

A REVIEW OF RARE DIURNAL RAPTOR SPECIES BREEDING IN KARELIA

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A description of the present status of populations of 12 diurnal raptor species listed in the national and regional Red Data Books and breeding in Karelia is provided, including data on their distribution and abundance. Maps of distribution of rare raptors in Karelia and adjacent areas are supplied. The situation is the most strenuous for the Spotted Eagle, Peregrine Falcon and Golden Eagle (8, 10 and 36 pairs). The Short-toed Eagle and Red-footed Falcon in the region are at the limit of the distribution ranges; the Pallid Harrier is an accidental breeder in Karelia. The populations of the rest of raptors are either relatively stable or increasing in the long term (White-tailed Sea Eagle, Osprey and partly Merlin).

Key words: diurnal raptor species, Karelia, rare species.

ОБЗОР РЕДКИХ ВИДОВ ДНЕВНЫХ ХИЩНЫХ ПТИЦ, ГНЕЗДЯЩИХСЯ В КАРЕЛИИ. Зимин В.Б., Сазонов С.В., Лапшин Н.В., Артемьев А.В., Медведев Н.В., Хохлова Т.Ю., Яковлева М.В. Институт биологии КарНЦ РАН, Институт леса КарНЦ РАН, Заповедник «Кивач», Карелия, Россия.

Охарактеризовано современное состояние популяций 12 видов дневных хищных птиц, занесенных в российскую и региональные Красные книги и гнездящихся в Карелии. Приводятся сведения по их размещению и численности. Даны карты распространения редких хищных птиц в Карелии и на сопредельных территориях. В наиболее неблагоприятном положении находятся большой подорлик, сапсан и беркут (8, 10 и 36 пар). Змея и кобчик встречаются в регионе у границ ареалов, степной лунь эпизодически гнездится в Карелии. Население остальных хищных птиц сравнительно стабильно в многолетнем плане или отмечается рост численности ряда видов (орлан-белохвост, скопа и отчасти дербник).

Ключевые слова: дневные хищные птицы, Карелия, редкие виды.

In Karelia there annually breed 9 species of diurnal raptors listed in Red Data Books of Russia, Karelia and East Fennoscandia: the Golden Eagle, Spotted Eagle, Hen Harrier, White-tailed Sea Eagle, Black Kite, Osprey, Kestrel, Peregrine Falcon and Merlin. Accidental breeding of three more red-listed species – the Short-toed Eagle, Pallid Harrier and Red-footed Falcon – is presumed, but not yet confirmed by nest or brood finds. Some data on the abundance and distribution of red-listed raptors in 1991 can be found in the review "Bird fauna of Karelia" and in the Red Data Book of Karelia (Zimin et al. 1993, 1995). The present review summarizes data on the distribution and abundance of rare diurnal raptors, including those collected during inventories carried out in 1992–2005 in Karelia and adjacent districts of the Arkhangelsk and Vologda regions. Distributions of individual raptor species are described using dot maps based on the network of ornithological landscape districts of Karelia substantiated in detail elsewhere (Sazonov 2004).

Short-toed Eagle *Circaetus gallicus*. The species belongs to the avifauna pertinent to European broadleaved forests. Registered irregularly from SE Lake Ladoga area, which is the northernmost point of the species range in European Russia.

Known registrations of the Short-toed Eagle in spring and summer are mostly limited to the Olonets federal zoological reserve. In the second half of April 1975 one individual was sighted three times, once at the Segezhs koye mire edge near the border with the Leningrad region. In mid-June 1996 a single individual, tentatively identified as one of the species, was seen on a forested islet amidst the Segezhs koye mire, nearby a newly built nest of a large raptor on a pine tree.

In June and July of 1997–1999, several times lone birds and once a pair of the Short-toed Eagle were seen around the village of Sarmyagi, by the northern boundary of the Olonets nature reserve. One of the birds was carrying prey (a snake) southwards, towards the Verkhneropakskoye mire.

Most probably one or two pairs of Short-toed Eagles nest in the Olonets federal zoological reserve

area, at least in some seasons with a hot and dry summer. One should note also that SE Lake Ladoga area, alongside with the Zaonezhje Peninsula, is one of the few districts in Karelia with high species diversity and population density of reptiles.

Golden Eagle *Aquila chrysaetos*. The species is azonal for flatland taiga, representing the fauna of northern Palaearctic mountains. It was initially related to piedmont steppe and semi-open montane forest landscapes, from where it spread widely to flatland taiga regions. Being a eurytopic species, the Golden Eagle requires extensive open spaces in its hunting grounds. In flatland taiga, such are heavily paludified areas with forest and mire complexes, shore areas of large water-bodies with semi-open habitats, as well as large-scale harvested and burnt areas. Furthermore, the Golden Eagle needs large trees with a branched crown and flattened top for its nests, and thus tends to settle in high old-growth forests.

A clearly distinguishable tendency now already is concentration of breeding Golden Eagles around the largest protected areas (PAs) of Karelia and western Arkhangelsk region – Kostomukshsky strict nature reserve, Paanajärvi and Vodlozersky national parks, Kozhozersky nature park, etc. They offer a favourable combination of several factors: active logging is underway along their periphery providing extensive supply of freshly harvested areas, whereas old-growth forests within PAs provide shelter from human persecution and disturbance, as well as optimal conditions for construction of the species' massive nests. This tendency for the birds' immigration to PAs is sure to gain momentum in the future, as resources of mature coniferous forests in intensively harvested areas get exhausted.

In cohabitation areas, the Golden Eagle and the White-tailed Sea Eagle compete for nest areas, the latter, as a larger and more aggressive bird, forcing the former out. In areas with a high density of the White-tailed Sea Eagle population, Golden Eagles have to settle in drainage divides, in heavily paludified remote localities far away from large water-bodies (Sazonov et al. 2001).

The present Golden Eagle abundance in Karelia is estimated at 36 pairs, of which 21 are found in northern taiga and 15 in middle taiga (fig. 1). Five Golden Eagle pairs breed in the Paanajärvi national park (0.5 pairs per 100 km²). Eleven Golden Eagle pairs live in the Vodlozersky national park and the neighbouring Kozhozersky nature park, situated in Karelia and western Arkhangelsk region and forming an integral Vodlozero–Kozhozero taiga reserve with an area of 670,000 ha (Sazonov 2005). Fifteen pairs are known from the Vodlozero–Kozhozero reserve area including its immediate surroundings (0.2 pairs per 100 km²).

All registrations from Karelia and western Arkhangelsk region include 21 occupied Golden Eagle nests, of which 11 were located on pine trees (two

on dead standing trees) and 10 on top and middle platforms of triangulation towers. Two of the nests at triangulation points fell together with the towers in 1998–2002: one in the Karelian part of the Vodlozersky park, the other one in the Plesetsky game reserve (Arkhangelsk region). Another nest which the Golden Eagle had used for several years collapsed from a tower in the upstream of River Vyg, at the border between Karelia and Arkhangelsk region in March 2005.

Golden Eagle nests on triangulation towers have been found also in other taiga regions, e.g. in the Pechora river drainage area and Northern Urals area (Neufeld 1989). Frequent settlement on triangulation towers is a feature distinguishing the Golden Eagle from other raptors. This way of nesting is, on the one hand, induced by a deficit of old large trees with a well developed crown in felled forest areas. On the other hand, it reflects the species' preference for triangulation towers, which are situated in drainage divides and on dominant elevations, and provide the birds with a good panoramic view and control over the surroundings. Because of prolonged lack of maintenance and collapse of the towers (in addition to the ones mentioned above, a case is known when a tower with a Raven *Corvus corax* nest fell down), the Golden Eagle loses convenient nesting facilities, which is another motive for them to move from felled areas to old-growth forests surviving mostly in PAs.

Total Golden Eagle abundance in Northwest Russia is estimated at ca. 60 pairs: 36 pairs in Karelia, 10 in western Arkhangelsk region, including Onega river drainage basin and the Onega Peninsula, at least 10 in the Murmansk region, 3 pairs in the Leningrad region (Pchelintsev 2001, Red Data Book of the Murmansk Region 2003, Sazonov 2004, Red Data Book... 1998). The breeding grouping of the Vodlozero–Kozhozero reserve and its immediate surroundings (15 pairs) makes up about a fourth of the species numbers in the taiga regions of Northwest Russia. At the moment, it is the largest among those known from flatland taiga of European Russia.

Spotted Eagle *Aquila clanga*. A Palaearctic forest species; prefers flatland forest areas. Over several past decades, the Spotted Eagle abundance has been declining heavily throughout. It is listed in Red Data Books of Russia and Europe, and in the International Red Data Book. In taiga regions of northern Europe the species demonstrates distinct southeastern affiliations. Marginal population close to the western limit of the distribution range has become one of the basic reasons for the Spotted Eagle's disappearance from Finland already after 1975 (Red Data Book ... 1998). The Spotted Eagle differs from the Golden Eagle in the choice of habitats and nests mostly in very wet forests situated in low river floodplains and heavily paludified drainage divides.

