



The current status of the Peregrine population in Yamal and Lower Ob region

Sergey P. Paskhalny¹ and Mikhail G. Golovatin²

¹ Ecological scientific research establishment of Institute of Plant and Animal Ecology, Ural branch of Russian Academy of Sciences, Zelyonaya Gorka Street, 18, kv. 1, Labytnangi, 629400, Yamalo-Nenets autonomous region, Russia. spas2006@yandex.ru

² Institute of Plant and Animal Ecology of Ural branch of Russian Academy of Sciences, 8 March Street, 202, Yekaterinburg, 620144, Russia. golovatin@ipae.uran.ru

Abstract

The Peregrine is a rare species across much of its range. However, the Yamal Peninsula is one of the territories where it is common up to present time. We are sure that the information we have on this species in the wild, particularly its distribution and population size will be interesting for those studying Peregrines. In this paper we have used our own data and published papers collected for the period 1977-2006. Our own data was collected during work at particular fixed sites on land and from boats. Study sites were situated near the sea coast and inland, including valleys and uplands. Their size ranged from 25 to 100 sq. km, on average $53,8 \pm 18,1$ SD. On the North Yamal 17 plots were observed; on the Middle Yamal – 24; on the South Yamal – 17; on the Polar Urals – 7 and in the Ob river valley and nearby – 9. Additionally, all rivers accessible by motorboats were checked. Our work was conducted during the Peregrine's breeding season between June and August. We can confidently say that during 30 years we have visited practically all parts of the Low Ob valley, the Polar Urals and the Yamal Peninsula.

Key words: Peregrine Falcon, *Falco peregrinus*, Siberia, Yamal, Ob, distribution

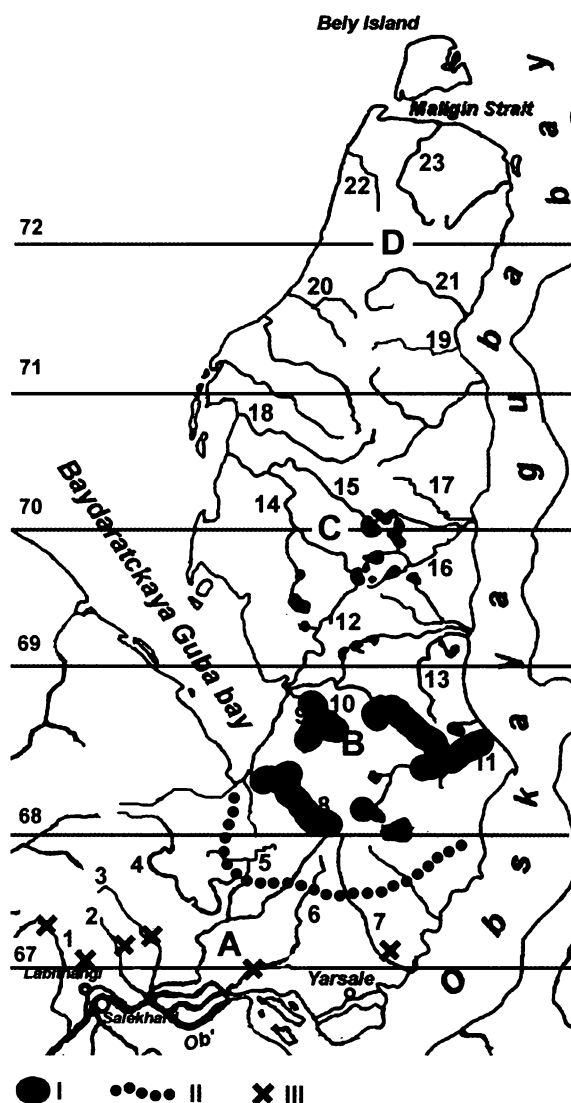


Figure 1. Distribution of the Peregrine in the Yamal and Low Ob region

Zones: A – forest-tundra (the average nesting density is 2,6 pairs/100 km of river valleys), B – south subarctic or shrubby tundra (7,9 pairs/100 km of river valleys), C – north subarctic or typical tundra (2,0 pairs/100 km of river valleys), D – arctic tundra (1,9 pairs/100 km of river valleys); I – the area of highest density of the Peregrine; II – the south boundary of regular nesting; III – most south points of nesting.

Rivers: 1 – Sob', 2 – Kharbey, 3 – Longotyegan, 4 – Schuchya, 5 – Heyaha, 6 – Hadytayaha, 7 – Yadayahodyaha, 8 – Yerkutayaha, 9 – Heyaha, 10 – Yuribey, 11 – Nurmayaha, 12 – Yasaveyyaha, 13 – Sabyaha, 14 – Mordyyaha, 15 – Seyaha-Mutnaya, 16 – Seyaha-Zelyonaya, 17 – Yasaveyyaha, 18 – Naduyyaha, 19 – Sabettayaha, 20 – Syadoryaha, 21 – Tambey, 22 – Paiyndteyaha, 23 – Yahadyaha

Distribution

The Peregrine nests up to the north ridge of the Yamal Peninsula. Zhitkov saw a nesting pair of falcons on the NW coast of the Peninsula, on the river slope of Paindteyaha (72°37'N). Tyulin (1938) said about the capture of one pair of falcons on the north ridge of the Yamal Peninsula – near Khae-sale cape (72°52'N). In the following years birds were observed near the northern coast of Yamal – in particular on the Yahadyiaha river, 20 km in from its mouth.

