

Changes in the fauna and distribution dynamics of terrestrial vertebrates in the European North of Russia

Pjotr Danilov, Vladimir Zimin & Ernest Ivanter

Institute of Biology, Karelian Research Centre, Russian Academy of Sciences, Pushkinskaya 11, 185610 Petrozavodsk, Karelia, Russia

Introduction

Changes in the fauna composition and boundaries of the range of species in the European North are affected by a number of factors. The leading role is now played by human-induced transformations of animal habitats. Rapid alteration of the ecological situation in extensive areas results in fragmentation or destruction of primary and establishment of secondary ecosystems, where native species may fail to find a suitable habitat. On the other hand, the emergence of new conditions in secondary types of ecosystems facilitates their colonization by new species.

Other important factors influencing the changes in distribution are annual and multiannual natural abundance variations, particularly accumulation of the so-called population «potential». Another one is artificial support of the high density of some hunted animal populations in certain areas, as well as introduction of new species and wildlife conservation activities.

The Karelian landscapes changed notably in the last century. Vast areas of primeval forests were replaced by clearcuts, and then covered primarily by deciduous and mixed stands of varying age. Agricultural area increased mainly at the expense of large drained mires. Bogged forests in large areas were considerably transformed by forest drainage, as well. All these changes had a tangible effect on the general appearance of the terrestrial vertebrate fauna and the distribution of its representatives.

Results and discussion

The limits of the distribution range of sand lizard (*Lacerta agilis*), water snake (*Natrix natrix*), crested newt (*Triturus cristatus*) and common toad (*Bufo bufo*) have moved much to the north within a short enough period of time.

The bird species for which a distribution shift further to the north was observed are blackbird (*Turdus merula*), ball-coot (*Fulica atra*), white and black storks (*Ciconia ciconia* and *Ciconia nigra*), black-headed gull (*Larus ridibundus*), and many passerines. Some bird species are expanding their range quite rapidly. Thus, Eurasian blackbird, for which no reliable reports of nesting could be found before 1965, colonized the southern part of the republic in the last 10-12 years, and now nests regularly up to as far as 63° N (Зимин 1988).

The mammals that demonstrated a high expansion rate are: mole (*Talpa europea*), European hedgehog (*Erinaceus europeus*), Northern birchmouse (*Sicista betulina*), common vole (*Microtus agrestis*), Eurasian harvest mouse (*Apodemus agrarius*), European polecat (*Mustela putorius*), Eurasian badger (*Meles meles*), Midrussian wolf (*Canis lupus*) and roe deer (*Capreolus capreolus*) (Fig. 1).