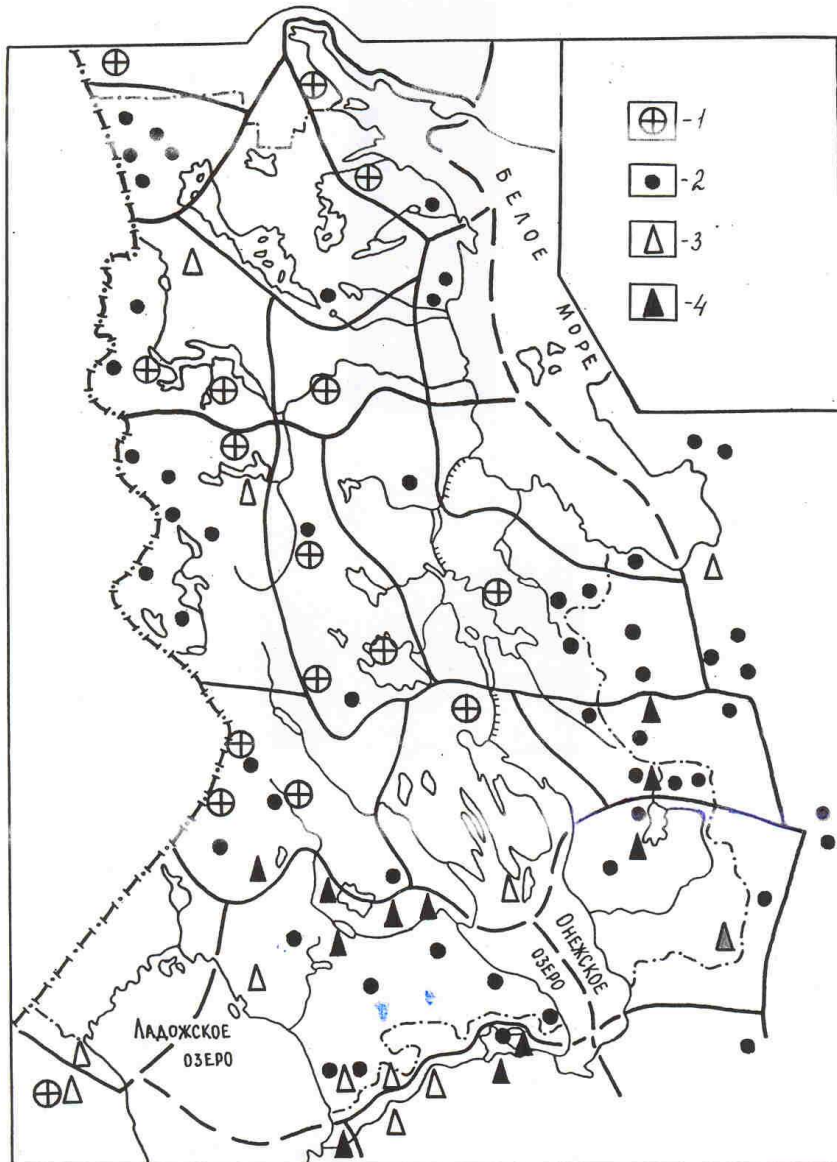


Figure 1. Distribution of the Golden Eagle *Aquila chrysaetos* and Spotted Eagle *A. clanga* in Karelia and adjacent areas.
 1, 2 – Golden Eagle sightings in the past (before 1960) and recently; 3, 4 – the same for the Spotted Eagle.

In the mid-20th century, the Spotted Eagle was much more widespread than today. It was, for instance, a few times observed in northern taiga of Karelia and adjacent regions. In June 1941, one individual was killed near the village of Kholmogory, Arkhangelsk region (Parovshchikov, cited after *Birds of the Soviet Union* 1951, Vol. I). In the summer of 1941, a Spotted Eagle nest on a pine tree was found in the Kananainen village area, south of the contact point of Lakes Pyaozero and Topozero in Karelia (65°45' N, 31°21' E); on July 30 the nest contained two large fledglings (Lehtonen 1942). This nest is the northernmost find of all known previously

in European Russia. In early July 1950, a single Spotted Eagle was seen by the southern shore of Lake Nyuk (Zimin et al. 1993). In the 1970s, the species was registered only once, from the lower reaches of River Onega late in August (Korneeva et al. 1984).

Since the 1980s, the Spotted Eagle has been registered as a very rare breeder only from middle- and southern taiga of Karelia and adjacent regions (fig. 1). While in the 1970s the breeding population in the Leningrad region was 18–20 pairs, in the 1990s it fell to just 10 pairs (Malchevskiy & Pukinskiy 1983, Pchelintsev 2001).

The present Spotted Eagle abundance in Karelia is estimated at 7–8 pairs. Most registrations in the breeding season come from the Shuja River watershed, which is heavily paludified and contains many extensive open mires – it is estimated that 5 pairs of the Spotted Eagle breed there. A Spotted Eagle brood was seen on the left bank of River Shuja, in the Padozero forestry unit, west of Petrozavodsk on 5 August 1988: two young poorly flying birds stayed at the edge of a large partially drained transitional mire.

Another two or three Spotted Eagle pairs are presumed to live in Lake Vodlozero area, as well as in the Kolodozero locality in the SE corner of the Pudozh district. Breeding of the Spotted Eagle known from Ilekka River middle reaches in the Arkhangelsk part of the Vodlozersky national park in 1981–1988 may still be taking place (Borshchevskiy 1991). The only registration of the species from northern taiga of Karelia during the latest period is an observation of a lone individual in a fen by the White Sea coast opposite to the Syrovatka Island, north of the Pon'goma village and Von'ga river mouth on 3 August 1991.

Hen Harrier *Circus cyaneus*. The species is azonal for taiga, and has a distinct northern distribution. Being a species of open habitats, the Hen Harrier clearly avoids drainage divide forests with dense closed-canopy stands. Its breeding population in taiga regions is split into two relatively independent subpopulations located at the northern and southern margins of taiga.

The southern, or agrarian subpopulation is concentrated in the middle- and southern taiga subzones, i.e. in areas most widely covered by human activities, where it breeds mostly in extensive farmland. The northern, or pre-tundra subpopulation lives in high latitudes, in open forest-tundra or southern dwarf shrub tundra habitats. The subpopulations are separated by taiga regions very little used in agriculture and with very thin Hen Harrier density. The species penetrates deeper into the northern and middle taiga, especially on drainage divides owing to clear-cutting, which generates a rich supply of freshly harvested areas and open-canopy young stands. An exception in a way is part of the southern White Sea area – from the town of Belomorsk and the village of Vir'ma to the town of Onega, where the Hen Harrier is quite common. Even there, however, it settles almost exclusively in the belt of semi-open habitats along the seacoast, where natural coastal meadows and reed-dominated fens are plentiful.

This pattern of the Hen Harrier distribution is strongly influenced by its nomadism – a close relationship between the distribution and abundance of the species and reproductive outbreaks of small rodents. Thus, the species' population density in

southern Karelia, in Shuja fields near Petrozavodsk, varies depending on the abundance of small rodents, from 3 to 10 pairs per 3000 ha of farmland. Fluctuations of the Hen Harrier abundance in northern Finland are even wider, reaching 4-fold or even 18-fold levels (Saurola 1985).

Other nomadic species alongside with the Hen Harrier are the Rough-legged Buzzard *Buteo lagopus*, Kestrel *Falco tinnunculus* and many *Strigidae* – especially the Short-eared, Hawk and Long-eared Owls *Asio flammeus*, *Surnia olula* and *Asio otus*, as well as partially Tengmalm's and Great Grey Owls *Aegolius funereus* and *Strix nebulosa* (Saurola 1985). The taiga zone breeding distribution of a species like the Kestrel largely resembles that of the Hen Harrier. In contrast to the latter, the Kestrel reaches into alpine tundra areas and sea archipelagoes, but it does not spread widely across flatland forest-tundra or, even more so, southern dwarf shrub tundra.

The bulk of the Hen Harrier population in Karelia concentrates in the farmland in the south of the republic, its preferred habitats being extensive areas of modern agricultural landscape with large meadows and arable fields (fig. 2). Meanwhile, there are hardly any breeding Hen Harriers in Finnish farming areas at the Karelian Isthmus and South Karelia latitudes (Hyytiä et al. 1983, Saurola 1985). This is apparently related to characteristics of the agricultural landscapes and excessive intensity of agriculture in the country: drainage is mostly managed with subsurface systems resulting in the loss of the landscape diversity; fields in ridge- and cliff-dominated landscapes often get "overdrained"; crop rotation is very intensive and sward establishment in ploughed fields is minimal.

The present Hen Harrier population in Karelia is estimated at ca. 200 pairs, with among-year variations from 100 to 300 pairs. Population in middle taiga is 130–150 pairs, in northern taiga – 30–50 pairs. In addition to farmland, the Hen Harrier settles in felled areas and young open-canopy stands (about a fourth of the population). In the southern White Sea area the species nests also in coastal meadows and reed-dominated fens.

In most protected areas, where primary taiga dominates, the Hen Harrier is rare. E.g., its abundance in the Vodlozero–Kozhozero reserve is estimated at 10–30 pairs, of which 7–20 nest in the Vodlozersky park and 3–10 pairs in the Kozhozersky park (Sazonov 2005). The species breeds most regularly in farmland (ca. 10 pairs), whereas its breeding in overgrowing felled and abandoned areas within PAs or in felled areas along the reserve border has been observed only in years with high rodent abundance, and it is limited to the earliest stages in the forest ecosystem succession before closed-canopy young stands develop there.

