

Saker Falcon (*Falco cherrug*) in Russia.

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The Saker (*Falco cherrug*) is one of the most endangered falcon species in North Eurasia. In the past three decades its range and numbers have been declining at an alarming rate. The species is a typical representative of arid zone ecosystems and in Russia it occurs at the extremes of its range.

In this paper we review the recent state of the Saker in the central part of Southern Russia (between the Volga and the Yenisey Rivers).

Methods

The region under question occupies the southeast of the Russian plain (all of Zavolzhye, places eastwards from the Volga, and all of the southern Urals), the southern area of western Siberia, and the mountains of southern Siberia (Altay – Sayan Region). The total area of steppe and forest-steppe biome suitable for Sakers to breed covers 1,084,035 km² (Figure 1). This territory was surveyed by the authors in 1994–2003. The total size of the expedition surveys within the areas of possible breeding was 72,721 km². Breeding territories of Sakers were found mostly during surveys of open habitats using cars, but some were located during foot surveys. The search pattern was based on known and recorded hunting birds, and a search for nesting structures in suitable breeding habitats.

Nesting territories are understood in this paper to be places occupied by Sakers with either an active or non-active nest; with fledglings; or with adults that have been recorded giving alarm calls or showing aggressive behaviour towards humans or other raptors. A territory was considered as 'possibly occupied' if adult birds were recorded delivering food several times in one area.

There were several study areas established in the region; all of which were thoroughly surveyed for the presence of all raptor species, with exceptional attention being paid to the Saker. All nest sites were mapped using Arcview GIS 3.2a software (ESRI, Redlands, California, USA) from which we calculated the overall numbers (Karyakin 1996, 2000). On the basis of the mapped nests within the study areas, we modelled typical nesting habitats using satellite imagery (Resurs-MSU-E, Landat7) and vectorised topomaps (1:200,000) and plotted nest-worthy Saker habitats within the region in question. The numbers were then extrapolated using the densities observed within the surveyed study areas.

Historic records of the Saker

The most northerly-located nests sites in Russia were reported in the past in the sub-taiga regions of the Krasnoyarsk District (c. 56°N). Breeding Sakers (with 4 chicks) were reported: close to Krasnoyarsk (Kim 1988); along the Bazaikha river, a tributary of the Yenisey near Divnogorsk within the area of Krasnoyarsk Water Reservoir (Yudin 1952, Polushkin 1988); at the Karaulnaya (a tributary of the Yenisey); on Otdykha Island on the Yenisey close to Krasnoyarsk (in 1976); and finally, close to Dononovo village, 50 km north of Krasnoyarsk (Baranov 1998). In the Krasnoyarsk environs in 1980 the density of Sakers was reported as being 1–2 pairs per 100 km of the survey area; in the Kizir-Tuba (Kuraginskiy region) density was 4–5 pairs per 100; in the Usinskaya depression 2–3 pairs per 100 km; and in the Sharipov region (close to the Bolshoye Lake) 1–2 pairs per 100 km of the survey area (Baranov 1988).

At the beginning of the 20th Century Sakers were recorded at Balkatiskoe village, Achinsk region; at Altayskaya village in the Khakassia steppes; at Salbat Lake, at the Minusinsk depression; and at Bozhye Lake (Sushkin 1914). In the second half of the 20th century they were recorded in the Minusinsk depression, in the foothills of the Eastern Sayan, and in particular, in the territory of the Sayano-Shushenkiy Nature Reserve (Sokolov et al. 1983). In the 1990s Saker breeding within the Reserve was reported as follows: on a 55 km stretch of the Yenisey river, down-

Figure 1 Black lines - Borders of Districts of the Russian Federation. 1- Northern border of the Saker range in Russia. 2 - Historic range of the Saker. 3 - Recent range of the saker. Numbers of the districts are the same as in Table 1.



stream from the Uzunsuk (5 nests); along tributaries of the Yenisey, Ubun and Bolshaya, and Malaya Ura rivers; 2 nest sites were also known on the Khemchik estuary (Stakheev at al. 1999).

The main breeding region of the species north of the western Sayan is at the Minusinsk depression, where in the 1970s the Saker was common at the Maliy Kyzikul lake, and on the Tayezhnyi Research Station (Batenevkiy ridge). In the forest-steppes of the western bank of the Yenisey its density reached 5-7 pairs per 100 km² of forests (or 2-3 pairs per 100 km²) of the total area. On the eastern bank of the Yenisey the density was less than 1 bird per 100 km of survey area, or 0.5 pairs per 100 km² of forests (Kustov 1980, 1981, 1982). Prokofiev (1987, 1993) observed Sakers in at least 15 sites in the Khakassia, including the sub-tundra zone of the western Sayan, however the majority of the sites were in the Minusinsk depression.