On the Bely Island A. N. Tyulin observed one bird on the 4 September 1935 and proposed that it had been nesting. However, other researchers (Sosin & Paskhalny 1995; Rogacheva et al. 1995; Dmitriev et al. 2006) did not meet Peregrines on the island. This is not surprising because suitable places for Peregrines to nest practically are absent on the island: the relief of the terrain is very flat and sea bluffs near the Malygin channel are low.

The species range in the south border area is in the forest tundra zone (Fig. 1). Nowadays there is regular nesting of Peregrines up to the Schuchya river (near 67°25' N) retracing old haunts. Previously their range was more southerly – near 66°44' - 66°54'N. There were agitated pairs of Peregrines in the region of the Obdorsky Mountains (the Polar Urals) noted by E. K. Gofman and there were nests found on the River Khanmey in the neighborhoods of Labytnangi town in 1970 (Danilov et al. 1984).

Nowadays birds are not nesting in these places and is probably due to increasing human impact in the region (an increasing population in Labytnangi, and building of new settlements etc.). However, recently we have confirmed cases of Peregrines nesting on the north of this line – in 1983 in the canyon of the Longotyegan River (the middle part of the river) and in 1996-1997 near where it meets the River Ob. The optimal area for the Peregrine in the Yamalo-Nenetsky region is now in the south subarctic or shrubby tundra, between 68 and 69 parallels.

Nesting density and nesting territories using

As is well known, Peregrines will have close contact with their nesting territories for many years, although a nest locality can change annually for different reasons. In territories of regular nesting birds, the same nest site plots can be occupied for many generations. For example, Osmolovskaya in 1942 found a Peregrine nest in the same hill Tir-sede where it was first found by Zhitkov in 1908 (Danilov et al. 1984). Sometimes these sites are used most years with the odd absence in some years. Therefore, Peregrine nest sites may be potentially used also only once or twice over several years. We employ the «concept» territory when nesting birds are present at particular sites.

Forest tundra (67-68°N)

The Peregrine is rare near the south border of this area. Between 1937 and 1941 in the middle flow of the Schuchya river between the Schuchya settlement and the mouth of the Heyaha river (near 82 km of river valley) two nesting Peregrine territories were found and four on a 30 km stretch of the Heyaha river (Dunaeva & Kucheruk 1941; Osmolovskaya 1948). In 1938 territories on the Schuchya river were not used, but in 1939 and 1941 all of these ones were occupied. The nesting density was 3, 6-5, 4 pairs/100 km of valley.

In 1973 (Kucheruk et al. 1975) after researching a large area of land, only two nests were found near the mouth of the Heyaha and in the lower part of the Sibileyaha river (right affluence of the Heyaha). In 1976 one nesting pair was found along 83 km of river valley in the lower part of the Schuchya (Danilov et al. 1984). Kalyakin (1998) writes that in the Schuchya basin in the mid- 1970's 15 nesting pairs nested and in the mid-1980's less than 4 nested.

At the end of the 1980's in the basin of the middle part of this river 3-7 pairs of falcons were found (Mechnikova & Gizzatova 1991). In 1993 we found only one nest in the canyon of the north arm of the Big Turn of the river. In 2005 in the middle part of the Schuchya two nests and another seven nests were found on its left tributaries (Mechnikova & Kudryavtsev 2005). So, in total the Peregrine population density in the basin of this river changed between 0,8-5,4 pairs/100 km of river valley, on average $2,9 \pm 1,7$ SD. And on the Schuchya river it was exactly – 0-2,4 pairs/100 km of river valley, on average $1,3 \pm 0,9$ SD.

In the 1960's, on the Hadytayaha river, from the river mouth to the border of the forest line (67°22'N) along 77 km of river valley there were five Peregrine nests (Dobrinisky 1965), and one of these was in the lower part of the river (near 67°N). Later, up to 1973 there were only two pairs, and after this, just one (Danilov et al. 1984). It was thought one pair were nesting at the beginning of the river (on 60 km of its valley). And in 2005 only this plot on the river's length was occupied, but in the forested part of the Hadytayaha river Peregrines were not found to be nesting.

The real density of species on the river had fallen down from 4,3 (in 1960's) to 0,7 pairs/100 km of river valley in this time. Now on average it is $2,2 \pm 1,6$ SD pairs/100 km of river valley.

On the east of Yamal forest-tundra we have very limited information about the Peregrine. One nest was found on the Yadayahodayaha river in 1975 (on the Parneyaha – its tributary) and two on the Porsyaha (upper flow) (Danilov et al. 1984; Paskhalny et al. 2000). We made many hours of observations near Yarsale and we know that this area is not preferred by this species. We have not found any nests for 40 years of investigations in a 30km area near the

settlement. So we estimate the density of Peregrine in forest-tundra as 2,5 pairs/100 km river valleys, changing between 0,7-5,4 pairs/100 km.