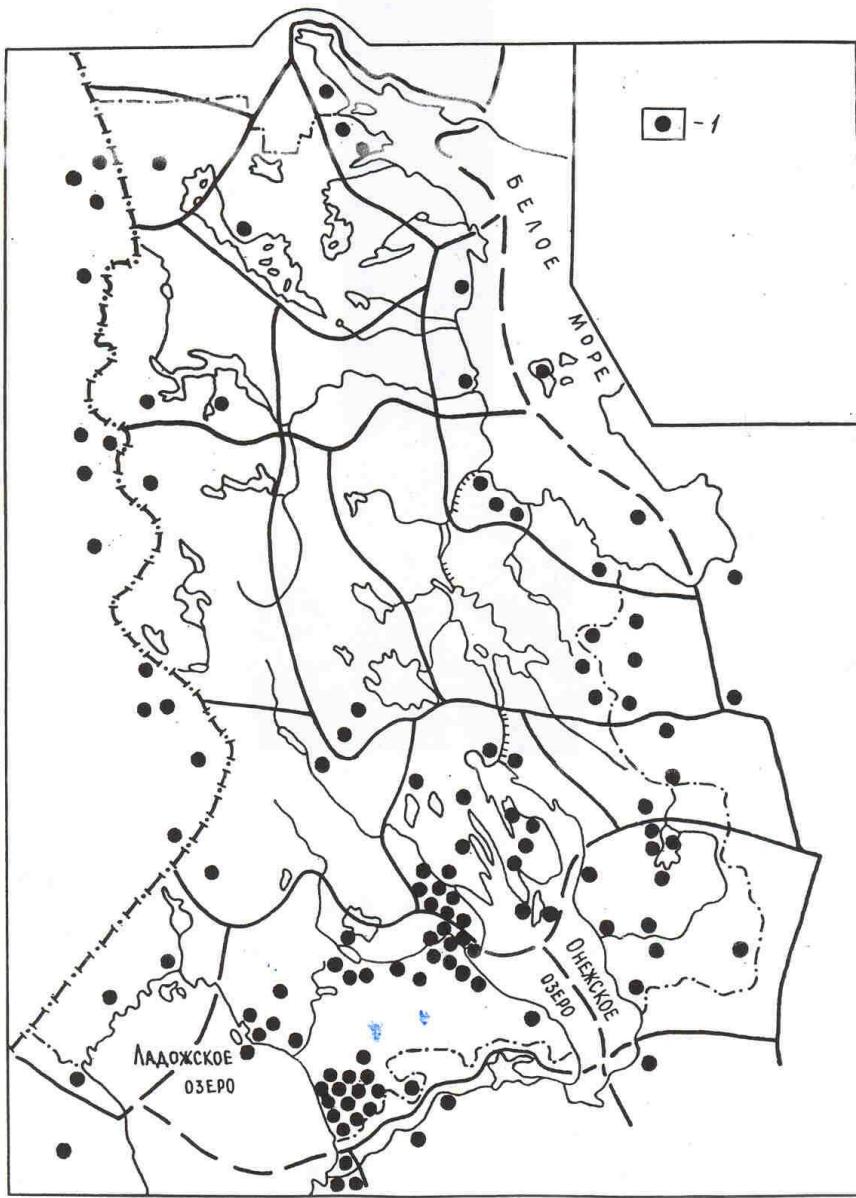


Figure 2. Distribution of the Hen Harrier *Circus cyaneus* in Karelia and adjacent areas. 1 – sightings in the breeding season, recent data.

Pallid Harrier *Circus macrourus*. A representative of the semiarid fauna, a native of dry steppes of SW Asia. The species irregularly appears in northern plains of eastern and western Europe, including the taiga zone (Formozov 1959). Its breeding was episodically registered in the Leningrad region in the late 19th – mid-20th centuries: 1897, 1913, 1935, and 1952–1953 (Malchevskiy & Pukinskiy 1981). In the summer of 1931, a Pallid Harrier was taken from the Tundra station, 40 km south of Arkhangelsk (Parovshchikov 1941).

In Karelia, the Pallid Harrier appeared in 1995–1999 in farmland in the Olonets plain (Zimin et al. 1997, 2000). In early May 1999 and mid-April 2002, Pallid Harrier males were seen in Shuja fields

near Petrozavodsk. The species is presumed to breed in the Olonets plain, at least in some years. Thus, on 10–17 May 1995, the birds were registered there a few times (three males and three females), and display flights of a male Pallid Harrier were observed several times in Sarmyagi village area, at the margin of the drained part of the Sarmyagi–Segezha mire (Zimin et al. 1997).

White-tailed Sea Eagle *Haliaeetus albicilla*. The species is azonal for taiga. In any geographic zone the species settles along large bodies of either fresh or salt water with high fish production. The present optimum of the species' distribution range, i.e. northern taiga regions of European Russia, is largely

of secondary nature. It is the result of persecution of the Sea Eagle by humans in densely populated regions of central and southern Russia, which had been invariably heavy up to the 1960s–1970s.

Owing to well organized conservation of the species in its breeding and wintering grounds (first of all in the Baltic region) in the past 15 years, a tendency or recovery of the White-tailed Sea Eagle abundance has been going on in many regions of Russia and adjacent countries, including southern parts of the forest zone. Between 1990 and 2000, the Sea Eagle population in Finland increased from 80 to 130 pairs, in Karelia from 40 to 70 pairs, in the Leningrad region from 12 to 20 pairs, i.e. more than 1.5-fold (Malchevskiy & Pukinskiy 1983, Pchelintsev 2001, Sazonov 2004, Red Data Book ... 1998). The constantly controlled Vodlozero population now numbers 23 pairs, and 3 more pairs breed in the

immediate vicinity of the Vodlozersky park. In 1988–1989, there were 11–12 pairs registered from the Vodlozero area, in 1993 – 15–16 pairs, in 1998–2000 – 23–26 pairs (Sazonov et al. 2001). Equally significant was the rise in abundance in another region with optimal conditions for the species: the population in the Darwin reserve on Rybinsk reservoir increased from 10–12 pairs in 1988 to 22–24 pairs in 2000 and to 28–30 pairs in 2005 (Nemtsev 1988, Kuznetsov & Nemtsev 2005).

The White-tailed Sea Eagle abundance in Karelia is estimated at 80 pairs at present. If the habitats known previously or still undetected are taken into account, the Sea Eagle population may reach 85 pairs (fig. 3). Its largest concentrations are situated in Lake Vodlozero area and on the Karelian part of the White Sea coast (16 pairs).

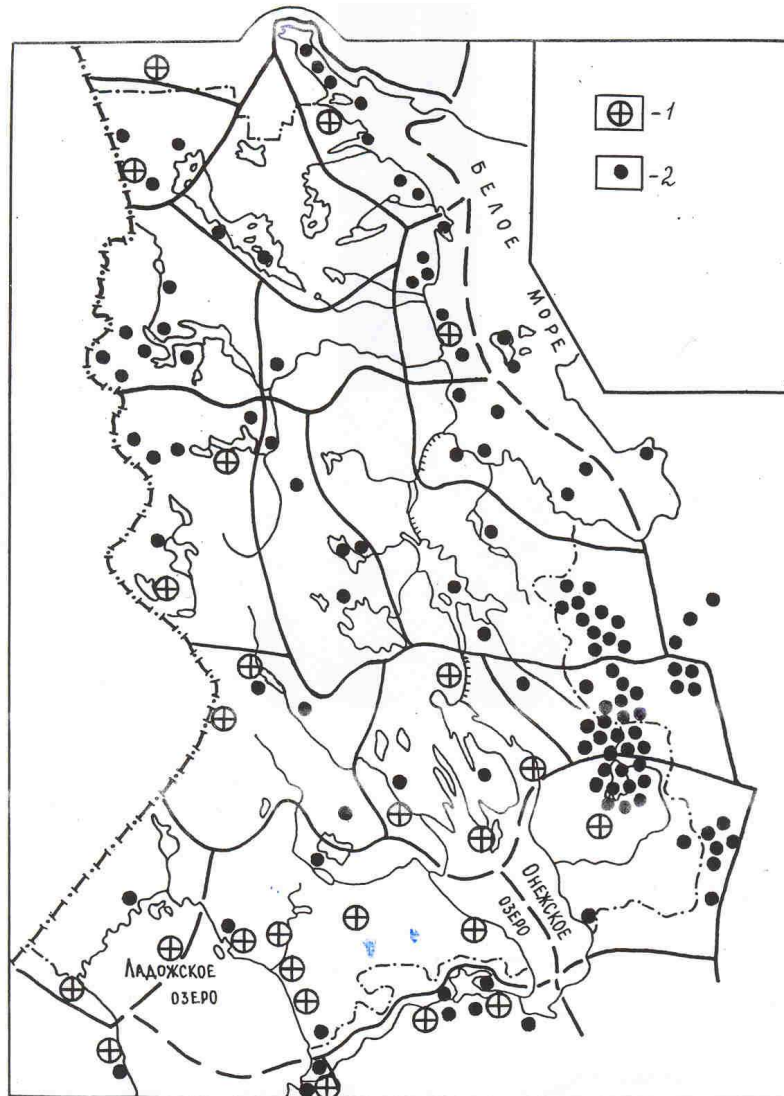


Figure 3. Distribution of the White-tailed Sea Eagle *Haliaeetus albicilla* in Karelia and adjacent areas.
1 – sightings in the breeding season in the past (before 1960), 2 – the same recently.