On the eastern bank of the Yenisey within the Minusinsk depression Saker nests were found in the Shuskenskoe Pine grove in the environs of the former Migninskoe Water Reservoir in the Ermakov region. A pair were recorded near Siniy Kamen' village. Single individuals were reported from Vozneseka village, in the Kobezh river valley, and at the Philaretikha site near Semennikov village (Baranov 1998). In the under-taiga belt Saker nests were found in 1988 at Oykh mountain near Kuragino village, near Pokrovka village at the Kyzir river valley, 7 km downstream from the Kyzir river estuary along the Kazyra river (Kartauz region), and along the Tuba river 10 km downstream from the Kuragino village (Baranov 1988). Single individuals were reported on 3 July 1989 on the eastern bank of the Yenisey river 5 km from the river Kan confluence, and at the rivers Kyzir and Tuba (on islands Taskin, Efer'ev and Kolmakovskiy) on 25 and 26 August 1994 (Valukh 1996).

Sakers were also reported in the Usinskaya depression close to the Aradan town, and in the Kurtusibinsk Mountain Range.

In the western Tuva the Saker is a common breeder in the steppe belt of the mountains (Sushkin 1938). Nests were found in proximity of Torgalyg, Ovuyrskiy region, in the valleys of the Moron and Naryn rivers, and along the southern slopes of the Khorumung-Taiga, near Khadyn Lake (Yanushevich 1952). Between the 1970s and the 1990s breeding was reported on the slopes of the Mongun-Taiga, Tsagan-Shibetu, on the western Tannu-Ola mountain ridges, and on the southern slopes of the Ukok Ridge in the valleys of Ezhimand Demir Sug rivers. Sakers were also seen at the Khemchik river on 7 July and 11 August 1977 and in the basin of the Chazydyr on the northern slopes of the western Tannu-Ola in July 1984. A pair of young was also seen on 9 August 1975 in the alpine belt of the eastern Tannu-Ola ridge at the sources of the Teregtig-Khem river (Baranov 1991).

In the Altay Republic the Saker was most often recorded in the south-eastern Altay mountains, where in 1992 its density reached 12.3 pairs per 100 km². Lower densities occurred in central Altay, and was even less numerous in northern, north-western and north-eastern Altay. The total numbers of Sakers within the Altay Republic was estimated at several hundred pairs (Chupin and Irisova 1996). In the south-eastern Altay the Saker breeds on the Saylugem



Figure 2. Traveling in search of Sakers is sometimes difficult.

mountain ridge where on numerous occasions it was reported at the sources of Chagan-Burgazy, along the Tarkatt and Ulandgryk rivers, and at the Tashanta pass (Sushkin 1938, Stakheev et al. 1985, Loskot 1986, Malkov 1987, Irisova and Irisov 1990). In the Southern-Chuya Range the falcon was regularly sighted on the Chagan-Uzun river and its basin, and along the Irbistu river, in the Kok-Ozek and Elangash valleys, and along the Dzhazator river (Sushkin 1938, Orlova and Ilyashenko 1978, Irisova et al. 1988, Irisova and Irisov 1990). On the Ukok plateau the Saker was recorded along the rivers Kalguta, Ak-Kol, and at the Kaldyan-Kol lake (Sushkin 1938, Irisov and Irisova 1982). There were records from the Chikhacheva and Kuray mountain ranges, at the Dzulukol depression, (Irisov and Irisova 1982, Stakheev et al. 1982, 1985, Maleshin 1987). In the central Altay the Saker was found on the Ulagan Plateau, at the Zhunmaly and Dzasator rivers, in the Katun' river valley, in the Onguday environs, and on the slopes of the Kuray depression (Sushkin 1938, Irisov, Stakheev 1976, Malkov 1979, Livanov et al. 1990). In the Katun' river valley in 1977 the reported density between Inya and Elanda villages was 1 Saker per 100 km of river bank, and between the Inya river and the Kadrin estuary as 1 individual per 100 km² (Malkov and Malkov 1980). In 1988 in the Katun' river valley between Kuyus and Edigan the Saker was reported at a density of 14 individuals per 100 km² and in 1989 between Ingen' and Kupchegen' villages at 9 individuals per 100 km² (Livanov et al. 1990). In the Teregtinskiy mountain range



Figure 3. Tree nesting is characteristic for the North-Western part of the range.