Shrubby (south subarctic) tundra (68-69°N)

In the area between 68 and 69 parallels we find the highest density of Peregrines in the Yamalo-Nenetsky region, mainly in the Yuribey, the Yerkutayaha and the Nurmayaaha rivers basins (Fig. 1). The Yuribey river basin. On the Yuribey – the largest of Yamal rivers – our observations have been made for 12 years (1978-1986, 1990, 2004-2005). During this period we found 22 nesting plots (territories) where Peregrines were agitated. However, all of them were unoccupied annually. Nesting density varied from 3,6 to 7,7 pairs/100 km of river valley (Tab. 1), an average $5,4 \pm 1,4$ SD. Pairs did not take up nest sites along the river regularly.

Table 1. Nesting density of Peregrine (pairs/100 km of river valley) in different years

| Year | Distance of controlled river [km] | Number of pairs | Density [pairs per 100 km] |
|------|-----------------------------------|-----------------|-------------------------------|
| 1978 | 194 | 8 | 4.1 |
| 1979 | 137 | 8 | 5.8 |
| 1980 | 162 | 10 | 6.2 |
| 1981 | 194 | 8 | 4.1 |
| 1982 | 194 | 10 | 5.2 |
| 1983 | 194 | 7 | 3.6 |
| 1984 | 194 | 8 | 4.1 |
| 1985 | 137 | 6 | 4.4 |
| 1986 | 137 | 7 | 5.1 |
| 1990 | 137 | 9 | 6.6 |
| 2004 | 117 | 9 | 7.7 |
| 2005 | 194 | 15 | 7.7 |

In upper part of the Yuribey river slopes there are small numbers of Peregrines - they are not high and have not extended. There were only two nesting territories on 57 km of the higher part of the river and three on 60 km of the lower part of the river. Only one plot in both places was occupied every year.

In the lower part of the river there is a small settlement, Yuribey and this site is most visited by people. Nesting sites here are spread out (at the extreme one was 30 km away from the other) and are present mainly on a northern aspect. Perhaps falcons use them in different years as alternative territories.

There are many high and long slopes/cliffs suitable for Peregrine to nest in the middle stream of the river from the confluence of the Left and Right

Yuribey to Lamdonado locality where it dissects the Khoy elevation in the central part of the Peninsula. The majority of nesting territories (16) were concentrated in this part of the river. Annually we controlled five to eight pairs of Peregrines, and in 2005 even 11 pairs. The density varied from 6,0 to 13,3 pairs/100 km of valley, on average $8,2 \pm 2,1$ SD. The minimal distance between nests was 4,5 km, on average $8,6 \pm 2,8$ SD (in other parts of the river – $20,9 \pm 4,2$ SD km).

From literature data this can be less. Near Yarato-2 lake on the Arkayaha river (tributary of the Tal'beyahi river falling in the lake) V. I. Osmolovskaya (1948) found three nests 1-2 km away from one another.

Table 2. Peregrine territories occupation on the Yuribey river between 1978-2005

| Year | Checked territories | | Occupation of nesting territories (in %) | |
|------|-------------------------------------|---|--|-------------------------------------|
| | Total number of nesting territories | The number of corrected nesting territories | For all territories | For corrected number of territories |
| 1978 | 20 | 14 | 40.0 | 57.1 |
| 1979 | 16 | 10 | 50.0 | 80.0 |
| 1980 | 20 | 13 | 50.0 | 76.9 |
| 1981 | 19 | 12 | 42.1 | 66.7 |
| 1982 | 20 | 13 | 50.0 | 76.9 |
| 1983 | 19 | 12 | 36.8 | 58.3 |
| 1984 | 19 | 12 | 42.1 | 66.7 |
| 1985 | 17 | 10 | 35.3 | 60.0 |
| 1986 | 17 | 10 | 41.2 | 70.0 |
| 1990 | 16 | 10 | 56.3 | 90.0 |
| 2004 | 15 | 10 | 60.0 | 90.0 |
| 2005 | 22 | 15 | 68.2 | 100.0 |

Sometimes single birds could settle on a free cliff near the nesting pair. The occupation of nesting territories by pairs of birds changed from 35% to 68% (Tab. 2), and on average was $47,7\% \pm 10,0$ SD. The analysis of using confirmed territories showed that the number of nest sites rarely used were often situated near one to another. The minimal distances between the end of one territory on a river slope/cliff and the beginning of another were 0,8-3,0 km. In one case, Peregrines used a nestsite which was present between two adjacent territories occupied by other pairs of Peregrines. We also have examples of one nesting being occupied across two adjacent territories. Such change in nesting territories among some female Peregrines has been observed in Scotland (Mearns & Newton 1984). The same territory may be used by a number of different pairs of Peregrines over a number of years. As

a result of these facts we combined such "alternative" territories.

As a result the occupation of nesting plots will be higher for 1,5 times (on average $74,4\% \pm 13,8$ SD, change from 57% to 100%). This result accords with responding data for Western Europe: in Great Britain – 66,4% (Ratcliffe 1984), Ireland – 83-85% (Norris & Wilson 1983), Central France – 89,5% (Cugnasse 1984). In several cases falcons nested alongside a main river valley – on the banks of lakes and small rivers. In the Yuribey basin we found 10 such nesting territories over 1060 sq. km of observed area.

Taking into consideration the number of territories occupied, the nesting density was 0,6-0,8 pairs/100 sq. km of elevated land.

