

GYRFALCONS *FALCO RUSTICOLUS* IN THE TUNDRA OF NENETS AUTONOMOUS DISTRICT, ARCHANGELSKAYA REGION

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ABSTRACT.—The Gyrfalcon (*Falco rusticolus*) is one of the typical birds of tundra landscapes of the Nenets Autonomous District. The species has been observed from forest-tundra to the coast of the Barents and Kara seas. Despite its wide distribution, population changes, and breeding ecology, Gyrfalcons remain poorly studied. Limited availability of places suitable for nesting and abundance of food are the main factors influencing the mosaic distribution of Gyrfalcon nesting territories. Long-term dynamics of Gyrfalcon breeding and population are determined by the cyclic nature of their principal prey, the Willow Ptarmigan (*Lagopus lagopus*). The latter are at present increasing in their 11-year cycle, and the Gyrfalcon population of the study area is correspondingly growing. Climatic and anthropogenic factors are altering the suitability of areas for Gyrfalcons and other bird species of the tundra zone. *Received 7 March 2011, accepted 7 July 2011.*

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Key words: Abundance, distribution, breeding biology, east-European, Gyrfalcon, Russia, tundra, Willow Ptarmigan.

INFORMATION ABOUT THE BIOLOGY, distribution and abundance of Gyrfalcons (*Falco rusticolus*) was collected during field seasons from 1973 to 2010 in the tundra of Nenets Autonomous District, from Kanin Peninsula to Baidaratskaya Bay (Figure 1). Observations were made at fixed points, and along pedestrian, boating, and aircraft routes in spring (April–May), summer (June–August), and autumn (September–October) periods. We investigated the Kanin Peninsula, Malozemel'skaya tundra, Pechora River delta, Bol'shezemel'skaya tundra, and Yugoskij Peninsula (Figure 2).

Internal areas of the tundra were studied by floating down rivers by boat from upstream to the river mouths. During short (2–5 days) stops we studied the biology, distribution, and abundance of birds on pedestrian routes into the tundra. Geobotanical and landscape surveys were made along boat and pedestrian routes. The width of the counting strip for the species was 500 m. The total length of pedestrian routes was 6,652 km and boating routes was 7,147 km. We collected data on the distribution of Gyrfalcons in the landscape from aircraft routes from Kanin Peninsula to Yamal Peninsula.



Figure 1. Investigated area.

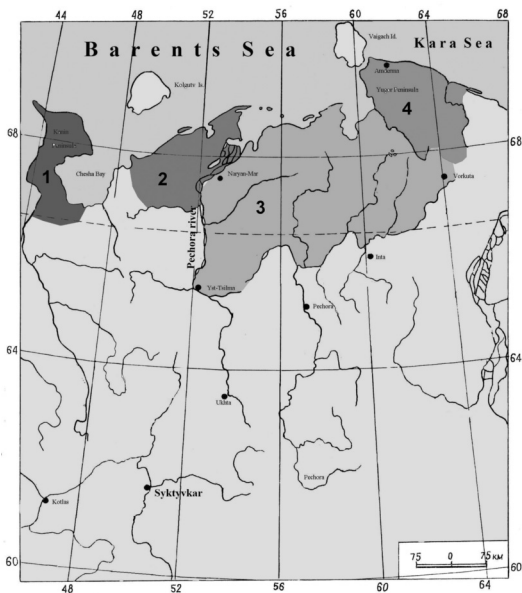


Figure 2. Investigated parts of tundra of European northeast of Russia.

1. Kanin Peninsula
2. Malozemelskaya tundra
3. Bolshezemelskaya tundra
4. Yugorskij Peninsula

RESULTS

The Gyrfalcon is typical of arctic avifauna. Our own data and literature sources show that Gyrfalcons mainly inhabit areas in the tundra zone, especially forest in the floodplains of rivers, and in river valleys on rock cliffs with ledges, overhangs, and crevices. There are very few places suitable for breeding by Gyrfalcons in the east-European tundra, and this is one of the main reasons for their mosaic distribution in the breeding area. Breeding Gyrfalcons are found in the western part of Kanin Peninsula (Konushenskij coast from Yamzcha to Shoina, Figure 3), in the mountainous part of the Kaninskaya tundra (Kaninskij Kamen range) (Dementjev 1935, 1951, Gladkov 1951, Spangenberg and Leonovich 1960), and potentially, birds breed in Timanskaya tundra.