Table 1. Numbers of Sakers in administrative districts of Russia.

¹	Region	Area, km ²	Known breeding territories	Estimated numbers (pairs)	Density (pairs per 1000 km ²)	Trend
1	Saratov District	101258	0	5 (0-10)	0.5	-2
2	Samara District	53579	2	4 (0-6)	0.7	-2
3	Republic of Tatarstan	48056	0	1 (0-2)	0.2	-2
4	Orenburg District	124606	12	26 (20-31)	2.1	-1
5	Bashkortostan Republic	74764	8	10	1.3	1
6	Chelyabinsk District	66015	7	20 (18-22)	3	1
7	Kurgan District	71692	7	65 (56-75)	9.1	0
8	Tumen' District	28064	0	4 (3-5)	1.4	0
9	Omsk District	34616	0	11 (5-16)	3.2	0
10	Novosibirsk District	21706	0	2 (1-3)	0.9	0
11	Altay Krai	140128	38	111 (99-140)	7.9	0
12	Kemerovo District	6928	0	6 (3-9)	8.7	-1
13	Altay Republic	76289	34	465 (310-610)	61	-1
14	Khakassia Republic	44291	21	190 (180-200)	42.9	-1
15	Krasnoyarsk Kray	65201	12	56 (40-70)	8.6	-1
16	Tuva Republic	126841	230	1130 (1070-1216)	89.1	-1
	Total	1084035	371	2106 (1815-2425)	19.4	-1

the Saker was breeding along the Ursul river, at the Seminchkiy range and was noted close to Shebalino village (Kuchin 1976). In the Altay Nature Reserve the Saker was reported at the Kayru river, at the sources of Chulchi river, in the Abakan Range at the sources of Erinat river and at the Shavla river near the sources of Kalbak-Kai creek (Folitarek, Dementiev 1938, Stakheev et al. 1982, Irisova and Irisov 1990). In the northern Altay the Saker was observed at the beginning of the 20th Century between Anos and Miyuta villages (Ruzskiy 1915), however by the end of the 20th Century it was no longer in evidence (Tsibulin 1999). A.P. Kuchin (1976) considered the Saker as a rare species of the central and south-eastern Altay, but noted that the species was more common at the sources of the Ob river, especially at the Biya-Chumish highlands (now a territory of the Altay Kray). In 1965-72 he observed 6 nests in a pine grove near Biysk town, between the Biya and Katun' rivers, at the Subenka and Ursul rivers, and at Elo village.

In the Altay Kray (not be mistaken with the Altay Republic) the majority of Saker sightings during the breeding season were reported from the forest patches and pine forest strips of the Kulunda steppe and the Ob plateau (Petrov et al. 1992, Plotnikov 1992, Kuchin and Kuchina 1995, Petrov 1995, Petrov and Irisov 1995). However some reports from the Altay foothills (Malkov 1998). V. N. Plotnikov (Malkov 1998) expressed the opinion that in the 1990s the total number of Sakers in the Altay Kray was 300 individuals (including 70 breeding pairs). In the Kurgan District the Saker was always considered at the limit of its range, and up to now there were no confirmed breeding observations in this region, although it is considered that it has spread up to the Sverdlovsk and Tumen' regions (Sabaneev 1874, Larionov 1926). On 19 June 2002 a pair of non-breeding Sakers was observed at Gorkoe lake (Ryabitsev et al. 2002) – this is the only published record of

a Saker in the Kurgan District. T.K. Blinova and V.N. Blinov (1997) observed a single Saker in the Tobol valley at Vedenyatsoye Lake, Tumen' District on 22 July 1982, i.e. after the breeding season. This latter observation is the northern-most record of the Saker. Yu. S. Ravkin and co-authors (1988) stated that the numbers of Sakers in the Western-Siberian Plane at the end of 1980s was 1000 individuals.