In the Vodlozersky national park, breeding of 46 White-tailed Sea Eagle pairs was recorded, 20 of them on the Arkhangelsk side of the region. At least 5 Sea Eagle pairs nest in the Kozhozersky park. Two more pairs live north of the park, in the middle reaches of River Kozha (Sazonov 2005). The species' population density is 2 pairs per 100 km² including waters in the Vodlozero area, 0.6 pairs in the Ileksa river watershed, 0.25 pairs in the Kozhozersky park.

A total of 56 occupied White-tailed Sea Eagle nests have been found through all years of studies in Karelia and the Arkhangelsk region. Of these, 52 were situated on pine trees, 2 on aspen trees (Vodlozero), and 2 on triangulation towers (White Sea, Kozhozersky park). A case of the Sea Eagle nesting on a triangulation tower is known also along the middle reaches of River Kuloi, Arkhangelsk region (Rykova & Rykov 1989).

In 1995–1997, the Vodlozero population of the White-tailed Sea Eagle was studied by Högmänder et al. (2001). Overall breeding success of the Sea Eagle in 1994–1997 was 1.8 young per a successful breeding attempt. According to ring recovery data, the nearest wintering grounds for Sea Eagles from the Vodlozero area are around the Baltic Sea. Of the 28 Sea Eagles ringed as nestlings, three were observed in the following years on Saaremaa Island (Estonia), on the Åland islands and in the mainland by the SE coast of Finland (Högmänder et al. 2001).

The Vodlozero–Kozhozero taiga reserve hosts the largest breeding group of the White-tailed Sea Eagle in European Russia, estimated to be 51–53 pairs. Breeding population in the western White Sea area is estimated of 25–30 pairs, that around Rybinsk reservoir 30–35 pairs of Sea Eagles. Present-day abundance of the White-tailed Sea Eagle in NW Russia is estimated at 175 pairs: Kola Peninsula 35, Karelia 80, western Arkhangelsk region 40, and Leningrad region 20 pairs (Ganusevich 1988, Pleshak 2000, Pchelintsev 2001, Khokhlova et al. 2001, Red Data Book of the Murmansk Region 2003, Sazonov 2004, Red Data Book... 1998). Thus, ca. 30% of all White-tailed Sea Eagles in taiga regions of NW Russia concentrate in the Vodlozero–Kozhozero reserve.

Black Kite *Milvus migrans*. Represents the avifauna of broadleaved forests, typically lives in floodplain landscapes with a dense network of small lakes, oxbow lakes and fens. The birds prefer open river valleys and low shores of large lakes, including farmland habitats. The species has distinct southeasterly affiliations; its breeding range in East Fennoscandia is strongly asymmetric with a south-eastward shift. Thus, the Black Kite is a very rare breeder in southern Karelia, in areas west of Lake Onego.

In western Arkhangelsk region, especially in its southern parts, the Black Kite is relatively common. The boundary of the species' continuous breeding range is much further north there than in Karelia

(fig. 4). The northernmost confirmed breeding point is the south of the Onega Peninsula, around Lake Solozero, where a Black Kite nest with 2 eggs was found on 12 June 1966 (Butjev & Nikerov 1969). The species occurs along Onega River valley to its lower reaches, where it was registered early in August 1980 (Korneeva et al. 1984). In Severnaya Dvina floodplain the Black Kite nests up to the village of Kholmogory and in some years possibly near Arkhangelsk (Parovshchikov 1941, Butjev et al. 1999). At the same time, it is no more observed breeding in the Karelian part of the White Sea southern coast.

Present-day abundance of the Black Kite in Karelia is estimated at 80 pairs. About 60 pairs nest in southern Karelia, most of them (40) inhabiting areas east of Lake Onego. An isolated group numbering ca. 15 pairs lives around lakes Kamennoye and Verhnee Kuito in NW Karelia. Three to five more pairs live in an adjacent area of Finland, from the town of Kuhmo to the village of Suomussalmi (Hyytiä et al. 1983). In 1999, the Black Kite was registered during the breeding season in the Paanajärvi national park (A. Rajasärkkä, pers. comm.). Prior to that, in mid-July 1989, it was sighted twice in the Sofporog village area, at the meeting point of Lakes Pyaozero and Topozero (Sazonov 1997).

Very few cases of the Black Kite breeding in northern taiga of Karelia and Finland have been confirmed (Kuhmo), or its nesting there is presumed (Kostomuksha, Kuito, Pyaozero). Obviously, the birds in northern Karelia are predominantly single or pairs wandering widely around the territory or occupying permanent areas where food supply is rich. Thus, the northern boundary of the species' continuous breeding range runs from lower reaches of River Onega and upper reaches of River Ileksa across central Lake Onego and northern parts of the Ladoga–Onego isthmus, partially covering NW Ladoga region (Salmi, Kuznechnoye station in the Karelian Isthmus).

Total Black Kite abundance in the Vodlozersky national park is 19–21 pairs (11–12 in the Karelian part), in the Kozhozersky nature park – 8–10 pairs. Average species' population density around Lake Vodlozero is 1.3 pairs, in the Ileksa river watershed 0.3 pairs, in the Kozhozersky park 0.5 pairs per 100 km². Local density in the Karelian part of the Vodlozersky park is 3–4 pairs (Pilmasozero and Kuganavolok localities). Counts in SE Pudozh district in 1984 yielded a value of 3.5–4 pairs per 100 km².

A male Black Kite carrying prey to the nest was regularly observed in the Karelian part of the Vodlozersky national park, on River Ileksa close to the mouth of River Novguda in June–July 1994–1995. The pair probably occupied the former nest of a large raptor sitting on a pine tree at the edge of a mire. In June 1996, an occupied Black Kite nest was found on a pine tree by the SE shore of Lake Kelkozzero, Pilmasozero locality of the park (Högmänder et al. 1998). A nest on a pine tree, which had probably belonged to the Black Kite, is known from the Ark-

hangelsk part of the park, from Murojgora range SE of Lake Nyukhchozero. In 1992–1997, a pair of adult birds was seen there a few times. Since mid-August, as young birds leave the nest, the number of Black Kite registrations from River Ileksa watershed, Lake

Kozhozero area increased notably (from 0.2–0.3 to 1–2 individuals per 100 km² – Borshchevskiy 1991, Sazonov 2005).

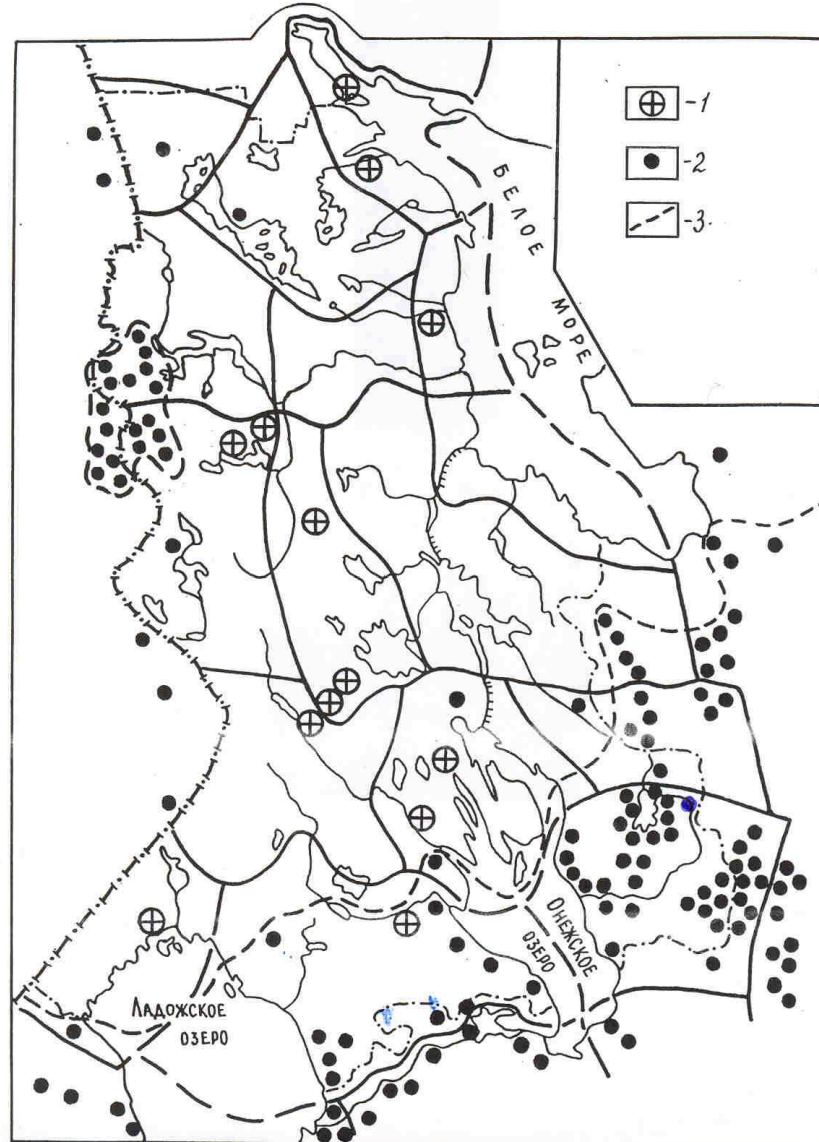


Figure 4. Distribution of the Black Kite *Milvus migrans* in Karelia and adjacent areas. 1 – sightings in the breeding season in the past (before 1960), 2 – the same recently, 3 – continuous breeding range.

