

# Birds of Yakutia: Fauna Diversity, Ecology, Role in Ecosystems and Human Life

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Yakutia is a large high latitude region in the north-east of the Palearctic with extreme rigid conditions for bird habitats and their breeding comparable with adjacent areas by richness and abundance of avian fauna. Yakutia occupies about 1/5 the area of Russia (Figure 1).

The features of habitat and breeding for birds here connected with the predominance of sharply continental climate, natural-landscape diversity, and with the summer light regime. The region has high water and forest cover, specific heat and watery regimes of permafrost soils. The annual temperature amplitude is unique in the Northern Hemisphere – it is more than 100°C, cold winters and hot summers. Snow melt begins in May and early June, the river ice breaks in the mid-May and mid-June. The vegetation growing season lasts from May 13 to September 19. Due to the winter extreme environmental conditions,

migratory birds (228 species, 84.1%) compose particular fauna of the region, mainly from the number of long-distance migrants.

The modern fauna of birds in Yakutia consists of 318 species (19 orders): 270 (16 orders) breeding species, including 43 (6 orders) sedentary - nomadic, and 48 (10 orders) vagrants (Table 1).

Over the past 60 years avifauna of the region increased by 68 new species: breeding - 38 (including 27 - first discovered, 3 - not previously recorded marine species, and 4 - first considered as sub-species, 4 - previously considered vagrants), and vagrants - 37. Changes in the bird fauna of the region and in the distribution and abundance of birds, are defined by the absence of significant zoogeographical obstacles and the territory accessibility for representatives of various fauna, conservation of natural habitats and the presence of man-made, and possibly, global warming, led to the spread of expansive and tolerate to anthropogenic landscapes species, mainly birds of wetlands. In recent years, the trends to range expansion and number increasing are particularly noticeable for some gulls, and for the swans in Kolyma River basin.

However, there is evidence of the human activities negative impact on the environment and on the birds themselves, particularly related to spring hunt and poaching for waterfowls. Nevertheless, most of Yakutia is preserved in its original condition and most of the changes in the fauna and bird population are determined by the natural course

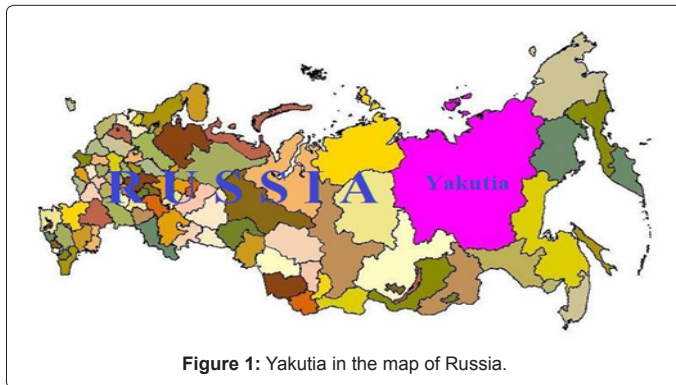


Figure 1: Yakutia in the map of Russia.

No	Order	The nature of species being			Total species number
		migratory	settled	vagrant	
1.	Gaviiformes	4	-	-	4
2.	Podicipediformes	3	-	2	5
3.	Procellariiformes	-	-	1	1
4.	Pelecaniformes	-	-	2	2
5.	Ciconiiformes	3	-	4	7
6.	Phoenicopteriformes	-	-	1	1
7.	Anseriformes	37	-	12	49
8.	Falconiformes	18	2	3	23
9.	Galliformes	1	7	-	8
10.	Gruiformes	7	-	4	11
11.	Charadriiformes	62	-	5	67
12.	Columbiformes	2	1	-	3
13.	Cuculiformes	2	-	-	2
14.	Strigiformes	2	7	-	9
15.	Apodiformes	3	-	-	3
16.	Coraciiformes	1	-	-	1
17.	Upypiformes	1	-	-	1
18.	Piciformes	1	5	-	6
19.	Passeriformes	81	21	13	115
Total species number		228	43	47	318
		271			

Table 1: Birds fauna of Yakutia.

No	Order	Rarity status				Number of sp.
		I	II	III	IV	
1.	Gaviiformes	-	-	1	-	1
2.	Podicipediformes	-	-	1	-	1
3.	Ciconiiformes	-	1	1	-	2
4.	Anseriformes	1	2	10	1	14
5.	Falconiformes	1	5	2	1	9
6.	Galliformes	1	-	1	-	2
7.	Gruiformes	2	-	4	-	6
8.	Charadriiformes	-	1	5	2	8
9.	Strigiformes	-	-	2	-	2
10.	Coraciiformes	-	-	1	-	1
11.	Passeriformes	-	-	13	9	22
Totally		5	9	41	13	68

Table 2: Bird List in the Red Book of Yakutia.

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Received August 02, 2013; Accepted November 23, 2013; Published November 29, 2013

Citation: Vladimirtseva MV, Germogenov NI (2013) Birds of Yakutia: Fauna Diversity, Ecology, Role in Ecosystems and Human Life. J Biodivers Endanger Species 1: 114. doi: 10.4172/2332-2543.1000114

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of events. Since the beginning of ornithological research in Yakutia (middle XIX-s) fauna of birds has not lost a species, in despite of the recent overall decline in waterfowl (swans, geese and ducks) number.

Bird List in the second edition of Red Data Book of Yakutia was expanded from 50 to 68 species (Table 2).