According to researchers of 19-20th Centuries, the Saker in the Volga-Ural Region was not rare on steppe and forest-steppes with a maximum density on the forest-steppes of the pre-Volga highlands, the High Volga (Na Gorakh) and the southern Urals (Eversmann 1866, Bogdanov 1871, Ruzskiy 1893, Zarudniy 1888, Sushkin 1897, Karamsin 1901, Zhitkov and Buturlin 1906, Kirikov 1952). It appears that the most significant enclave of breeding Sakers was within the territory of the Upper Zavolzhye, where, according to Karamzin (1901) the Saker was at a breeding density of 3-4 pairs per 100 desyatin (=1.09252 km²). The north edge of the range is limited by the Alaty river, the Kama confluence with the Volga, and the Belaya river in the Urals (Grigoriev et al. 1977). However in the beginning of 1980s it was not found to be breeding in Bashkiria or Tataria (Gorshkov et al. 1983, Ilichev and Fomin 1988), and only a few pairs were found in the Orenburg District (Davygora 1988).

Geography of breeding and numbers

As for the year 2003, we have located 371 Saker breeding territories in the region under review. In addition we know of 1 breeding territory in the Burtinskaya Steppe of the Orenburg Nature Reserve (Chibilev et al. 1996), 3 breeding territories at the south of the Saratov District (Zavialov and Ruban 2001), and 5 breeding territories in the Sayano-Shushenskiy Nature Reserve (Stakheev et al. 1999).

Thus for the last decade in a territory of 1,084,035 km² a total of 380 breeding territories have been located.

The most significant enclaves of breeding Sakers in Russia are in the Ubsu-nuur and Tuva depressions, as well as in the Altay Mountains. In 2 monitored areas of the Ubsu-nuur depression totalling 9639 km² (eastern bank of Tes-Khem 5117 km² and southern slope of Tannu-Ola – 4523 km²) we recorded 93 breeding territories. The density here reaches 2.1 pairs per 100 km². This data is representative for the whole of south Tuva and the adjoining Mongolian Territory.

In the Tuva Depression in a monitored study area of 6484 km² we found 20 breeding territories, which gives a density of 0.3 pairs per 100 km². The Saker breeds here on cliffs in un-forested habitat.

In the eastern and western Tuva, as well as in the south-eastern Altay, the Saker breeds in the alpine belt of the mountains. In the study area at the border between Tuva and Altay (3564 km²), we found 15 breeding territories, which give 0.4 pairs per 100 km². In all steppe depressions in the Altay the Saker breeds only at the edges of the depressions, which is very different from the habitat choice in the Tuva. It is possible that this latter distribution is as a result of selective pressure by falcon thieves targeting the most exposed nests. In the study area on the Chuya steppe (4190 km²) we found 18 breeding territories (0.4 pairs/100 km²). This is the largest breeding concentration in the Altay. In the period 1999 to 2002 the occupancy of the territories in this area declined – of 146 territories at least 17 (11.6%) were not occupied. The survey data led us to recalculate the numbers of Saker in the Tuva (126,841 km²) and Altay (76289 km²) for 2003. The Tuva now holds 1070-1220 pairs with 310-610 pairs in the Altay.

North of the Sayan a high density is observed in the Minusinsk depression, with the majority breeding in Khakassia. In Khakassia the core population (16 pairs) breeds in the north of the Minusinsk depression at the edges of the low mountains of the Kuznetskiy Alatau (5923 km²) making up a density of 0.3 pairs per 100 km².

In the central part of the Minusinsk depression the Saker is absent; again falcon thieves are to be blamed, and the species appears only at locations most distant from big towns such as Abakan and Minusinsk.

Our data suggests that in Khakassia (44291 km²) and in the forest-steppe zone of the Krasnoyarsk Kray (65201 km²) there are 180-200 and 40-70 pairs of Sakers respectively.

It is also possible that up to 9 pairs of Sakers breed in the forest-steppes of the north-east of the Kemerovo District (6928 km²) as the habitats there look like the ones in the adjoining areas of the Krasnoyarsk Kray. It is also possible that Sakers breed in the Kuznetsk depression, however this territory has never been surveyed, and there is no data in this decade's literature about Sakers in this area. All that is known is that there was a catastrophic decline of Sauslis (*Citellus sp.*) (Skalon and Gagina 2004), which were the main quarry in the Saker's diet there (Khakhlov 1937).

In the western Altay (the territory of the Altay Kray) the Kolyvan mountain range is at the limit of the Saker's breeding range. Here we found 6 pairs in 2003; five

of which were breeding in one study area (165.2 km²). The nest-worthy territory here is 1449 km². Based in these figures we can estimate the number of Sakers in the Western Altay as 33-44 pairs. This is the western-most border of the Altay-Sayan population.