Osprey *Pandion haliaetus*. The species is azonal for taiga. Like the White-tailed Sea Eagle, it lives around fresh- and saltwater bodies with high fish production. The Osprey may respond well to construction of hydraulic facilities: on Rybinsk reservoir, e.g., as extensive shallow areas became available, a dense Osprey population evolved since starting the late 1940s, and especially in the 1980s (Nemtsev 1988).

In the past 15 years, a tendency has been observed for a significant increase in Osprey abundance in many taiga regions. The population in Finland increased from 760 to 1000 pairs (Saurola 1990, Red Data Book ... 1998). The Osprey population in the Darwin Reserve on Rybinsk reservoir doubled over the 1980s from 10–12 to 22–27 pairs (Nemtsev 1988). By 2005 there lived 40–45 Osprey pairs already (Kuznetsov & Nemtsev 2005). The

number of known nest areas in Karelia increased in the 1990s from 75 to 130 (Sazonov et al. 2001). Leningrad region's largest breeding population of the Osprey was found in the southern Ladoga area, where it increased during 1995–2000 from 20 to 30 pairs (Vysotskiy 2000, Pchelintsev 2001).

The Osprey population in Lake Vodlozero area increased from 12–15 pairs in 1988–1989 to 20–25 pairs in 1998–2000. The abundance in River Ileksa watershed was 10–12 pairs in 1986–1988 (somewhat higher than in 1981–1985), the number in 1997–2000 remaining about the same (Borshchevskiy 1991, Sazonov et al. 2001).

It is estimated that 37–40 Osprey pairs live in the Vodlozersky national park (24–26 in its Karelian part), and 13–14 pairs in the Kozhozersky nature park. The species' population density is 1.9 pairs per 100 km² in Lake Vodlozero area, 0.4 pairs in Ileksa watershed, and 0.7 pairs in Kozhozersky park. Local counts yielded 3 pairs per 100 km² for the northern Vodlozero area, 2.5 pairs along Lake Kozhozero shore, and 2 pairs in the Shidmozero locality of the park.

In most operating and planned PAs in northern taiga of Karelia the Osprey population density is within 0.5–1.5 pairs per 100 km²: Kostomukshsky strict nature reserve (0.8), Paanajärvi national park (0.6), planned national parks Kalevsky (1.4), Tulos (1.6) and Pongomsky (1.1), and Soroksky integrated marine reserve (0.5). Osprey abundance in the western part of the White Sea, including the Onega Peninsula is estimated at 45–50 pairs, of which 30 pairs live in the Karelian part of the coast.

Where the conditions in middle taiga are optimal – high fish production in waters, low recreation pressure, availability of tall forest areas – there is capacity for high-density breeding of the Osprey even outside protected areas (1–2 pairs per 100 km²). In 1996, an occupied Osprey nest was found in the Sortavala city surroundings in the midst of a densely populated area (summer cottage communities and farmland), on Lake Hympeänjärvi shore 3–4 km away from the village of Zaozernyi. On 28 April a female was incubating 2 eggs there (Klibanyuk, personal communication – one of the earliest clutches ever in Karelia).

The Osprey abundance in Karelia today is estimated at 250 pairs, the number of nest areas known by year 2005 being 165. The number of Ospreys nesting in northern and middle taiga is about the same, 110 and 140 pairs, respectively (fig. 5).

A total of 51 occupied nests of the Osprey have been detected in Karelian and western Arkhangelsk region in all years. Most of them (46) were located on pine trees (including dead standing trees), two nests on spruce trees (Paanajärvi), one on a dead standing aspen tree (Vodlozero), one on a larch tree (SE Pudozh district). In central Karelia, a nest was found also on the platform of a metal tower of a transmission line running near the village of Tiksha (Zimin et al. 1993). In Finland, Ospreys settle

willingly on artificial nest platforms (up to 40% of nests found, Saurola 1990).

The Osprey breeding group inhabiting the Vodlozero–Kozhozero taiga reserve (50–54 pairs) is now one of the largest in the north of European Russia. It is comparable in size with the abundant Osprey population of the Rybinsk reservoir, estimated by different authors to comprise 40–50 to 55–60 pairs (Important bird areas of Russia 2000, Kuznetsov & Nemtsev 2005). The total number of the species in NW Russia is estimated at 410 pairs: Kola Peninsula 25, Karelia 250, western Arkhangelsk region at least 85, and Leningrad region ca. 50 pairs (Ganusevich 1988, Important bird areas of Russia 2000, Pleshak 2000, Pchelintsev 2001, Khokhlova et al. 2001, Red Data Book of the Murmansk Region 2003, Sazonov 2004, Red Data Book ... 1998). Thus, over 10% of the Osprey population breeding in taiga regions of NW Russia concentrate in the Vodlozero–Kozhozero reserve.

Kestrel *Falco tinnunculus*. The species is azonal for taiga, initially coming from piedmont steppe and semi-open landscapes of southern Palaearctic mountains. The distribution in the taiga zone is similar to that of the Hen Harrier. It is mostly limited to southern and middle taiga, where farmland is the main breeding habitat. Simultaneously, Kestrel breeding is quite stable also at the northern margin of taiga. The species reaches out into extrazonal habitats – coastal meadows and treeless sea archipelagoes, alpine tundra heathlands, and open elfin woodland in forest tundra areas. On the other hand, the Kestrel hardly ever appears in the midst of northern taiga growing in drainage divides, with few exceptions of registrations made from mosaic agricultural landscapes.

A few occasions are known of the Kestrel settling in freshly harvested and overgrowing felling sites in middle taiga of Karelia: e.g. in the Lahdenpohja and Suojärvi districts (1976 and 1992), in the Pudozh district at the Vodlozersky park border and in the Vytegra district of the Vologda region near the Soidozersky nature reserve (1995 and 1998). In the 1950s–1960s, however, when logging volumes were the highest and the species depression had not yet begun, Kestrel breeding in freshly harvested areas was much more common (Neufeldt 1958).

In terms of the abundance dynamics, the Kestrel is a nomadic species heavily dependent on the abundance of small rodents (Saurola 1985). Abundance fluctuations among years may be 5-fold. Even given among-year variations in the population, however, the Kestrel occurrence and abundance have dropped dramatically over the past three or four decades, since the 1950s–1960s.

The Kestrel abundance in Karelia is estimated at 200 pairs at present, varying from 150 to 300 pairs in different years. The bulk of the population concentrates in the farmland of southern Karelia (180 pairs), whereas that in the north, mostly in the White Sea area, consists of no more than 20–30 pairs.

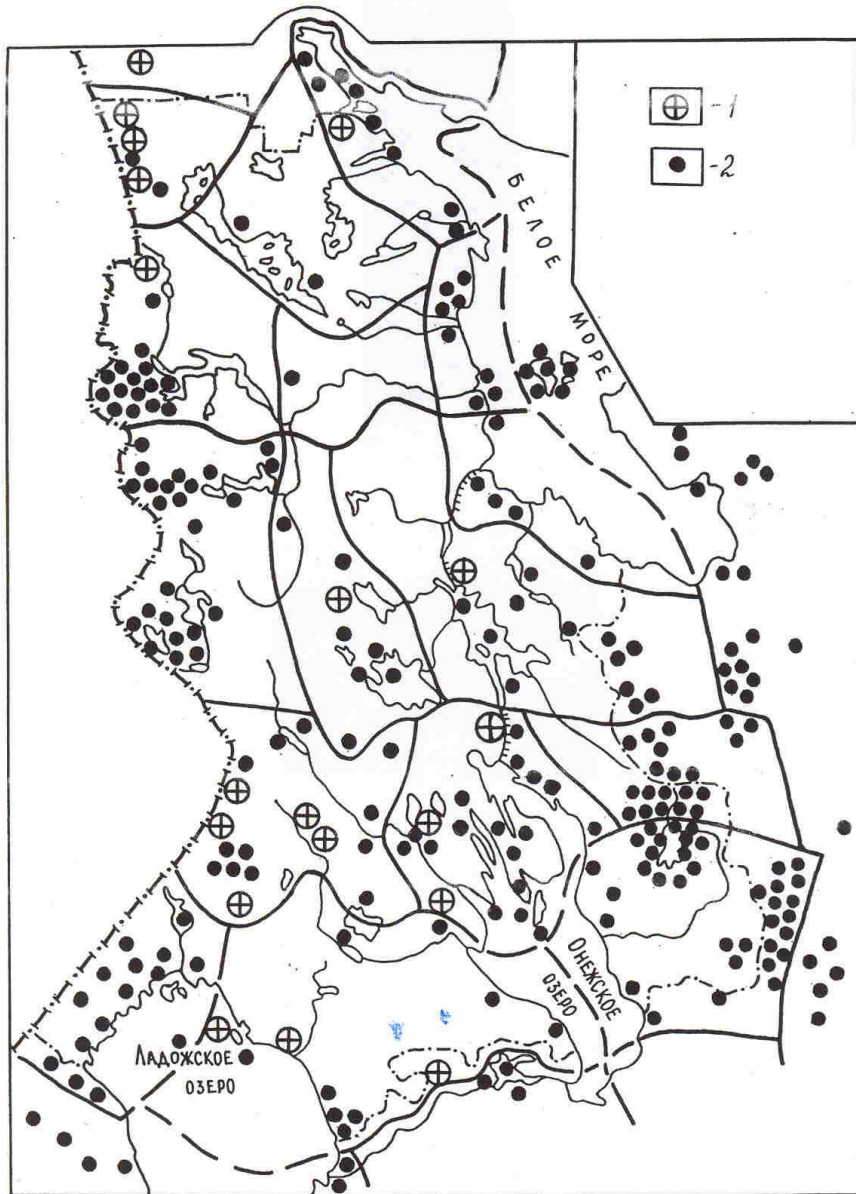


Figure 5. Distribution of the Osprey *Pandion haliaetus* in Karelia and adjacent areas. 1 – sightings in the breeding season in the past (before 1960), 2 – the same recently.