In the Malozemelskaya tundra, Gyrfalcons breed in the river basins of the Indiga, Velt, Sengajaha, and Neruta Rivers, on the Russkij Zavorot Peninsula, on the coastal tundra of Korovinskaya Bay, and the Pechora River delta (Mineev and Mineev 2009). In the Bolshezemelskaya tundra, Gyrfalcons breed in the basins of the Usa River (Uspenskij 1965), Chernaya, Shapkina, More-Yu, and Bolshaya Rogovaya Rivers, and on the coast of Haipudirskaya Bay (our data). On the Yugorskij Peninsula, Gyrfalcons nest on the coasts of Yugorskij Shar channel (Kalyakin 1989) and Kara Bay, in the mountains of the Pai-Hoi range (Bolshaya Oyu River basin), and in the country between the Vasjaha and Malaya Oyu Rivers (our data).

In the east-European tundra, Gyrfalcons begin to breed at the end of March through the beginning of April, when winter conditions prevail with low temperatures and high snow cover. Due to this early breeding, Gyrfalcons choose suitable nest sites that are more or less free of snow, such as forest belts (usually far from the tundra), and on cliffs with ledges, overhangs, and crevices.

Abundant food is essential for successful breeding, and the basis of this food during this period is Willow Ptarmigan (*Lagopus lagopus*), which tend to concentrate in forests in river valleys situated deep in the tundra zone. With high snow cover, Willow Ptarmigan migrate south from the tundra along river valleys, and in spring they come back along the same paths. With low numbers and low snow cover, Willow Ptarmigan may remain in the tundra, concentrating in the floodplains of rivers with high willow shrubs and in forested floodplains. Gyrfalcons share the ecological features favored by Willow Ptarmigan and always nest in such habitats or very close to them. Breeding Gyrfalcons have also adapted to nesting on geodesic beacons in woodless, flat tundra occurring on the migration routes and breeding places of Willow Ptarmigan.

Migration routes of Willow Ptarmigan in the Malozemelskaya and Bolshezemelskaya tundra mainly follow the valleys of the big rivers. From Kolguev Island, Willow Ptarmigan move to the mouths of the Velt and Indiga Rivers from where they enter the Malozemelskaya tundra. The birds that breed in the Malomel'skaya tundra in high numbers migrate along the valleys of Pechora and Sula Rivers (Figure 4). Ptarmigan that inhabit the area between the Pechora and Chernaya Rivers migrate along the valleys of the Pechora, Kuya and Shapkina Rivers in winter. Ptarmigan breeding in the area between the Chernaya and More-Yu Rivers move to the Kolva and Adzva River valleys, and then to the forest tundra. Ptarmigan from the eastern part of the Bolshezemelskaya tundra, when snow cover is high, mainly migrate to the basins of the Bolshaya Rogovaya, Seida, Vorkuta and Usa Rivers (Skrobov 1975).

Willow Ptarmigan that inhabit the tundra of Nenets Autonomous District have short (3–4 year) and long (6–11 year) cycles of peak abundance. The dynamics of Gyrfalcon abundance in great measure is determined by these cyclical population changes of Willow Ptarmigan. We recorded 3–4 pairs of Gyrfalcons in

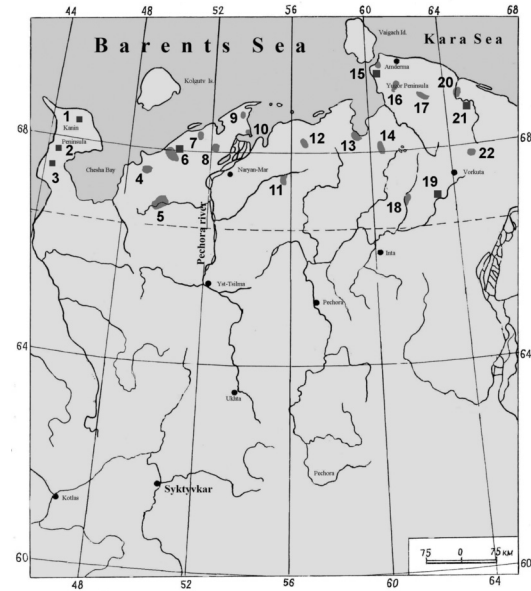


Figure 3. Breeding sites of the Gyrfalcon:

1. Mesna River basin
2. Shoina River basin
3. Yamzha River basin
4. Indiga River basin
5. Sula River basin
6. Middle course of Velt River
7. Sengjaha River basin
8. Middle course of Neruta river
9. Beluzejto lake area
10. Lovetskij Island
11. Shapkina River basin
12. Chernaya river basin
13. Haipudirskay Bay
14. More-Yu River basin
15. Coast of Yugorskij Shar Channel
16. Middle course of Bolshaya Oyu River
17. Area between two rivers Vasjaha-Malaya Oyu (Pai-Hoi range)
18. Upper course of Bolshaya Rogovaya River
19. Upper stream of Usa River
20. Kara Bay coast
21. Lower course of Kara River
22. Upper course of Vorkuta River