It is possible that some Sakers are breeding in the Biya-Chumish highlands and in the southern foothills of the Salair range; however there has been no data from there since the 1970s. In addition this territory also experienced a Sauslik decline. The most optimistic estimate for this place is no more than 7-10 pairs.

The total numbers of the Altay-Sayan population thus totals 1636-2149 pairs, with 1885 pairs as a midpoint.

In western Siberia the Saker breeds almost exclusively in pine forests surrounded by steppes. In the Altay Kray we located 32 Saker breeding territories. Almost all territories were located at the edges of pine-forest strips. In 1283 km of the forest edges we found 31 of the mentioned breeding pairs. Thus one breeding pair is located on every 41.4 km portion of the forest edge line. The Saker showed a significant association with long matured forests: the nests were much denser (one every 11 km) in mature pine woods (>80 years old), especially if there was unploughed steppe close-by. The total perimeter length of the pine-forest strips is 2417 km, of which 939 km is the perimeter of the mature forest and 437.5 km is the perimeter of mature forest bordering unploughed steppes. Extrapolation of the measured density using the length of borders of the pine-forest strips gives a figure of 58-85 pairs of Sakers. Thus the total figure for the Altay Kray is 99-140 pairs of Sakers or 111 as a median. The forest strips also extend into the Novosibirsk district, where it is possible that 1-3 pairs of Sakers breed.

In the Kurgan District the Saker breeds, as in the Altay Kray, in steppe pine forest patches, which are concentrated along the Tobol river terraces and its main tributaries. The majority of Sakers breed in the southern part of the district. The density of Sakers in the Tobol terrace is 1.6 pairs per 100 km² of forest. We found 7 breeding territories, which were equally distributed in a study area of 2462.3 km². The area of forest in the study area was 425.3 km². The area of the pine-forest patches in the District is 4062.5 km², which gives the estimated density of Sakers here to be 56-75 pairs or 65 pairs as median.

Between the Kurgan District and the Altay Kray the steppe forest patches are distributed along a small area along the terraces of the Tobol, Ishym and Irtysh rivers, all within the Tumen' and Omsk Districts. In the territories of these districts it is possible that there are 8-21 Saker pairs (a median of 15).

The Chelyabinsk District is the western-most border of the western Siberian Saker population. There is one nesting enclave at the Ural-Tobol watershed (9 pairs, 6 of which are breeding in the Chelyabinsk District). One pair is known to breed on cliffs of the Ural river in the Orenburg District. The density of Sakers in the Chelyabinsk district is very low, we estimate the total numbers as 18-22 (20 median) pairs.

A small breeding enclave consisting of 6 nesting territories is located in the eastern slope of the southern Urals. Here the Sakers breed on cliffs. Despite the widespread presence of the Imperial eagle (we know of 148 nests

of the Imperials), none of the Sakers occupy Imperial Eagle nests (in contrast to the north-eastern Saker populations).

A fairly large breeding enclave is located in the Guberlinskiy hillocks, however only part of these hillocks is located in the Orenburg District, the rest being in Kazakhstan. In the Orenburg part of the hillocks we know of 6 breeding territories.

The numbers of Sakers in the Guberlinskiy hillocks and South-Urals (Bashkiria and Orenburg District) is 15-35 pairs.

We estimate the total number of Sakers in western Siberia to be 150-220 pairs (180 median), including a few pairs in the Bashkiria and Orenburg Districts.

Between the Ural mountains and the Volga river the Saker is scarce. Constant breeding territories are known only in the Syrt highlands bordering the Urals. In the Zavolzhye for 1998-2002 we know of 5 breeding territories. In the forest-steppes of the Upper Zavolzhye we know 2 pairs of Sakers, both bred in the Orenburg district. One pair was breeding for 2 years in a raven's nest on top of a concrete electricity pylon and then disappeared; the second pair bred for one season in a common buzzard's nest at the edge of a pine-forest patch on a river terrace. In the steppes of the Zavolzhye we found 3 Saker breeding territories: one was located in the Ural river valley in the Orenburg District (for one season), two others were in the Siniy Syrt of the Samara District (both unsuccessful). It appears that there is no area in the European part of Russia with regular Saker breeding; however some stray pairs breed in various places. The total number of Sakers between the Volga and the Urals does not exceed 25 pairs. In the areas west from the Volga river breeding is unlikely, as in the past year there were no sightings of this species in the last known breeding locations in the Don basin or in areas westwards from the Volga (Antonchikov and Piskunov 2003, Galushin et al. 2001).