In 1942 Osmolovskaya found two nests near Yarato lakes on a 100 km stretch of high tundra (or by other calculation on 345 sq. km) (Danilov et al. 1984). This density (0,6 pairs/100 sq. km) supports our own data. In shrubby (south subarctic) tundra we did not meet falcons large distances away from river valleys.

The Heyaha river basin

On the Heyaha river the density of Peregrines was the same as in the middle part of the Yuribey – 8,1 pairs/100 km of valley. We found five nesting territories on 62 km of the river valley (125 km of channel) and three at Heto lake at the source of the river. In 2004 and 2005 two pairs nested near the lake. Distances between these nests were 3.7 km, on the river minimal – 6,1 km, on average $9,8 \pm 2,5$ SD.

The Yerkutayaha river basin

In the lower art of the Yerkutayaha and its right tributary the Payutayaha on 59 km of valleys (120 km of channel) during four years (1999-2002) 2-7 pairs of falcons nested (Shtro et al. 2000; Sokolov et al. 2002). The density was 3,4-11,9 pairs/100 km of valley, on average $7,2 \pm 3,8$ SD respectively.

The Nurmayaha river flows to the east of the Yuribey and drops down into the Obskaya guba bay. Here along 30 km of the river valley 2-3 pairs of birds nested in different years (Danilov et al. 1984; Ryabitsev & Alekseyeva 1995). The density thus equals to 6,7-10 pairs/100 km of river valley. So in the optimum area in Yamal the usual density of Peregrine is 5-13 pairs, on average – near 7,9 pairs/100 km river valley. In some cases along the main rivers – about 0,7 pairs/100 sq. km.



Figure 2. Typical nesting habitats of Peregrine on the Yamal (Yuribey river)

Typical (north subarctic) tundra (69°-71°N)

In this part of Peninsula the Peregrine is rare. On some sufficiently large rivers, for example the Yasaveiyaha (right tributary of the Yuribey), on 115 km of river valley we observed only single birds.

At 225 km of the Mordiyaha river valley five nesting territories were found (one near Yambuto lake). Of these, 3-4 were occupied annually, i.e. nesting density was 1,3-1,8 pairs/100 km of river valley. The same density (1,3-1,9 pairs/100 km valleys) of Peregrine nests is found on the Syaha-Mutnaya river (the right tributary of Mordiyaha), where we have found three territories, one of which is not used annually. At 70 km of the Naduiyaha river valley (north boundary of subzone) one occupied Peregrine nest and another agitated pair were found (Shtro & Sokolov 2006). So the nesting density was 2,9 pairs/100 km of valley.

In 2005-2006 during a 200 km excursion along the western part of the Yamal we explored nearly 125 sq. km of land. Only two Peregrine territories were found: one 7 km from the seashore on the bluff of the small river Sabryavpenzya, another on the steep of seashore near the mouth of the Yarayaha river, 25 km away from the first nest. Annually only one territory was occupied. Nesting density was 0,8 pairs/100 sq. km. On the east side of Peninsula one nest was found in the valleys of the Yuribeytoyaha, the Sabyaha and the Seyaha-Zelenaya rivers. Accordingly the density of falcons was 1,5 pairs/100 km of valleys.

The situation seems as exclusive as on the Yasaveiyaha river (left tributary of the Seyaha-Zelyonaya). In 1975 three pairs of falcons nested on one high river bank (Danilov et al. 1984) or 6 pairs/100 km of river. However, the density will be 3,1 pairs/100 km of valley if we consider other parts of river with less high banks. In typical (northern subarctic) tundra the usual density of Peregrines is 1,3-3,1 pairs/100 km of river valley, on average – near 2 pairs/100 km, away from river valleys about 0,8 pairs/100 sq. km.

Arctic tundra (71°-73°N)

In arctic tundra are known sporadic observations of species. Zhitkov (1912) saw a nesting pair at the mouth of the Payndteyaha river in 1908 but we did not detect Peregrines here in 1981 and 1983. At the beginning of August 1981 we observed one bird on the bluff of the Yahadyiaha river, 20 km in from its mouth and in the middle of August we observed one on the shore of the Obskaya guba bay 25 km south of Sabetta. Towards the end of August 1983 we met falcons in the lower stream of the Tambey river, and on the 30 July and 3 August 1985 in the lower part of the Syadoryaha river.

It is important to note that we worked in arctic tundra mainly in August and occasionally at the end of July because it is difficult to observe nesting

birds at any other time. A single nest was found on the 25th July 1980 in the middle stream of the Sabettayaha river near an influx of the Tarcheda tributary.

We can therefore say that on 230 km of river valleys visited there were near to six nesting territories. Nesting density we estimate at 1,9 pairs/100 km of river valleys in consideration of the level their occupation.

Population of Peregrines in the region

Taking into consideration the character of distribution and density of Peregrines it is possible to appreciate the abundance of this species in different parts of the Yamal (Tab. 3). About 320 pairs nest on average on the Peninsula. This maximum estimation of the population takes into account the actual observations of nesting and displaying birds rather than the potential of the area for nesting Peregrines. Also, if we consider that a decline in the number of pairs of Peregrine pairs in one part of Peninsula is compensated by increase in another, a more realistic estimation is around 300-385 pairs. A number of single birds have been observed, on average 1 single bird observed per 14 pairs, therefore the total population size in the nesting season is between 625-800 individual birds.

