habitats does not, however, play the only role here, for the bird densities have also changed in areas that have remained in natural condition (for within-habitat changes, see O. Järvinen & Väisänen 1978).

According to the Finnish winter bird censuses (Sammalisto 1974), the wintering populations of *Perisoreus infaustus* and *Parus cristatus* decreased greatly during the years 1960–1973 (the former by about 70 % and the latter by about 30 %); the populations of *Parus montanus* and *P. cinctus* showed only slight decreasing trends. This information covers the whole country and thus only the trends of *Perisoreus infaustus* and *Parus cinctus* can be applied without reservation to northern Finland (usually only a few individuals of these species are observed outside Northern Finland). The variation in the numbers of wintering *Parus cinctus* is very large, being of about the same magnitude as that in the typically erratic species *Aegithalos caudatus*, *Carduelis spinus* and *flammea*, *Pinicola enucleator* and *Loxia curvirostra* (Sammalisto 1974). During the years 1976–82 the wintering populations of these species did not show any clear changes in Northern Finland: *Parus cinctus* evidently increased somewhat, while *P. cristatus* showed a slight decreasing trend (e.g. Sammalisto 1982). The routes of the winter bird censuses usually run close to human habitations, which causes underestimation of the numbers of species preferring wilderness habitats. For example, the numbers of *Parus montanus* are about ten times as great as those of *Parus cinctus* on the winter bird census routes in Northern Finland, while the corresponding ratio in the virgin forests of Northern Kuusamo is about 1.5:1.

In December–February during the winters of 1981–82 and 1982–83, skiing trips were made in Northern Kuusamo, in the virgin forests of the Oulanka National Park, and in forest islands and narrow strips of forest bordering forestry roads outside the Park. About 40 km were covered both inside and outside the park. The forests of the National Park are large and are connected

with uninhabited areas of enormous size behind the Finnish-Soviet border. The forest fragments outside the Park usually amount to 10–30 ha in size and are relatively isolated from other forest patches or the National Park (the distance varies from some hundreds of metres to a few kilometres).

The forests of the National Park and the fragments are fairly similar as regards the vegetation: virgin forest with pine and spruce dominant is abundant in both. The figures below do not include the birds living near the Biological Station in the Park and the few farms outside it. The numbers of Siberian Jays and Tits recorded during the trips were as follows:

	National Park	Forest patches
<i>Perisoreus infaustus</i>	8	6
<i>Parus major</i>	1	—
<i>P. cristatus</i>	1	1
<i>P. cinctus</i>	13	3
<i>P. montanus</i>	13	12

The flock sizes in the two areas were of the same order of magnitude: 2.0 in deep forest, and 1.6 in forest patches. *Parus cinctus* is the only species showing a clear preference (statistically significant) for one of the two areas. The same preference was observed in both winters. Since I usually did not use the same routes in the same winter the possibility that some birds were counted more than once is negligible. The relatively "high" numbers of *Perisoreus infaustus* in the forest fragments is surprising, because the wintering territory of the species is very large (1–1.5 km²) and is supposed to consist only of old forest (Blomgren 1964, 1971). One possible explanation for this is that Siberian Jays readily visit timber-cutting areas, where they wait around men working in the woods in the hope of finding something to eat.

The breeding densities of *Perisoreus infaustus* and *Parus cinctus* are low (1 pair per km² or less for all of the species). Censuses have been conducted in the areas discussed above, but the number of observations is so minute that no conclusions can be drawn. Several observations indicate, however, that *Perisoreus infaustus* does not require large continuous areas of forest for breeding. *Parus montanus* is also often observed in small forest patches, and even in recently clear-felled areas with only thickets of hardwood. Two nests of *Parus cinctus* were found in forest islands 10 and 15 ha in size, both of them lying several hundred metres from other forest patches. In both cases the parents collected food for their young from the areas around the "nest island", which had been clear-felled about twenty-five years earlier, but not from the neighbouring forest patches (a distance of about 400 m). The third nest found outside the National Park was located in the centre of an area clear felled about 30 years earlier (35 ha in size), which has now a thicket of pine saplings 4–6 m in height.