The total number of Sakers in the area under question is 1815-2425 pairs (Table 1).

Isolated enclaves of Sakers are found in the steppes near Baikal Lake. In these areas there are 300-500 pairs (Ryabtsev 1984, 1995, 1997, 1998, Goroshko et al. 2000). With these numbers it is possible to estimate the total current population of Sakers in Russia as being 2115-2925 breeding pairs.

Depending on food availability and weather conditions only 56-95 % of pairs breed in any particular year, and only 24-76% are successful. In the Altay-Sayan region we observed significantly less successful pairs than in western Siberia and the Urals (Table 2). This is, perhaps, caused by the more severe conditions and higher poaching rates. Across all of Russia only 41% of breeding attempts are suc-

cessful (Karyakin 2003). As a result it is possible to conclude that the core of the Russian Saker population consists of 860-1200 successful pairs.

In general there is a negative trend in the number of Sakers across Russia. Nevertheless, in contrast to the almost-disappeared population of the European part of Russia and the declining eastern population, the number of Sakers in the Urals and western Siberia is more or less stable. In some enclaves numbers are even growing (Urals proper and regions adjoining the Urals from the east). Despite the stability in this part of the range (c. 11% of the total numbers in Russia) the overall trend is negative (Table 1).

Nesting habitats and breeding rate

In the Altay-Sayan region most Sakers breed on cliffs, regardless of whether or not forest is present in the immediate vicinity. The Sakers in this region opt for crags or pinnacles. They occupy the nests of upland buzzard, raven, and to a lesser extent, other species. In the southern Urals the Saker also prefers cliffs, and raven nests dominate the list of nest-providers. In the western Siberian and European part of Russia Sakers nest almost exclusively in trees, mostly pines (with Imperial Eagles as the main nest provider) (Table 3).

In the Altay-Sayan region the clutch size was 2.7 ± 0.42 (average \pm SD), range 1-5 (N=15). The brood size in successful nests was 2.5 ± 0.09 , range 1-5, N=139.

In western Siberia the only known clutch had 3 eggs, however, the average clutch size has to be higher, as brood sizes of 4 dominate in the sample. The average brood size in this region was 2.9 ± 0.18 , range 1-4, N=17.

In the Volga-Ural region the only known clutch contained 4 eggs. It also looks as if the majority of clutches contained 4 eggs, as judged from the brood size. The latter in this region was 2.9 ± 0.88 , range 1-4, N=24. Brood size observed after fledging was 2.8 ± 0.80 , range 1-4, N=13.

Egg sizes were $53.1-58.6 \times 40.9-44.5$ mm, average $55.9 \pm 0.56 \times 42.8 \pm 0.19$ (N=22).

Discussion

The data from the literature, as well as data from the surveys mentioned in this study suggest that the numbers of Sakers east from the Urals are stable if somewhat declining, whereas the population in the European part of Russia has ceased to exist. Here we hypothesise on the causes of the rapid decline in the European part of Russia.

The data from the literature given in the review at the beginning of the paper, as well as that given by Bragin (2001), are displayed in the map shown in Figure 6. It is possible to suggest that at the beginning of 20th Century there were the following large enclaves of Sakers: between the

Table 2. Occupancy of Saker nests as seen in surveys.

Year	Territories checked		Occupancy	Number of successful		Successful nests per visited territory	Successful nests of occupied territories	Chicks per successful pair
	Total	Occupied		total	Visited twice			
1999	98	53	54.08	52	3	53.06	98.11	2.25+0.08 (n=51) (1-3)
2000	83	20	24.1	20	1	24.1	100	2.38+0.12 (n=13) (1-3)
2001	61	31	50.82	29	12	47.54	93.55	2.44+0.28 (n=25) (1-4)
2002	102	46	45.1	45	19	44.12	97.83	3.00+0.28 (n=37) (1-5)
2003	77	46	59.74	20	2	25.97	43.48	2.69+0.30 (n=37) (1-4)
Total	421	196	46.56	166	37	39.43	84.69	2.54+0.09 (n=139) (1-5)