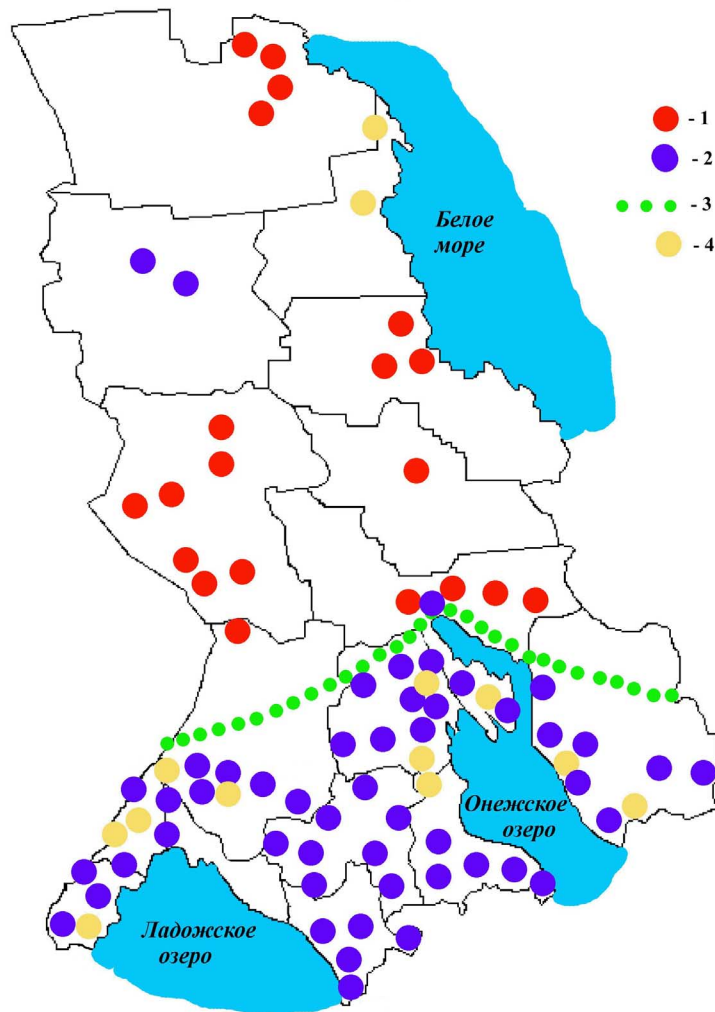


Fig. 1. Distribution of the wild boar and roe deer in Karelia (according to Danilov 1979, with additions) 1 – places of wild boar registration, 2 – wild boar breeding and staying over winter, 3 – the border of the regular registration and breeding of the wild boar, 4 – places of the roe deer registration

However, an absolutely fantastic phenomenon for which no clear explanations have been found yet is the speedy expansion of the European wild boar to the north observed in the 1960's - 80's throughout the European part of Russia. This phenomenon deserves a more detailed discussion.

In the very remote past, some 2-3 millennia B.P., and in the period covered by history, i.e. 2-3 centuries ago, wild boar could be found neither in Karelia, nor even in most of the area now included in the Leningrad region. The northernmost finds of wild boar bones amongst fauna remnants from Neolithic sites are: the southern shore of Lake Ladoga (Иностранцев 1882) and the southern coast of Finland Bay (Поляков 1879).

At the beginning of the 20th century, wild boar could not be found in most of the Russian Northwest territory either (Русаков 1979). Moreover, it was believed that the species could not live further to the north than the mean maximum snow cover depth isoline of 40 cm and snow-covered period duration over 160 days (Формозов 1946, Насимович 1955, Фадеев 1973). The closest to Karelia area where wild boar was a permanent resident was the Baltic states.

The first wild boar individuals in the Leningrad region were encountered in 1947-1948. It only took the species 20 years to colonize the whole of the region and show up in Karelia, and 15 more years to reach the Arctic circle (Иванов 1962, Данилов 1979, Русаков 1979, Русаков & Тимофеева 1984) (Fig. 1).

We do not however consider extra distant occurrences of individuals or small groups of animals with no reproduction in the area as actual expansion of the range, be it wild boar or any other terrestrial vertebrate species. With this principle in view, the modern northern limit of the wild boar permanent residency range in Karelia can be depicted as an abstract line joining the settlements Tolvajarvi – Karhumäki – Pjalma – Kolodozero (Fig. 1).

The visible reason for wild boar expansion to the north is first of all the situation with high population densities in the adjacent areas where the animals came from. In our case these were the Baltic states and Belorussia. Another reason was the series warm winters with little snow in the late 1960's – early 1970's. On the third place is the high moving activity of the animals. Therefore their arrival in areas quite far from the residential habitats, surely contributed to the expansion. Such behavior is pre-determined not only by the species ecology, but also by the scarcity of natural feeding resources for wild boar in the Russian European North and the difficulties with obtaining food owing to the early and deep freezing of the soil.

A tendency towards expansion northwards has been lately demonstrated by many representatives of the broad-leaved forest fauna complex, which is mainly due to the primeval coniferous forests in the north- and mid-taiga being replaced by deciduous and mixed stands, and the emergence of large clear-cut and young stand areas.

Most representatives of the north-taiga fauna show no visible trends for southwards expansion of the range. On the contrary, the above reasons forces many of them to shift the southern limits of the distribution range to the north. For example Siberian chickadee (*Parus cinctus*), pine grosbeak (*Pinicola enucleator*), three-toed woodpecker (*Picoides tridactylus*), smew (*Mergus albellus*) and willow grouse (*Lagopus lagopus*) are such species. Retreat of game animals to the north was caused both by direct human pursuit (wolverine, forest reindeer), and the growing disturbance factor.

Our data shows that the major reasons for the shrinkage of wolverine range and abundance were the application of poison in the so-called wolf-fighting from 50-s to the early 1980's, and direct pursuit of the animals using snowmobiles nowadays.