That large virgin forests are not necessary to the breeding of *Perisoreus infaustus* is supported by indirect evidence. The population size of this species in the 1940's was ca. 186 000 (Helminen & Väisänen 1980) and at that time the area of old forests (>100 years) amounted to 4.3 million ha, which means that the area available for one pair of *Perisoreus infaustus* must have been 23 ha. For safety's sake, we can add the area of poorly productive forest land ('kitumaa') to the calculation, since it is used to some extent by the species, and this gives a territory size of 39 ha. Since this figure is clearly smaller than the actual territory size of the species (50—75 ha, Blomgren 1964), we can conclude that *Perisoreus infaustus* does not require old forests for breeding, provided the estimates of the population and territory size are true. Similar calculations give the area available for one pair of *Parus cinctus* as 21 ha, which accords with the known territory size of the species (about 15 ha, Haftorn 1973, A. Järvinen 1982). Finally: the assumption that the habitats concerned would have been saturated by these species is perhaps not true.

According to the observations reported in this note, the "forest fragmentation-wintertime" hypothesis seems to hold good for *Parus cinctus*. It should be remembered, however, that the number of observations is very small, and that they are perhaps not representative of the whole of Forest Lapland. The hypothesis should be tested with more extensive data, and answers should be sought to such questions as: Why is *Parus cinctus* dependent on large virgin forests in Southern Lapland in wintertime, although it can survive the winter in Northern Lapland even outside the range of conifer forests (A. Järvinen 1982; the population of the species has even decreased most in Forest Lapland, O. Järvinen & Väisänen 1979)? And why are the small forest patches surrounded by clear-felled areas not used by *Parus cinctus* as they are by *P. montanus*, although the species are quite frequently observed together in mixed-species flocks in large forests? Finally: the assumption that the habitats concerned would have been saturated by these species is perhaps not true.

Selostus:

Selostus: Havaintoja havumetsän lintulajien suhteesta metsien pirstoutumiseen

Vanhojen metsien hakkuita pidetään syynä mm. tiaisten ja kuukkelin voimakkaaseen taantumiseen viime vuosikymmeninä Pohjois-Suomessa. Yhtenäisten metsäalueiden pirstoutumisen arvellaan haitanneen erityisesti lajien talvista elämää, sillä ne tarvitsevat tällöin laajoja yhtenäisiä metsäalueita. Jouluhelmikuiset hiihtomatkat Pohjois-Kuusamossa talvina 1981/82 ja 1982/83 suunnitellin siten, että kuljetuksi tuli yhtä pitkä taival (n. 40 km) Oulangan kansallispuiston 'syviä' metsiä sekä puiston ulkopuolella olevia metsäsaarekkeitä ja metsäautoteiden varsin kulliseja. Biotoopeiltaan alueet ovat vertailukelpoiset. Lapintiaisia tavattiin enemmän suurissa kuin pienissä metsissä, muilla lajeilla ei ollut eroja.

Useiden pesimäaikaisten havaintojen perusteella (Pohjois-Kuusamo) ainakaan hömö- ja lapintiaisen sekä kuukkelin pesimäaikaan tarvitse suuria yhtenäisiä

metsäalueita. Ravintoa haetaan jopa hakkuuvaiheissa eikä pesäsaarekkeenkaan tarvitse olla suuri. Kuukkelin osalta sama voidaan päätellä epäsuoremmin. Lajin kannan vahvuus oli 1940-luvulla noin 186 000 paria. Yli 100-vuotiaiden metsien pinta-ala oli tuolloin Pohjois-Suomessa 4.3 milj. ha, joten yhdellä kuukkeliparilla oli käytössä vanhaa metsää 23 ha. Jos pinta-alaan lisätään varmuuden vuoksi vielä kitumaat — missä lajia pesimäaikana jonkin verran esiintyy — reviirin koko olisi ollut 39 ha. Lajin pesimäreiviiri on kuitenkin paljon suurempi (50—75 ha), joten kuukkelien on täytynyt pesiä myös muualla kuin vanhoissa metsissä, korvissa ja rämeillä — mikäli tiedot sen populaatio- ja reviirikoosta ovat oikeat. Lapintiaispäriille olisi samalla tavoin laskien ollut 'tilaa' Pohjois-Suomen vanhoissa metsissä ja kitumailta 1940-luvulla 21 ha, mikä on sopusoinnussa lajille ilmoitetun reviiriköön kanssa (noin 15 ha). On kuitenkin epätodennäköistä, että po. biotoopit olisivat olleet kuukkelin ja lapintiaisen aukottomasti miehittämät.

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