Table 3. The number of the Peregrines in Yamal and the Lower Ob region

| Area | Number of pairs | | Number of single birds | |
|---------|-----------------|------------|------------------------|------------|
| | Limits On | On average | Limits On | On average |
| 67-68°N | 30-70 | 45 | 2-5 | 3 |
| 68-69°N | 60-155 | 95 | 4-10 | 7 |
| 69-71°N | 60-145 | 90 | 4-10 | 6 |
| 71-73°N | 60-140 | 90 | 4-10 | 6 |
| Total | 210-510 | 320 | 14-35 | 22 |

The data is analogous with the previous population estimate at the Peninsula – 355-370 pairs (Paskhalny et al. 2000). A comparison of the density dynamics of the population in the optimal part of the species' area – on the Yuribey river – with summer temperature (deviation of summer average temperature from perennial average) demonstrates a decrease in falcon numbers in comparatively warm years (Fig. 3). On the contrary, increased numbers of individuals occurred in relatively cold years. This probably depends on the redistribution of young first breeding birds over the area. In warm years they move to the north and spread all over the region where they later nest. In cold years the first breeding birds prefer the optimal regions.

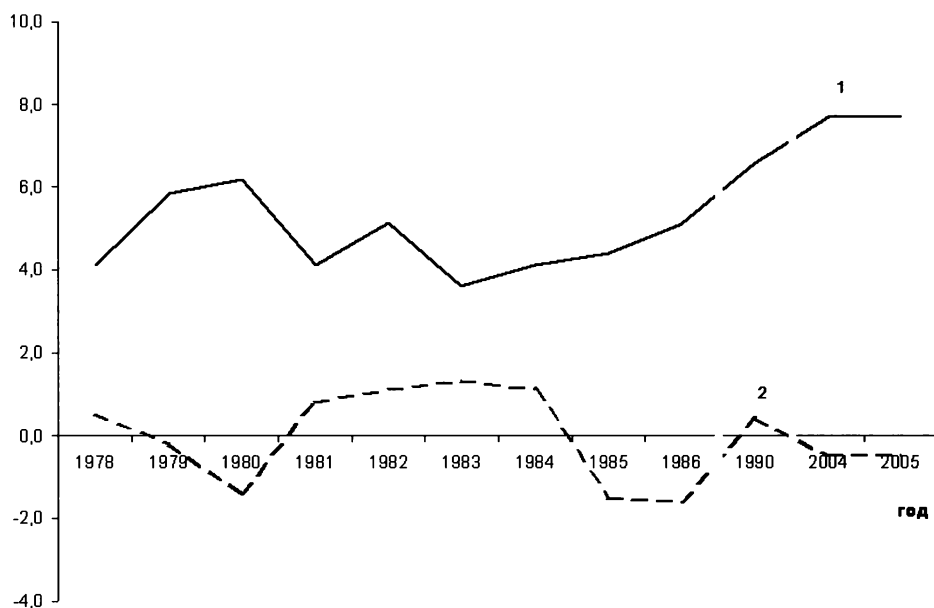


Figure 3. Dynamics of the Peregrine density at the Yuribey river (1) and deviation of average summer temperatures (June – July) from average perennial summer temperature (2)

Characteristics of residency

Spring migration

In Yamal, Peregrine spring migration takes place in May – first half of June. In 1942 on the South Yamal, Osmolovskaya (1948) noted one pair on the 14th May. On the Yuribey river in very early spring 1977 a territorial pair was met on the 16th May (Paskhalny et al. 2000). In different years we have observed migrating birds in this region up to the 5th June. In 1908 in the arctic tundra Zhitkov (1912) found a pair on their nesting territory on the 31st May (Gregorian style). Generally, the recording of falcons in the spring occurs during the period that the first waders arrive and during the active migration of waterfowls and passerines. However, Osmolovskaya (1948) pointed out that Peregrines had appeared two weeks before any mass bird migration.

Nesting habitats

In Yamal an overwhelming majority of pairs place their nest on high abrupt banks of river valleys and infrequently on bluffs near lakes and on the seashore. We think that the recording of river valleys being used by Peregrines as nest sites is somewhat biased and is determined by the specific researcher's mean of transport – many use boats along the rivers to survey Peregrines. Therefore,

these nest sites are more likely to be recorded. During the Peninsula survey we moved through the region as frequently by foot and crosscountry vehicles (within land plots from 25 to 50-100 sq. km) as by water. Nevertheless, in majority of cases, nests were found on the main banks of river valleys (56 of 68 known nesting territories or 82%), 15% – on lake banks, 3% – on seashore bluffs. It is interesting that neither we nor other researchers found nests on lake banks in the forest-tundra. We found nearly 15% of nesting territories on shrubby (south subarctic) tundra (5 of 33 known for us) and another 85% on river banks.