Some noteworthy changes were observed also in the situation with forest reindeer. After the time when semidomestic reindeer husbandry in Karelia was over and the pursuit and killings of wild animals by reindeer breeders was stopped, wild forest reindeer started recovering its former abundance and distribution range quite rapidly. As a result, as soon as in the mid-1970's the population abundance reached over 6000 individuals, and the southern distribution limit shifted down to the abstract line joining the communities Kuolismaa – Porajärvi – Maselgskaya, and then along Lake One-go shore to the administrative border with the Vologda region (Данилов 1975а, Данилов et al. 1973, 1986) (Fig. 2).

Dramatic transformations in the society in the late 1980's-early 1990's however brought by a poaching «bloom» in Karelia, as well as in other parts of Russia. As a consequence, there are now just a little over 3,500 reindeers in Karelia, the southern distribution limit retreated almost as far north as Segezha. The southern part of the range became fragmented again.

Sometimes, drastic ecological changes are the results for a retreat of the species from the positions conquered in the course of prolonged expansion in one direction. Thus, as a result of the northwards expansion of gray partridge in the 19th – beginning of the 20th century, the species settled in Karelia up to the latitude of Segezha (63° 30' N). After the form of the agricultural activities in the region changed, i.e. grain crop cultiva-

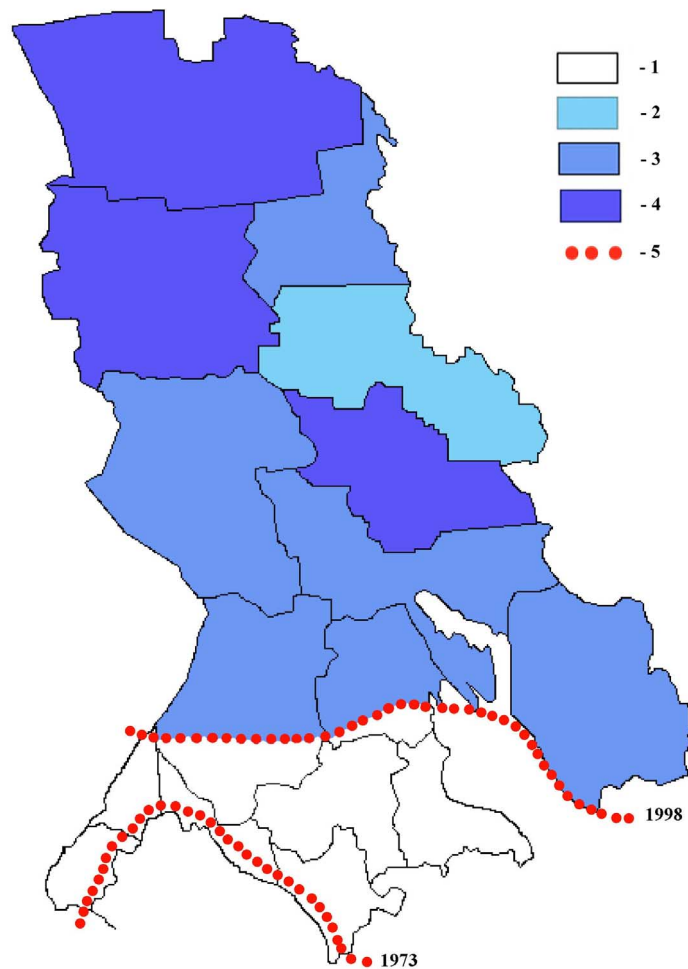


Fig. 2. Distribution and number (average for many years) of the wolverine in Karelia, tracks per 10 km. 1 – no tracks, 2 – 0.01 and less, 3 – 0.02-0.09, 4 – 0.10 and more, 5 – southern border of spreading

tion stopped, gray partridge completely disappeared from the republic (the last find was reported in 1961). About the same happened to European hare, small number of which have stayed only in the southernmost agricultural districts of the republic.

A vivid example of rapid colonization of northern areas followed however by a gradual retreat is demonstrated by starling. In the first half of the 20th century it spread into the Kola peninsula, nesting there steadily and abundantly. Starting with the mid-1970s however, its abundance in the northern regions of the Northwest Russia, as well as in the North of Scandinavia, rapidly decreased. By now the process reached Central Russia (Зимин 1988).

Finally, the human activity that is the last one to be considered here, but produces an exceptionally powerful impact on the fauna, is the introduction of new animal species. In Karelia the process started in 1932 with the release of muskrat in the Pudozh district.