In average years, 3–4 Kestrel pairs breed in the Karelian part of the Vodlozersky park, in insular meadows and on shores of Lake Vodlozero. In years with high rodent numbers, e.g. in 1995–1996, the Kestrel abundance there grows to 7–10 pairs (fig. 6). In such years, the species is encountered outside farmland – in the waterlogged zone along Lake Kolonzhzero with its meadow wetlands with a cover of tall *Carex rostrata* hummocks (1986, 1996), as well as in freshly felled areas adjoining the park in the west (2 pairs in 1995).

A curious feature of the Kestrel biology in the Vodlozero area is frequent nesting in buildings (2 of the 4 known nests). Only one case like that is known

from the rest of Karelia – nesting for several years (1981–1983) at the chimney of a wooden house in the abandoned village of Kashkany, Pryaza district. In 1984, a Kestrel pair succeeded in raising young in a niche of the hip roof of the belfry on the wooden church in the Ilyinsky graveyard (Malyi Kolgostrov Island). In the summer of 1986, a nest with down-covered nestlings was found in a Goldeneye *Bucephala clangula* nest box placed at the water edge on Lake Kolonzhzero shore. In early June 1995, a Kestrel nest with a recently laid clutch of 5 eggs was discovered on a wooden chapel standing amidst meadows in Kolgostrov Island; the nest sat on logs in the corner underneath the chapel

roof. In 1997, a Kestrel pair settled in an old nest of the Hooded Crow *Corvus corone* on a spruce tree at the edge of village Koskosalma meadows (Kanzanavolok Island); in the second ten days of June there were down-covered nestlings in the nest (Högmander et al. 1998). The reasons for the high frequency of Kestrel nest finds in buildings must be the very low density of the Vodlozero area popula-

tion of the Hooded Crow (main source of nests for small falcons) and late timing of breeding (fledglings leave the nest on 15–20 June), as well as the fact that available vacant Crow nests get occupied also by other falcon species (Merlin, Hobby), which start breeding nearly simultaneously with the Kestrel.

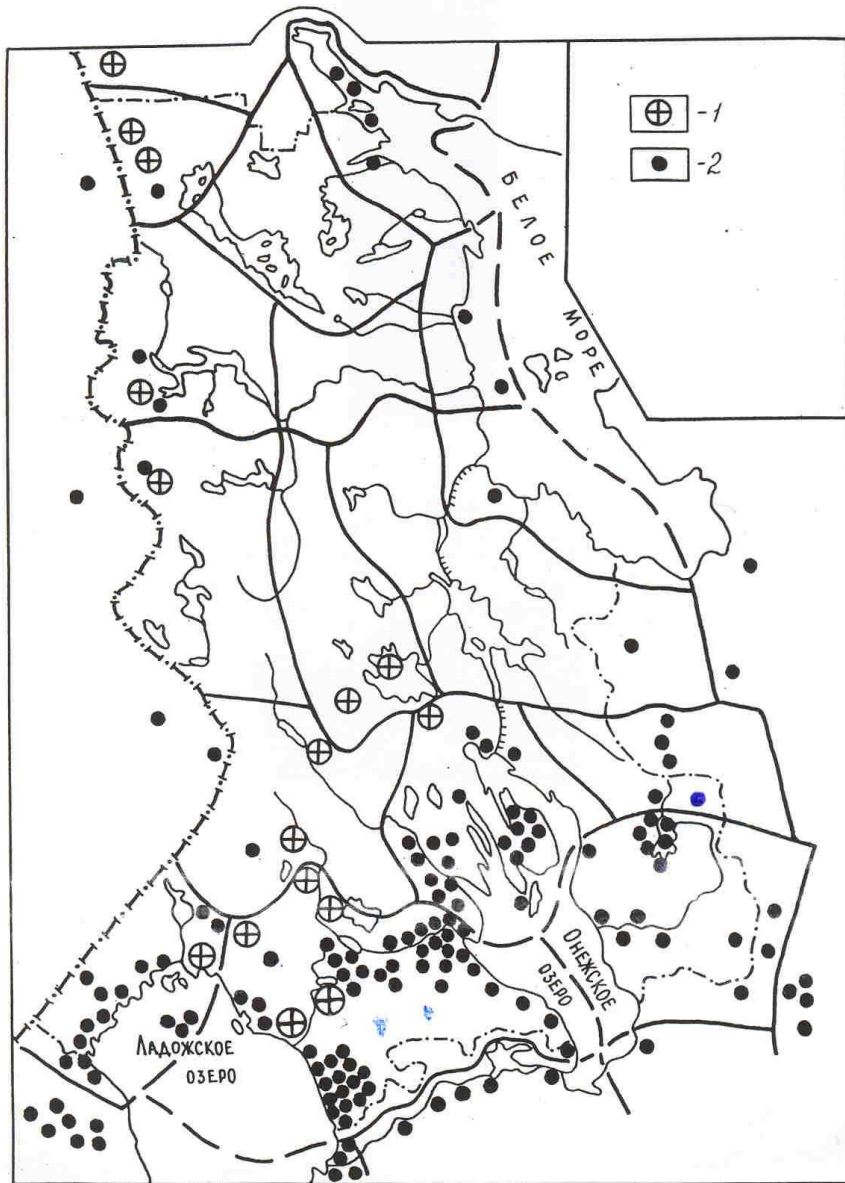


Figure 6. Distribution of the Kestrel *Falco tinnunculus* in Karelia and adjacent areas. 1 – sightings in the breeding season in the past (before 1960), 2 – the same recently.

Merlin *Falco columbarius*. A hypoarctic species, with optimal range in forest tundra and southern dwarf shrub tundra. The Merlin breeds with relatively high stability also in the northern periphery of taiga, especially in its extrazonal habitats –

coastal landscapes, treeless uplands of the “tunturi” (fjell) type with alpine tundra heathlands and coniferous-birch elfin woodland. In taiga regions of northern European Russia the species has clear northeasterly affiliations.

Settling within large continuous areas of northern and middle taiga growing on drainage divides, the Merlin prefers intrazonal habitats – heavily paludified areas, shores of large lakes and river valleys, as well as edges of felled sites and farmland. It often chooses to breed in forest fragments surrounded by open mires or open lake water, which reflects the Merlin's close connectedness with its main nest suppliers, the Hooded Crow *Corvus cornix*, Raven *Corvus corone* and some raptors (Rough-legged Buzzard, Osprey, etc.).

Middle and southern taiga regions are suboptimal for the Merlin, wherefore it remains a rare breeder there. Merlin breeding in southern Karelia and Leningrad region is registered mainly in years with a high crop of coniferous seeds (spruce, pine, larch) and forest berries (rowan, bird cherry, cowberry, blueberry, etc.), and hence, with high abundance of granivorous and carnivorous passerines, which are the main prey for this bird-eating raptor. In addition, voles would also be found in the Merlin diet in seasons with peak abundances of small rodents (Semyonov-Tyan-Shansky & Gilyazov 1991).

In the 1950s–1960s, the Merlin population in Karelia and Finland declined sharply (Zimin et al. 1993, Saurola 1985, Järvinen & Koskimies 1990). In 2001–2003, a tendency for an increase in the frequency of the species breeding in western Onego area was observed, namely in Shuja farmland near Petrozavodsk. In 2004, a pair succeeded in raising young in a spruce forest patch within Petrozavodsk city line.

In the lower reaches of River Onega, the Merlin was very common in riparian forests and overgrowing clearcut areas in 1971–1974 seasons (Korneeva et al. 1984), i.e. in years with high yields of coniferous seeds and berries and simultaneous marked rise in the breeding density of *Fringillidae*, *Emberizidae*, *Turdidae*, *Anthus*, *Bombycillidae* and other passerines constituting the bulk of the falcon's diet. In about the same seasons (1973–1975 and 1977), when the crops of coniferous seeds and berries were similarly high, Merlins were quite often observed breeding in southern Karelia and the Leningrad region (Malchevskiy & Pukinskiy 1983, Zimin et al. 1993).