What is, as before, related mainly with a proactive strategy of ornithofauna as biodiversity component protection, than with the changing of a species status, what means the quantity of species in Red Data Book was increased because conservators decided to protect some species to save them in advance but no because they became really endangered. However, not all birds included in IUCN Red List in the recent years have a national (7 species) or re-gional (3) conservation status. In Yakutia, it relates to *Anas falcata*, *Limosa limosa* and *Emberiza auriole*, and in Russia, it relates also to *Polysticta stelleri*, *Falco vesperinus*, *Crex crex* and *Bombycilla japonica* [1].

Spatio-temporal contrasts of nesting conditions cause uneven and focal nature of bird distribution and high dynamics of their number, amplifying in many of them by staying on the periphery of species ranges [2]. This results poly-specific communities with unusual high latitudes saturation in colonial and prone to group nesting bird species. The founders of such settlements occupy the leading positions. The leaders are good markers of different kind of habitats and they determine the structure of the breeding colony. Such the leaders are types of the habitats well-being markers and they determine the spatial structure of the breeding communities. Reducing in quality and quantity of the bird population composition in the main habitats, compared to more southern latitudes, accompanied by an increase in the relative abundance of some of them, what leads to a narrowing of the dominant species range [3-5]

Species diversity and abundance of birds, in particular, in the taiga sector in the region are generally lower than those in more southern latitudes. The depletion of the bird's fauna, in accordance with the Rule of Compensation, is accompanied by an increase in the number of certain species due to the reduction of environmental opportunities and due to the reduction of environmental Vicariate possibility and intensity of the competitive relations and the increase in the relative ecological capacity of the land [6]. According to environmental Vicariate Rule of Jordan, the ranges of closely related species or subspecies of animals typically occupy contiguous territories and did not significantly overlap. At the same time, relative forms usually replace each other geographically. A similar feature noted previously for the Taimyr tundra biota [6,7] and for northern taiga of Western Siberia [8].

Birds nest in the study area, especially in its northern part, in unpredictability and in seasonally unstable conditions. As a consequence their periodic non-breeding is reported periodically (in birds of prey, Siberian crane, Ross's Gull, etc.) in tundra and leaving nests and nesting chicks in the north taiga and taiga-tundra subzones (in Northern house martin). For example, birds of prey may do not breed as often as once in 4 year, because of sharp lack of rodents once in 4 year own to special reproductive cycle of the last ones. High amplitude dynamics, what means the number of birds participating in breeding may be very different from year to years, in the migratory birds breeding number and the ability to maintain it as a whole probably due to their ability to settle south during the spring migration (or) conversely, to penetrate the north of the usual nesting sites, aided by the weakening of phylopatry in northern populations. Resistance of breeding settlements in several species because of the wide dispersion and probably high mortality of young birds is determined by immigration as well as

phylopatry, resulting in periodic changes of their composition. The social composition of a bird population can change from year to year, what means changing in total number of adults and juveniles.

Total duration of potential terms of egg-laying start is more than 160 days in the taiga zone of Yakutia (last 10 days of the February - last 10 days of the July). Nesting birds takes place in four stages, seasonally corresponding to winter, summer and two transition periods (late winter and spring - April to mid-May and the spring-early summer - mid-April to early June), which are accompanied by the phenoclimatic events that act as signals for the egg-laying. [9,10,4,5]. The stages differ with the composition of breeding birds, nature and intensity of their participation in the process of egg-laying start and the number of breeding pairs. When stages change, the corresponding structures, materials, locations and extents of cover slots and the types of food are registered. The mass start of egg-laying (90.2% of the species and 78.6% of nests) in the late spring and early summer is defined by migratory species. The breeding occurs more general in the nesting communities, allowing them to complete the reproduction in optimally possible terms under the time pressure. The nesting season of most birds is substantially reduced comparing with the southern latitudes. It goes in earlier phenological conditions and its initial phase and the egg-laying start's intensity peak in the species are displaced by calendar to a later time.

Despite the fact that the birds with middle-sized clutches prevail (predominantly 1-4 and 4-6 eggs), more than 80% of the species lay equal or more larger number of eggs than in other parts of the range [11,12] With the notable exception, the reproduction of birds of monocyclic and a slight increase in egg number probably not compensate inter-population differences in fertility, because many species have several generations per season in the southern latitudes. Birds experience recurrent shortage of food in the taiga latitudes. Overwintering success of settled birds depends on the forage capacity of habitats as well as from the amount of stored food. Migratory birds are most vulnerable in the spring and early summer, when their death on arrival and in early nesting, abandonment of clutches and delay the egg-laying as a result of cooling and starvation period, are reported. Analysis of the relationships in birds forage (all seasons for a number of sedentary species and limited period of reproduction for the most species) indicates their preferred carnivorous [3-5]. Invertebrates, as the dominant food component and the object of active birds hunting, are found in their diet from April (the spiders compose the basis of food in Siberian Jay chicks at this time) until the end of August (birds feeding with flying insects start to migrate at this time). During the breeding period, specialized herbivorous species (4.7%) eat themselves and feed juveniles with animal food, and polyphagous, including many types of predation (24.4%), do the same. Bird feeding is provided with trophic plasticity, the ability to switch from one type of feed to another, depending on its abundance and accessibility, which is most, pronounced in the feeding of nestlings: the composition of their food varies depending on time of day, weather, season and habitat by the growth and development. The impoverishment of food resources, with increasing patchiness of their distribution and abundance of some of them leads to a narrowing of the feeding spectra and limit the number of major types of bird food. Birds are able to pass on the optional monophagy in critical as well as in food prosperous seasons.

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