In 1934 muskrat introduction was followed by the release of a small group of American mink near Petrozavodsk. At present the species is quite common and even numerous throughout Karelia. Our investigations (Данилов 1963, 1969, 1972, Danilov 1992) showed that mink acclimatization succeeded owing to the continuous adding of farm-bred animals escaped into the wild (Fig. 3).

The introduction of this predator in Karelia lead to tragic consequences for the native species European mink. The latter disappeared from Karelia, now only presumably occurring in the north-east of the Pudozh district. (Fig. 3). The same reason caused the extinction of European mink from the Leningrad region, and most parts of the Novgorod, Pskov, Vologda and Tver regions (Данилов & Туманов 1976).

In the early 1950s another representative of the North American fauna appeared in Karelia. Canadian beaver immigrated from Finland, where the species had been released earlier (Данилов 1962, 1975b, Danilov 1992, 1995). Expanding their range both independently and with human help, the animals colonized most of Karelian territory (Fig. 4). Their abundance is now a little over 3000 individuals.

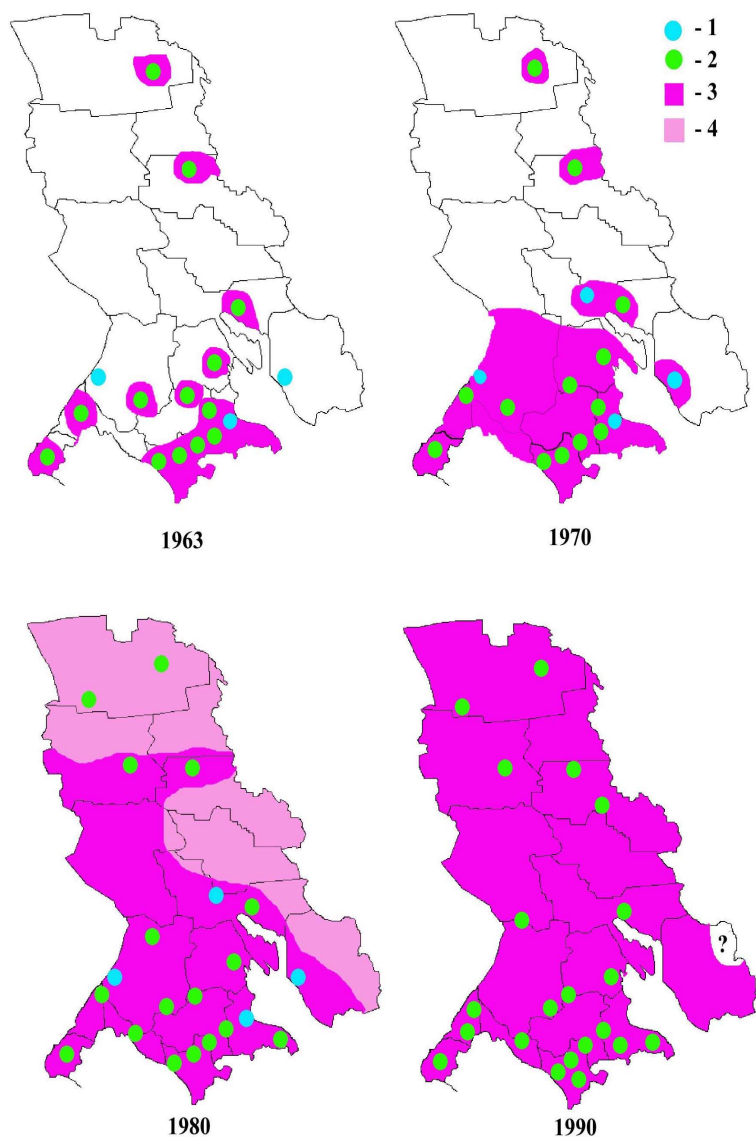


Fig. 3. Distribution of the american mink in Karelia (according to Danilov 1992), 1 – places of release, 2 – fur breeding farm, 3 – area of animals habitat, 4 – area of rare occurrence, ? – area where european mink could inhabit