In our opinion in typical (northern subarctic) tundra nesting took place more often near lakes and is dependent upon the specific, local relief of the land. There were six (26%) nesting plots on lake banks among 23 known territories in this habitat and 2 (9%) on the seashore. Aside from the Peregrine nests on the river and lake banks nests have also been found on polar knolls (Osmolovskaya 1948; Shtro & Sokolov 2006). In the mountains and foot-hills of the Polar Ural, Peregrines nest on rocks (Danilov 1969; Kalyakin 1977; Golovatin & Paskhalny 2006). A presupposition was made concerning the possible nesting of a pair of Peregrines in a tree (Danilov et al. 1984) on a basis of finding an anxious pair in a bottomland forest on the Hadytayaha river in 1972 where there was an absence of bank bluffs in the nearby vicinity. A definite importance in choosing a nesting place is the height and extent of a bluff. The height of slopes used for nesting from our observations varied from 4 m to 40 m and the average was 16,7 m. However, despite large rivers having numerous low undermining banks (3-8 m), many are not occupied by Peregrines except where the nest site is placed on a slope of comb opening to the river. On short bluffs (up to 60 m) birds practically do not nest and prefer longer ones or a series of neighbouring steepes. The vegetation covering bluffs and slopes don't have any particular effect on the Peregrines in our opinion. In around a 1/4 (28%) of inspected nests, breeding took place on slopes overgrown by shrubs and grassy vegetation. 28% were on turf-clad; 20% on few turf-clad and 24% on bluffs with thin vegetation.

Many researchers repeatedly noted a preferential choice of location by Peregrines to nest on slopes facing a southerly direction (Osmolovskaya 1948; Danilov et al. 1984). Both V. I. Osmolovskaya and ourselves found birds will use bluffs that face different directions, however, the nest itself in the majority of places will be on a side, promontory or brow oriented in a south direction (S, SW and SE) and is often defended against prevailing cold winds. Among nests inspected by ourselves, 3/4 (74%) were found to be oriented towards the south. More than 1/3 (38%) of known nests were situated on the shelves of bluff slopes; 25% on the sides of combs crossing the main bank; 22% on the promontories of bluffs and 16% at the base of outlying eroding banks.

Half of all nests are placed under the protection of low ground prominence, bushes or grasses while a 1/4 are under ground bulkhead and a 1/4 were completely unprotected.



Figure 4. Typical Peregrine nest

On the whole it is possible to state that falcons prefer to nest on warming slopes and/or in places defended against prevailing cold winds. Nests are situated predominantly at elevated points, in places where access to it is limited (on promontories, narrow spines, ground outliers etc.). However, there is a sufficient and wide set of possible variants of nest locations relating to height, orientation and other features of its placement and choice. The vast content of ice in the Yamal's ground means dynamic processes of erosion caused by the ice slowly effect slopes and bluffs through summer melting, wash-out by thaw, pluvial and river waters. Evidently a proportion of nesting places are destroyed over time by the effects of ice and erosion. This may be as high as 30% of such nests. Therefore it is not uncommon for Peregrines to change their nesting site from time to time. A shift of nesting place along the boundary of a territory can also occur when there are no obvious dangers to the old nests. The old nests can then exist alongside the new ones (Osmolovskaya 1948; our data).

The finding of a new nests was helped by the type of construction being typical for species. A trampling hollow in the ground could be observed ranging from 160x170 to 255x255 mm in diameter (on the average 204x215 mm) and 20-50 mm in depth. In two cases Peregrines used the old nests of Rough-legged Buzzard *Buteo lagopus* - one of these crashed to the ground. The covering of the nest hollow was either absent (majority of nests) or highly scarce. If it did exist it usually existed of rotted vegetation, dry grass, dry leaves of dwarf birch and feathers. Only in the one nest dry culms were formed a lax "ring".



Figure 5. Peregrine female near nest

Breeding

According to Osmolovskaya data (1948), nesting Peregrines near Yarato lake in 1941 laid their first eggs between the 4th and 7th June. In the lower part of the Yenzoryaha river a full clutch of 4 eggs was found on 6th June 1997 (Paskhalny et al. 2000). At a nest on the Porsyaha river, two eggs and a week later four eggs were found on the 13th June, 1976 (Danilov et al. 1984). At the Nurmayaha river in 1962 a full clutch was found on the 17th June (Galushin et al. 1963).

The earliest dates of hatching nestlings fell during the seasons where spring was earlier than the average. For 67°-68°N (Heyaha and Sibileyse rivers) this was the 7th July 2005 (Metchnikova & Kudryavtsev 2005). For

68°-69°N: 28th June 1990 – the Heto lake (Paskhalny et al. 2000); 3rd July 2005 – the Yuribey river (our data); 5th July 1989 – the Yerkuta river (Paskhalny et al. 2000); 5th-12th July 1941 – the Yarato lake (Osmolovskaya 1948) and 9th-10th July 1982 – the Yuribey river (our data). For 69°-71°N (a low part of the Seyaha-Mutnaya river) – 11th July 1989 (Paskhalnyi et al. 2000). For 71°-73°N (the Sabettayaha river) – 11th-15th July (Paskhalny et al. 2000).