The present Merlin abundance in Karelia is estimated at 700 pairs, including 250 pairs in middle taiga and 450 in northern taiga. The population density in most forest regions is within 0.3–0.5 pairs per 100 km², reaching 1–2 pairs only in low mountainous landscapes of the Paanajärvi catchment and on the White Sea coast in 1989–1999 (fig. 7).

In 2002–2005, Merlin registrations from eastern parts of Karelia and western Arkhangelsk region (in addition to the above mentioned western Onego area) became more frequent. The areas include the Vodlozero–Kozhozero taiga reserve and eastern shore of Lake Onego, northern White Sea coast.

According to 1981–1988 observations, e.g., the Merlin was a rare breeder in the Arkhangelsk part of the Vodlozersky park (Ileksa river watershed). Its population density was within 0.1–0.3 pairs/100 km²

and nearly all registrations were from heavily paludified habitats outside the main lake-river systems of the region (Borshchevskiy 1991). During 1994–1999 surveys in the Vodlozero area and Ileksa river watershed, the Merlin was registered just twice and only from the Karelian part of the park: from the Pilmasozero locality near Lake Kelkzero shore in June 1997, and from a drainage divide wetland in the Novguda locality near Lake Varozero in June 1999.

In the Kozhozersky park in the summer of 2003–2004, the Merlin was observed more often than in earlier study years (twice in a breeding season). A male with small prey in its talons was seen in a pine forest on the northern shore of Lake Shidmozero early in July 2003. At Krivoi Poyas, an alerted male Merlin was noted in a mire near Lake Startsevo in mid-June 2004. Local densities of the species in these seasons reached 1–2 pairs/100 km² of forests and wetlands. In the northern Vodlozero area, however, Merlin counts in 1997–1999 did not yield more than 0.3–0.5 pairs/100 km².

In mid-June 2005, an alarmed pair of Merlins was noted in the Umba locality of the Vodlozersky park, near the border between Karelia and Arkhangelsk region (density ca. 2 pairs/100 km²). In June 2003, two Merlin registrations were made from the eastern shore of Lake Onego, between River Tuba and Pudozhgorskiy village. In mid-July 2003, 2 Merlin pairs were registered from a monitored area of 4,000–5,000 ha in the territory of the planned Pongomsky national park (density over 4 pairs/100 km²). In 1991, however, the species counts around villages of Kuzema and Pongoma yielded an index of just 1.5 pairs/100 km². One can thus speak about an upward tendency in the Merlin abundance in the last 5 years, at least for eastern parts of southern and northern Karelia and western Arkhangelsk region.

Red-footed Falcon *Falco vespertinus*. A representative of the broadleaved forest avifauna, inhabitant of forest steppe landscapes and arid steppe regions. The species' distribution in the European North indicates clear southeasterly affiliations. In years when anticyclones predominate and the weather in summer months is hot and dry, mass arrivals of Red-footed Falcons take place in the west of the taiga zone, resembling invasions. For some years with an early spring and warm summer, the species breeding has been confirmed: e.g. on the Svir Bay of Lake Ladoga, within the Nizhne-Svirsky strict nature reserve in 1997 and 1999 (Rezvyi & Noskov 1998, Kovaljov 2001).

The earliest known registrations of the Red-footed Falcon in the north of European Russia were made in 1842 and 1847 from southern Lake Ladoga area and Northern Ural region (Portenko 1937). Later on, Hobbies were registered in the summer of 1869 from two locations – Andomskiy graveyard by the SE shore of Lake Onego and Kargopol city surroundings by Lake Lacha (Meves 1871 cited after Bianki 1916).

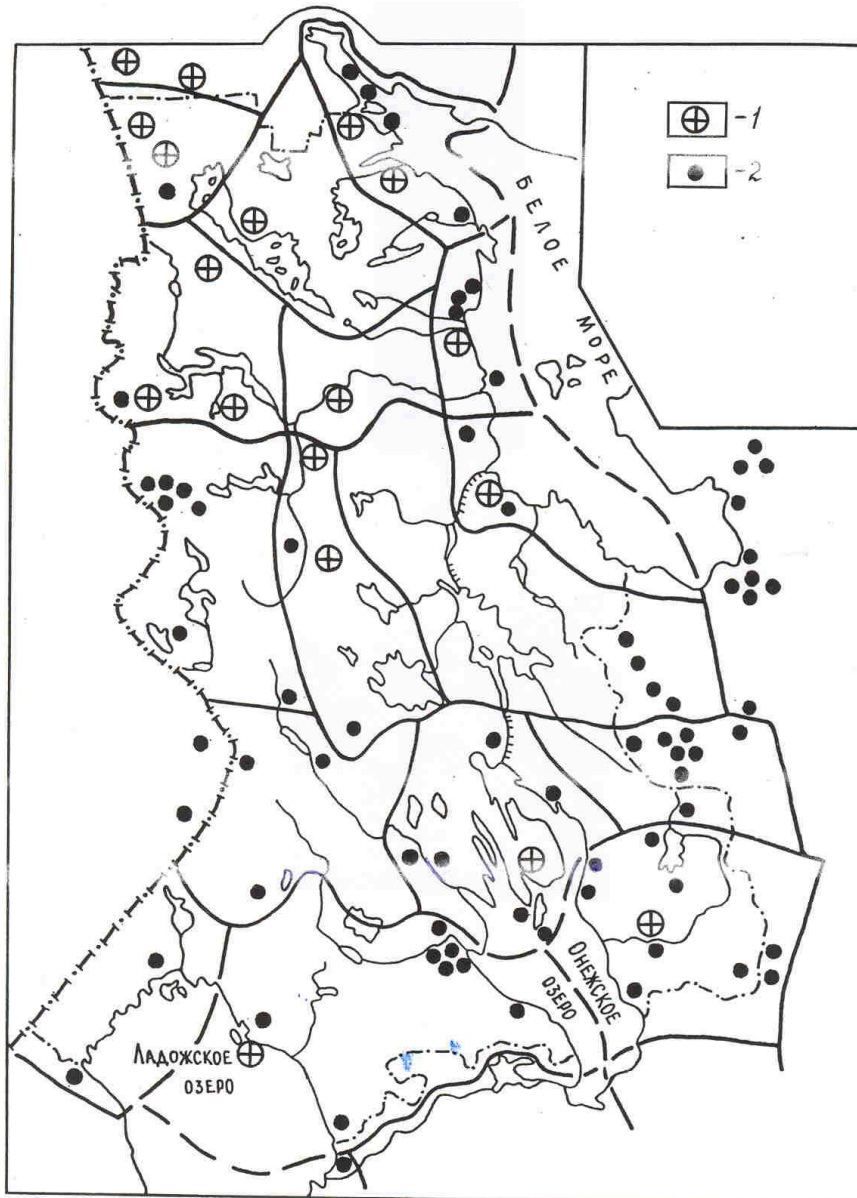


Figure 7. Distribution of the Merlin *Falco columbarius* in Karelia and adjacent areas. 1 – sightings in the breeding season in the past (before 1960), 2 – the same recently.

In the late 19th and first of half of the 20th century, invasions were more frequent than in the following three decades. They concurred during the warming periods of the 1880s, 1920s and 1930s. In the North, such climate changes entailed extreme phenomena – intense heat spells, frequent droughts, drying out of navigation pathways (Potakhin 1999). There is good correlation between years of falcon invasions into the taiga zone of European Russia and periods of climatic extremes:

– 1875–1876 – 5 records from the Svir River area in 1875, 4 finds between Zaonezhje Peninsula and Lake Segozero in 1876 (Sievers 1878);

– 1879–1880 – observations of several individuals near Petrozavodsk in 1879, 3–4 contacts in the Suojärvi district, western Karelia (Göbel 1879, Schulman 1882);

– 1908–1910 – multiple contacts in the Ust'-Sylsolje district of the Vologda province from Sol'vychegodsk to the present-day Syktyvkar (one of the most common raptors around settlements), including a find of a nest with down-covered nestlings late in June 1909 (Andreev & Bianki 1910);

– 1923–1928 – frequent summer contacts in the Priozersk area, Karelian Isthmus (Malchevskiy & Pukinskiy 1983); besides, a vagrant was seen from Murmansk surroundings in August 1921, and over 10 registrations of Hobbies were made between May

and August of 1926–1928 from the northern Ural region (Portenko 1937; Kohanov 1987);

– 1934–1935, 1938 – a number of records from the Pudozh district, one seen near Petrozavodsk (Novikov 1935, Neufeldt 1958);

– 1942–1943 – four registrations from western parts of southern, central and northern Karelia in 1942; two birds near Olonets in 1943 (Koskimies 1979).

During earlier invasions the Red-footed Falcon apparently nested in southern parts of the

above-mentioned taiga regions, including Onego, Svir, Pudozh and Vodlozero areas (fig. 8). Being a southerly species, however, it remained an accidental breeder in the taiga of NW Russia even in periods of optimal climate. In the past few decades the species' registrations became far more rare, mostly made from the Svir area and Ileksa river watershed (Malchevskiy & Pukinskiy 1983, Zimin et al. 1993, Sazonov et al. 2001).