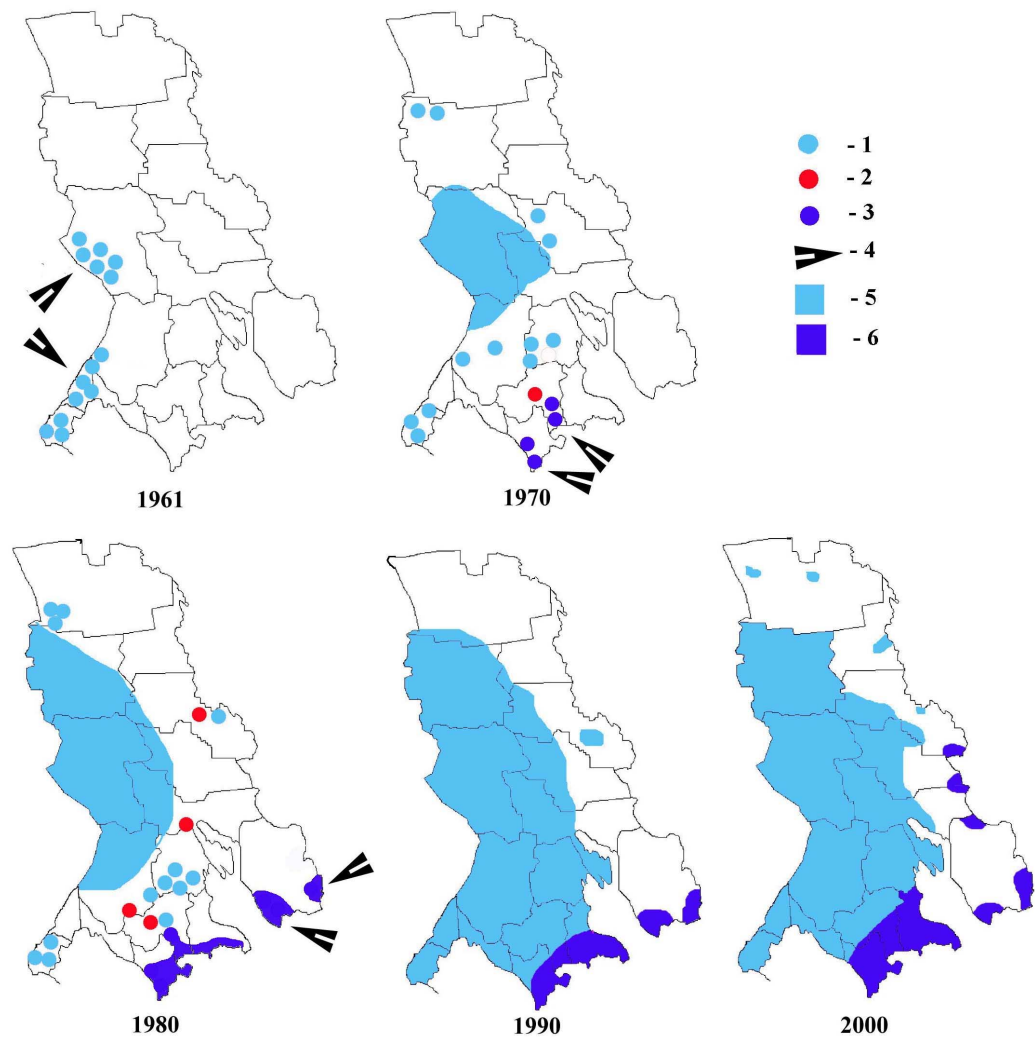


Fig. 4. Distribution of the Canadian and European beavers in Karelia, 1 – Canadian beavers settlements, 2 – places of Canadian beavers releases, 3 – European beavers settlements, 4 – ways of animals spreading, 5 – area inhabited by Canadian beaver, 6 – area inhabited by European beaver

Just a decade after the arrival of Canadian beaver, i.e. in the early 1960's Karelia was colonized also by European beaver spreading from the Leningrad region (Fig. 4). The total abundance of the species according to the 1999 inventory is not more than 1200 individuals. Further expansion of the animals and penetration of one species into the other's range creates a problem of competition between the species that could result in one species being displaced by the other one.

We have thus demonstrated that the composition of the terrestrial vertebrate fauna and the species distribution across Karelian territory changed significantly through the analyzed period. The avifauna received 25, and the mammal fauna 7 new species.

Analysis of these phenomena and their causes revealed a highly dynamic and even somewhat unstable situation with the whole of the terrestrial vertebrate fauna population in the area, which is quite typical of the Northwest Russia and Fennoscandia in general. Similar phenomena can probably be assumed to occur with other groups of animals.

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