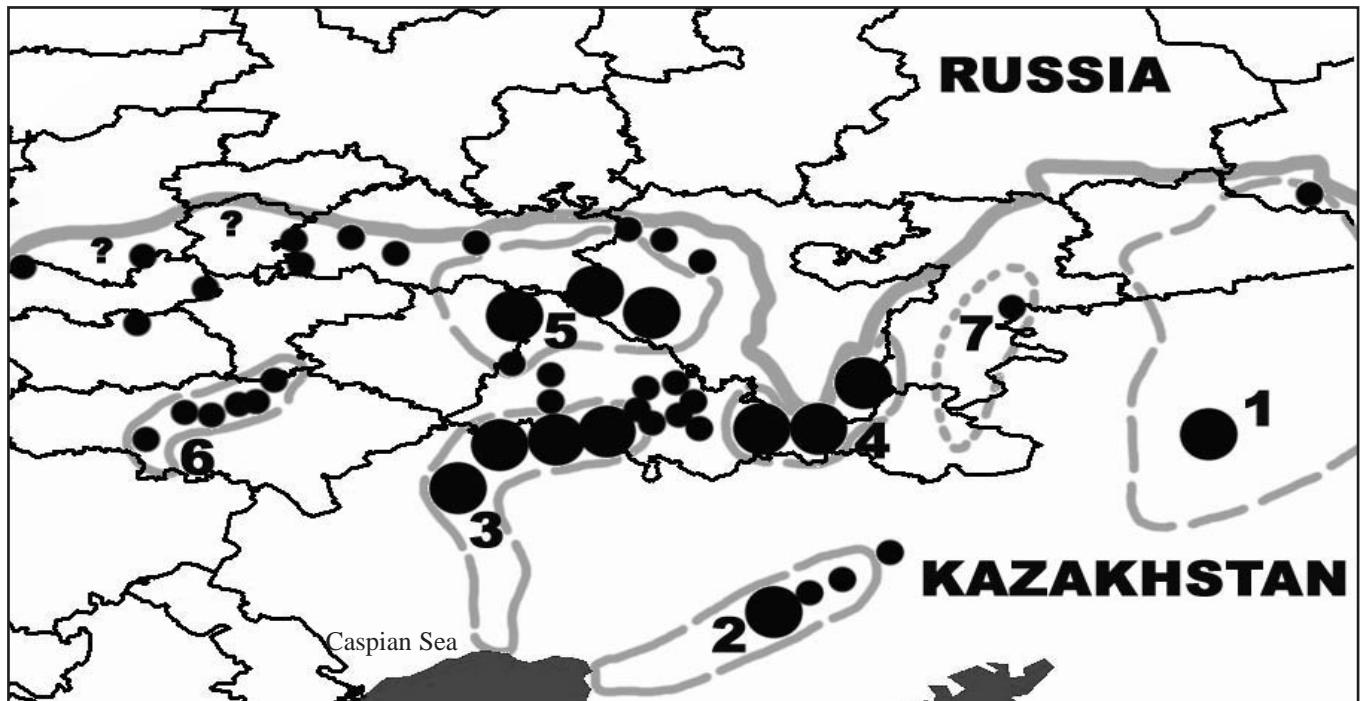


Figure 4. Historical range of the Saker in European part of Russia. Enclaves are marked with numbers and discussed in the text.

Tobol- Ishym rivers (1, Figure 4); at the forest strips along the Emba and Ural rivers (2 and 3, Figure 4); the southern tip of Urals (4, Figure 4); and in the eastern (5, Figure 4) and western (6, Figure 4) Volga Highlands. During the catastrophic decline of the Saker in the 1970s all populations, except that in Tobol-Ishym, ceased to exist. The mentioned areas contained scarce breeding pairs here and there, numbers of which declined steadily up to 1990s.

The Saker population crash coincided with widespread peregrine-DDT contamination well documented elsewhere (e.g. Cade et al. 1988, Ratcliffe 1990), a massive development of pristine steppe, and a sharp decline in quarry species (such as Sousliks), which were severely controlled on arable lands. In contrast to the peregrines, the Saker has not been able to recover because its most productive areas happened to be those under intensive agricultural pressure at the time, and there were no refuges, in which to let the species survive, except those of the Tobol-Ishym region and Mugodzhary (Kazakhstan). It is the latter regions that acted as source populations in the later years. However the slow recovery has been confounded by an intensive wild take by bird traffickers. Slow re-colonisation does take place in the southern Urals and regions east from Urals. In particular we found 2 new nests in Bashkiria at the southern tip of the Urals in 1999 (Karyakin et al. 2001). There were no Sakers recorded here, but the area was densely populated by peregrines. The appearance of the bigger Sakers led some of the peregrines to shift their territories. In 2000-2001 there were two more new nests and three new territories recorded in Chelyabinsk district. The first new pair appeared in 2000 at the Irklinsk Water reservoir of the Orenburg District. In 2002 the Saker was reported in the Chelyabinsk District in two new locations. In 2003 successful breeding was reported in one of the new territories, and a new territory found.