In seasons where spring appeared around the average date the hatching of nestlings happened between the 17th and 23rd July. So at 68°-69°N latitude 20th-22th July 1942 (Osmolovskaya 1948); 18th-20th July 1974 and 19th July 1975 (Danilov et al. 1984); after 22nd July 1979; 18th-19th July 1981; 18th July 1999 (Paskhalny et al. 2000) and 17th-18th July 2004 (our data). Analogous calculations of dates of hatching (the age defined amenably Osmolovskaya 1948) were found to the north – at the 69°-71°N latitude in 1995 (Paskhalnyi et al. 2000).

There are also cases of very late hatchings of nestlings. For example, a nest with 2 newly hatched chicks was found at the Kheyaha river on the 1st of August in 1990. Peregrines were absent here earlier on the 30th June when the bluff was thoroughly checked (Paskhalnyi et al. 2000). Perhaps this nesting attempt was a result of a repeat nesting attempt made by a pair that failed to nest elsewhere. Some observations were given as evidence about the possibility of this happening: On the 3rd June 1958 on the Yugorsky Peninsula, Uspensky (1965) found a nest with 2 fresh eggs near a falcon's nest containing egg shells; on the Taimyr Peninsula on the 11th July 1949, Sdobnikov (1956) found a nest with two eggs; on the Nurmayaha river (Yamal) one pair of Peregrines remained in the vicinity of their nest until the end of August after their clutch of eggs failed (Ryabitsev 1993).

The number of eggs in nests with full clutches varied from 1 to 4 egg. The average was $3,50 \pm 0,12SE$ (from 46 nests of our and published data: Dunaeva & Kucheruk 1941; Osmolovskaya 1948; Galushin et al. 1963; Danilov et al. 1984; Mechnikova & Kudryavtsev 2005; Shtro & Sokolov 2006). Clutches consisting of one to two eggs are rare – 4,3% and 6,5% nests respectively. The number of nestlings on average was $2,69 \pm 0,15SE$ (from 42 nests of our and published data: Dunaeva & Kutcheruk 1941; Osmolovskaya 1948; Dobrinsky 1965; Danilov et al. 1984; Bakmutov et al. 1985; Metchnikova & Kudryavtsev 2005). Fledglings take wing usually in the second part of August (Dunaeva & Kucheruk 1941; Osmolovskaya 1948) and in later nests in the final week. A brood of two fledglings was seen with a pair of adults on the bank of the Peunto lake (69°45'N) on the 23rd August 1986. A nest containing one chick four to five weeks old was found on the Sabyaha river on the 22nd of August in 1981 – older fledglings (siblings) may have left the nest earlier. At the same time in earlier nests, as at the Heto lake in 1990, the oldest young could fly

short distances by the 28th-29th of July (Paskhalnyi et al. 2000). Zhitkov (1912) on Tir-sede hill found a nest on the 6th August 1908 where two out of four fledglings had already begun to make short flights.



Figure 6. First nestling hatched

Breeding success

A comparison of the number of nestlings against clutch size reveals a breeding success at the hatching stage of 77%. The real breeding success could be lower, as downfallen nests are not counted, as well as eggs from small clutches. In 42 nests with nestlings five eggs were found unhatched (3,4% of the number of laid eggs). The death of nestlings may happen more often during cold and wet years as was the case at the Erkutayaha river in 2002 (Sokolov et al. 2002). The loss of nestlings often has a local character and occurs more often in the seaboard areas of the Kara Sea. Predation by arctic foxes, dogs and Rough-legged Buzzards *Buteo lagopus* is excluded, i. e. parents actively defend their nests and chicks. It was observed on more than one occasion foxes scampering as soon as they heard the alarm call of a Peregrine. Once a large dog (dratkhaar), heretofore did not having contacts with Peregrines, rushed to its master's legs as the Peregrine began to bother and demonstrate an attack.

Postnesting nomadizm and autumn migration

There is information that reveals that juvenile Peregrines stay within their parent's territory for 1-2 weeks after fledging (Osmolovskaya 1948; Danilov et al. 1984). Evidently some birds begin moving away earlier. Five single nomadic birds were met along 30-40 km of the western coast of the Baidaratskaya Guba on the 25th-28th of August in 1997.

Autumn migration is in September – early October (Kalyakin 1977; Danilov et al. 1984). We observed single birds near Yarsale between the 10th and 15th September 1974. Solitary individuals perhaps stay in winter, for example there is a report about the shooting of a Peregrine at the Tchuchya river in February 1975 (Kalyakin 1977).

Feeding

The diet of the Peregrine as a predator is characterised by two main features: the availability of prey and the size of prey species. In the regions where Peregrines live the prey size is comparatively small (Osmolovskaya 1948; Danilov et al. 1984; our observations). In majority of places the main important prey items are waders and in some years and seasons (spring, autumn) Willow Grouse *Lagopus lagopus* can make up a considerable proportion of the falcon's diet. Peregrines also eat lemmings when they are numerous (up to 42% of the diet according to Osmolovskaya 1948). Sometimes pairs may specialize on catching one particular prey species. For example, in one nest on the Tanlovayaha river (tributary of the Schyuchya) in 2005 the wings of six Long-tailed Skuas *Stercorarius longicaudatus* and two dead birds were found (Mechnikova & Kudryavtsev 2005).