■ literature data
 ● our own data

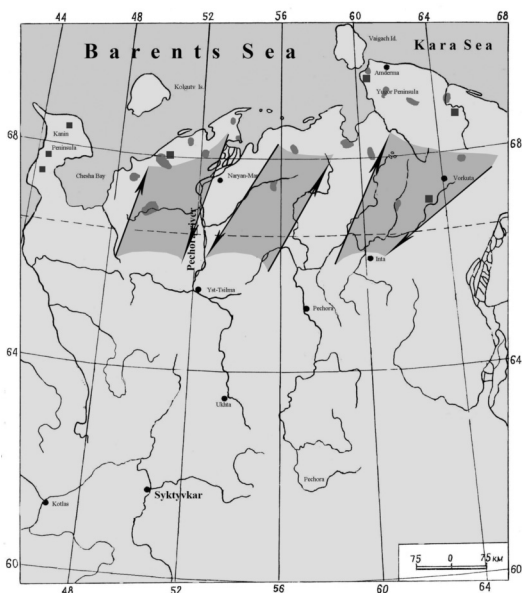


Figure 4. Migration routes of Willow Ptarmigan in tundra of Nenets autonomous district.

Table 1. The average number of Gyrfalcon pairs breeding in different parts of the Nenets Autonomous District, Russia.

Area	Pairs per 100 km ²
Kanin Peninsula	0.012
Malozemelskaya tundra	0.01-0.03
Bolshezemelskaya tundra	0.07-1.0
Yugorskiy Peninsula	0.03

100 km² in suitable nesting areas when Willow Ptarmigan densities were very high. In the east-European tundra at present, we are recording a regular 11-year cycle of increasing numbers of Willow Ptarmigan and a corresponding increase in the number of breeding Gyrfalcons in the study region.

The number of Gyrfalcons in the tundra of Nenets Autonomous District varies within wide limits in different areas (Table 1). Nesting sites and nests of Gyrfalcons are usually in use for a long time. For example, on “forest island” on the More-Yu River, Gyrfalcons nested from 1974 to 1979 (Mineev 1980); on Lovetskij Island (Mineev 1994) Gyrfalcons bred for about 30 years on the platform of a wooden topographic tower. Usually Gyrfalcons use old nests of Hooded Crows (*Corvus cornix*), Ravens (*C. corax*), or Rough-legged Buzzards (*Buteo lagopus*). Sometimes there are two nests in the one nest area, with only one of them in use.

Anthropogenic factors generally decrease the Gyrfalcon’s population density. In the former Union of Soviet Socialist Republics (USSR), trapping of Arctic Fox (*Vulpes lagopus*) and Willow Ptarmigan traditionally occurred in Gyrfalcon breeding areas and every year Gyrfalcons died in fox traps. Currently, trapping of Arctic Fox and Willow Ptarmigan has stopped, which has positively affected the number of Gyrfalcons. Grazing of Reindeer (*Rangifer tarandus*) herds in Gyrfalcon breeding sites also disturbs birds, resulting in high embryonic mortality or nest abandonment by incubating birds.

Recently, climate change at high latitude is characterized by encroachment of forest tree species and shrubs into the tundra landscape. The number of wintering Willow Ptarmigan is increasing in the new heterogeneous environment in northern areas of east-European tundra. Our study shows that the modern distribution and increasing number of Gyrfalcons are closely connected with this expansion of prey availability.

DISCUSSION

The distribution, abundance, and biology of the Gyrfalcon have been investigated in the tundra of Nenets Autonomous District. However, considerable areas of potential breeding habitat for Gyrfalcons in east-European tundra have not been surveyed, making it difficult to accurately describe the real situation for the species.

Main factors that determine the distribution and high number of Gyrfalcons in east-European tundra are the presence of suitable sites for nesting and abundance of their main prey species, Willow Ptarmigan. In the presence of these conditions we recorded a high density of breeding Gyrfalcons. The mosaic distribution of breeding Gyrfalcons is caused by selecting suitable nest sites on larger Willow Ptarmigan migration routes.

Anthropogenic pressure is also an important factor influencing the numbers of Gyrfalcons in the region. Before the 1990s, trapping of Arctic Fox and Willow Ptarmigan led to the deaths of large numbers of Gyrfalcons in the traps. Trapping of Arctic Fox and Willow Ptarmigan has since stopped, which has positively affected the number of Gyrfalcons. Unfortunately, mass trapping was replaced by the oil industry which is developing rapidly at this time in the tundra of Nenets Autonomous District. Oil development can decrease the number of places suitable for breeding, as a result of transformation of landscapes and disturbance. Modern climate warming in high latitudes assists the northward encroachment of bushes and woody plants. This phenomenon improves conditions for wintering Willow Ptarmigan, which can positively affect Gyrfalcons.

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