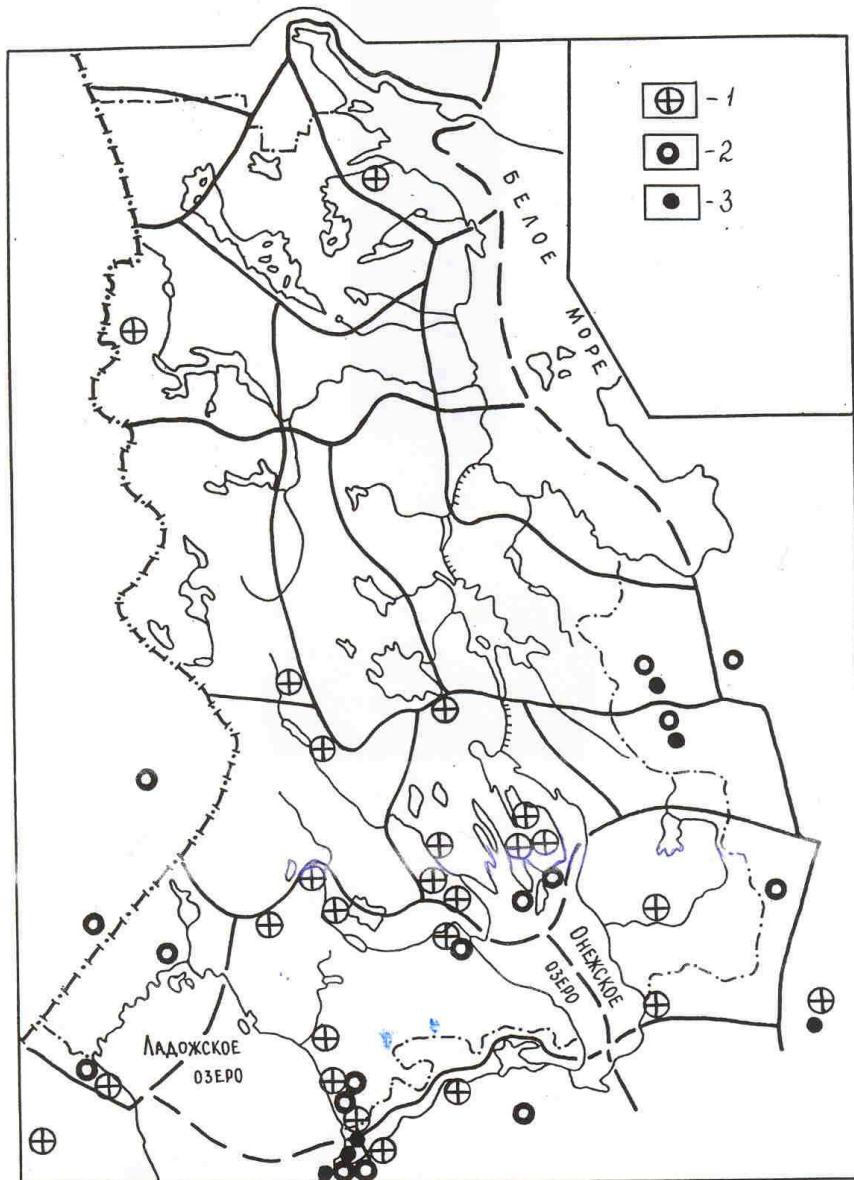


Figure 8. Distribution of the Red-footed Falcon *Falco vespertinus* in Karelia and adjacent areas.

1 – sightings of summer vagrants in the past (before 1960), 2 – the same recently, 3 – sightings in the breeding season.

In the Arkhangelsk part of the Vodlozersky park the Red-footed Falcon was a relatively common summer resident in 1982–1984. It was seen from May to August, mainly from heavily paludified habitats in drainage divides, the population density being 1–3 individuals per 100 km² of grounds. In some seasons with an early spring and warm summer, birds probably nested in the middle reaches of River Ileksa. From 1985–1988 onwards, falcons became much more rare there (Borshchevskiy 1991).

In the following years, the Red-footed Falcon was noted from the Ileksa River watershed three times. Three individuals were seen on the southern shore of Lake Toun on 2 August 1992. One bird was noted there on 7–12 July 1997, and on 13 July of the same year two individuals stayed over Tunemokh mire 12 km north of Lake Toun, at the confluence of rivers Ileksa and Uhta. In the Kozhozersky park, a single individual was seen in meadows by Kozhposyolok village on 5–6 August 1994. According to data from interviews, falcons occurred there near monastery buildings also in June and July of 1992–1993. Besides, the species was registered from the Konosha village area, Arkhangelsk region in mid-June 2000 (Sazonov et al. 2001). In July 2001, the species was reported also from Lake Lacha (Artemiev et al. 2001).

Thus, Red-footed Falcon were breeding in the eastern and southern border areas of Karelia in the past decades, most probably in 1982–1984, 1992–1994 and 1997–1999.

Peregrine Falcon *Falco peregrinus*. The species is azonal for taiga, initially coming from mountainous and alpine tundra landscapes. It belongs to the ecological group of eurybiotic birds, occupying a wide range of habitats. In the North, the Peregrine Falcon mostly breeds in zonal tundras and mountainous taiga regions. In flatland taiga, the species is confined to heavily paludified areas, sea coasts and archipelagoes. Large-scale logging leads to expansion of Peregrine hunting grounds and facilitates its spread into continuous taiga in drainage divides. Freshly harvested and overgrowing cut-over sites in northern taiga feature a sharply increased abundance of the Willow Grouse – the main prey for the Peregrine away from coastal areas. In freshly felled areas, especially when they are paludified, the population numbers of quite a few breeding waders – Greenshank *Tringa nebularia*, Wood Sandpiper *T. glareola*, Green Sandpiper *T. ochropus*, Common Snipe *Gallinago gallinago*, Whimbrel *Numenius phaeopus*, etc., increased for a period of 3–5 to 10 and more years, also expanding the food supply for the Peregrine.

In 1987–1990, the Peregrine started breeding (two pairs) in the Kostomukshsky reserve, around which intensive logging is underway. In 1998–1999, a Peregrine pair appeared in the territory of the planned Kalevsky national park – extensive fresh cut-overs have lately reached its very borders (Sazonov

1997, Sazonov et al. 1998). In 1992–1995, the species was registered (1 pair) from the Karelian part of the Vodlozersky park, where forests in the immediate vicinity have been actively clear-cut in the past 15 years.

Present abundance of the Peregrine Falcon in Karelia is estimated at 8–10 pairs, of which 3–4 live in the south and 5–6 pairs – in the north of the republic. The Peregrine population dropped sharply, particularly obviously in the White Sea area, where in the 1950s the species was far more frequent on passage and during migration than today (Zimin et al. 1993, Sazonov 2004). In the past few years, 2–3 pairs of the Peregrine Falcon have bred in the Karelian part of the White Sea area.

In 1994–2000, records of the Peregrine on passage in southern Karelia became somewhat more frequent: at least 5 registrations from Salmi, Kaskesnavolok, Kivach areas and Shuja fields near Petrozavodsk. In the latter case, Peregrines hunting Feral Doves were seen twice in October and November of 2000. In 2002, the Peregrine was observed in Shuja fields 4 times between 9 April and 16 May. In the 2003 season, a Peregrine pair apparently nested in the downstream of River Shuja: two registrations were made in April and June, including a bird flying with prey in talons (plumed dove) seen on 6 June. Dove-hunting Peregrines were observed in the western part of Petrozavodsk, by the embankment, in late April and early May of 2004.

In mid-August 2004, an adult and a juvenile Peregrine were seen by the village of Sheltozero. A pair probably nested nearby or on the Ivinsky Razliv pool (Verkhnesvirsky reservoir), where the Peregrine had been observed earlier (Pchelintsev 2000).

Among protected diurnal raptors breeding in Karelia the situation is the most critical for the Spotted Eagle, Peregrine Falcon and Golden Eagle (8, 10 and 36 pairs). The Short-toed Eagle, Hobby and Pallid Harrier breed occasionally. In Karelia, the Short-toed Eagle lives at the northern limit of its distribution range, the Hobby breeds during temporary invasions, the Pallid Harrier appears in years of massive northward dispersal from arid regions in the south of Eastern Europe and southwestern Asia. Quite stable is the Black Kite population, which is predominantly concentrated in the Pudozh district of the Karelian Republic.

The abundance of the Hen Harrier and Kestrel varies widely (3–5 times) due to their nomadic life style and close relationship to small rodent numbers. For the Kestrel, a series of years with higher breeding frequency and population density may be followed by nearly total absence from the area under control.

Substantial population growth has been observed for fish-eating raptors – the White-tailed Sea Eagle and Osprey in the 1980–1990s and thereafter (1.5-fold and locally 2-fold). It mostly took place in protected areas and water-bodies outside them with rich fish stocks maintained, the White Sea, Lakes Onego and Ladoga, Vodlozero–Kozhozero

taiga reserve, forest belt along the border between Karelia and Finland, Rybinsk reservoir, etc.

In the past 5 years, a tendency has appeared for a rise in the breeding frequency and abundance of the Merlin, at least in eastern parts of Karelia and western Arkhangelsk region. Among small falcons, a notable increase in the population density has been observed also in the Hobby. Its abundance increased in 1996–1998 and especially in 1999–2000 and following years in some of the surveyed districts of southern Karelia and western Arkhangelsk region: western Lake Onego area, Lake Vodlozero area, northwestern Lake Ladoga area, Ileksa River watershed, Lake Kozhozero area and others.

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