Nevertheless, despite some positive trends, there are also negative trends. It looks as if the Saker has disappeared from the bird list of the Saratov District

(Antonchikov and Piskunov 2003), with some of the breeding territories in the Eastern Volga Uplands having ceased to exist.

It appears that the area of regular Saker breeding is limited by the Ural mountains and the Ural river valley.

There is one feature that unites the recent distribution of Sakers in northern Eurasia: all stable populations are located within the ranges of small and medium size rodents and lagomorphs of the steppes such as Little Souslik group (Daurian Sousliks (*Spermophilus S. dauricus*)), Daurian Pika (*Ochotona daurica*), Steppe Lemming (*Lagurus lagurus*) and Brandt's vole (*Microtus brandti*). The northern limits of these species' ranges predetermine the northern limits of the Saker populations. The Saker populations which ceased to exist or which severely declined were those located within the ranges of other species of medium-size rodents – a group of so-called Large Sousliks (Speckled Souslik *S. suslicus*, Russet Souslik *S. major* and Red-cheeked Souslik *S. erythrogenys*). At the moment the numbers of these Sousliks is more or less stable, and which sustains the populations of the Imperial Eagle in the Volga and

Figure 5. Souslik -the basis of Saker diet in northern and eastern parts of the range



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Year	Number of nests	Substrates					Nest provider							
		Cliff	Tree	Electric line	Other	Flat ground	<i>Buteo lagopus, B. rufinus</i>	Raven	Golden Eagle	Imperial Eagle	Kite, Buzzard	Others	Not identified	Scrape
Altay-Sayan														
1999	88	88					81	4	1		1	1		
2000	72	66	6				42	20	1	2	4	2		1
2001	51	38		13			35	10	1		1	1	3	
2002	52	39	3	7	2	1	38	7			1	3	3	
2003	23	21	1	1			16	5	1					1
1999- 2003	286	252	10	21	2	1	212	46	4	2	7	7	6	2
Western Sibeira														
2000- 2003	38	1	37					1	1	32	2	2		
Southern Urals														
1994- 2003	12	8	4				6	6						
Eastern Volga and Western Urals														
1998- 2000	4		3	1				1		1	1			
Total for Russia														
1994- 2003	340	261	54	22	2	1	218	54	5	35	10	9	6	2

Table 3. Substrates of Saker nests in Russia and the original builders of nests.

Ural regions, however the Saker is almost non-existent here. This is rather mysterious. It is possible though, that these large Sousliks are not optimal quarry for the Sakers, and for optimal foraging the falcons need small and medium-size objects similar to Little Sousliks, Steppe Lemming and Brandt's vole. It is worth noting that within the breeding territories of Sakers in Bashkiria and the Chelyabinsk District, which are located north of the ranges of the Little Sousliks, the habitat always has a large pasture and a pond, and in the diet (apart from Large Sousliks) Water Vole (*Arvicola terrestris*), ducks (*Anas spp.*), pigeons (*Columba livia*) and corvids (*Corvus frugilegus*, *C. monedula*) are well represented. Similar species composition was found in the diet of the Sakers in the Lower Kama (Ushakova 1968). Bogdanov (1871) was convinced that waterfowl are the main diet of Sakers in the Volga districts. Sakers that specialize on large birds and Water Voles have a naturally different foraging strategy from those that feed on small and medium size rodents, and passerines. This latter is not applicable in areas outside the range of small and medium size rodents, so the falcons have had to adapt themselves to consumption of non-traditional quarry, which, in turn, limits their recovery within the former range.

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Editorial note

In this paper the authors use authentic terminology which refers to the administration division of Russia. Here an explanation of the terms. *District*- in this paper means current 'subject of federation' (Oblast'), i.e. area large enough to have representation in the Russian Parliament. Before 1917 these units were called "Gubernia". Kray – means a larger administrative division with more administrative powers. Kray and Districts have 'regions' "Rayon" which are smaller provinces within the 'subjects of federation'. Before 1917 they were known as 'uezd'. Nature Reserve in this paper means "Zapovednik" or strict Nature Reserve, i.e. a territory which is set aside for the purpose of Nature conservation and has limited access to general public.

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