Peregrines also feed on species that are not usually found amongst the common potential prey species in the region. These may be rare birds, species which casually fly into region or individuals which have a specific behavior. For instance, on the Yuribey and the Sabyaha rivers, 3 out of 16 bird remains found near a falcon's nest belonged to the Teal *Anas crecca* – a rare species at this latitude. Many authors (Osmolovskaya 1948; Galushin et al. 1963; Danilov et al. 1984) recorded Great Spotted Woodpeckers *Dendrocopos major* in the falcon's diet, which flew into the tundra habitat from the taiga zone. At the Hadytayaha river a female Peregrine brought the hind quarters of a middle-sized young hare to her nestlings (Mechnikova & Kudryavtsev 2005).

In 1984 at the source of the Seyaha-Mutnaya we observed a Peregrine take a White-fronted Goose *Anser albifrons* gosling (the size of a Teal) from the water within 50 m of a boat. It just managed to carry it off to the bank of the river. This example shows how the Peregrine may sometimes make itself conspicuous by a combination several peculiarities occurring all at once of the hunting of this species that may not often occur – it was in the presence of people, near its nest and capturing a bird that wasn't also in

flight. The general suggestion that Peregrines do not hunt near the nest is incorrect. There are observations of a Peregrine catching a male Blue-throat *Luscinia svecica* just under the vicinity of the nest (Danilov et al. 1984). We also observed as a falcon that took wing from the nest and swooped down to catch Red-breasted Goose *Branta ruficolis* gosling from the water.



Figure 7. Perennial Peregrine nest is easy accessible and difficult to notice

Human impact

The Peregrine is rather tolerant to human presence if there is no presence of persecution. There was a case when a pair of Peregrines made the nest on a ridge of bluff at 2 m from a path and they did not reveal themselves while people came close to nestlings (Morozov 1983). During the development of the Bovanenkovo gas-field in 1988-90, worker's houses were close to a Peregrine's nest which was sited at 100 m of the bluff. Near the nest people appeared and cross-country vehicles, helicopters flew, motorboats passed along the river. Nevertheless birds annually raised young - unfortunately the nestlings perished because they fell down the bluff when disturbed. We found a nest with four nestlings at the same place when we visited this locality in 1997. In 2005 and 2006 the pair successfully nested at 200 m on the neighbouring bluff.

In many cases Peregrines that have been disturbed moved to a more secure place at a greater distance away while staying in the limits of their nesting territory. So, on one steep slope in the lower part of the Yuribey river birds nested in five consecutive years from 1981 onwards. In 1986 near this place arose a small field camp of railway prospectors, and birds shifted away by 2 km where they made the nest on the lake bank. After four years they re-appeared back at the old river steep. In another case we observed how a female Peregrine was flushed from the nest when a man was 2-3 m from her. This was unexpected for the Peregrine. After this accident birds avoided the bluff and during the following four years nested 1 km away on a high spring bank. Unfortunately there are incidents of the direct killing of Peregrines and the intentional destroying of nests.

In localities intensively visited by people, a poacher appeared who shot a bird for fun or "for dummy" as it was near the Obskaya – Bovanenkovo railway at the Enzoryaha and the Erkutayaha rivers. After this, Peregrines have not nested. The effect is greatest in areas where there is a small density of Peregrines.

In the last few years the stealing of nestlings was related to their illegal sale for falconry. The legal system promotes poaching, i. e. Russian legislation does not provide serious penalties on people for such actions. It is perhaps because of a shooting and the destruction of a nest that the number of Peregrines has fallen the southern area where there is most easy access – in vicinities of the Labytnangi town, at the Tchuchya and the Hadytayaha rivers.

On the Yamal one of the possible and specific reasons for Peregrine nest destruction is the grazing by reindeer. This region is experiencing the biggest constantly increasing population of these animals in the world. On the seashore near the mouth of the Yundyyaha river (70°30'N) on the 7th July 2006 a Peregrine nest was found with the presence of numerous traces recent reindeer tracks. In the nest was a broken egg; birds demonstrated very weak anxiety. The male disappeared completely when observers were at a distance 300 m from the nest (Shtro & Sokolov 2006).

General estimation of population status

In the last 30-40 years, the southern border of the breeding distribution of Peregrines in the Yamal and Lower Ob region has shifted to the north by 55-75 km. Now the area of regular nesting of the species is northerly 67°25'N. It is most dense in shrubby (south subarctic) tundra between 68° and 69°N, exactly in basins of the Yuribey (middle part), the Kheyaha and the Nurmayaha rivers. There are 5-13 pairs here/100 km of river valleys, on average 7,9. At other territories in the Peninsula (in forest tundra, typical and arctic tundras) the density is similar – it varies between 0,7-5,4 pairs/100 km of river valleys, on average 2,2 pairs/100 km.

The Yamal Peregrine population is probably in quite good condition. The total size of the population in the nesting season is estimated to be ca. 625-800 individuals and 300-385 breeding pairs.

The most important human threats in the region are now the direct elimination of Peregrines and the destruction of nests as a result of the stealing of nestling's for sale. The level of influence and protection is not large but it mostly apparent on accessible regions near settlements and arterial roads.

There is a large possibility that this will increase as more Peregrine pairs appear to breed. Concerns by people have aroused an increase in the protection in the main areas of the species' habitation – in basins of the Yuribey, the Nurmayah, the Erkutayaha and the Heyaha rivers.

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