

PRESENT ABUNDANCE OF DIURNAL RAPTORS AND OWLS IN THE PERM REGION, KAMA AREA

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Data on the abundance and breeding parameters of 26 raptor species gathered over a long-term period (1975–2004) of studies of diurnal raptors and owls in the Kama area of the Perm region are reported. Reasons for changes in their breeding density both in the region at large (160,600 km²) and in the main research plot (100 km²) are analysed. The focus is on rare and endangered species included in the Russian Federation and Perm Region Red Data Books.

Key words: diurnal raptors, owls, abundance, Perm, Kama.

СОВРЕМЕННОЕ СОСТОЯНИЕ ЧИСЛЕННОСТИ ХИЩНЫХ ПТИЦ И СОВ ПЕРМСКОГО ПРИКАМЬЯ. Шепель А.И.

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Исследования хищных птиц и сов проводили в период 1975–2004 гг. на территории Пермского Прикамья (Пермский край), территория которого составляет более 160 тыс. км² и располагается в пределах Западного Предуралья. Сравнивались данные за 1975–1989 гг. и 1990–2004 гг. Стабильная высокая численность характерна для канюка (*Buteo buteo*) – 5500 пар, полевого луны (*Circus cianeus*) – 3000, пустельги (*Falco tinnunculus*) – 3000, черного коршуна – (*Milvus migrans*) 3000, ушастой совы (*Asio otus*) – 2000, перепелятника (*Accipiter nisus*) – 1500, осоеда (*Pernis apivorus*) – 1000, тетеревику (*Accipiter gentilis*) – 1000, чеглока (*Falco subbuteo*) – 1000, лугового луны (*Circus pygargus*) – 600, длиннохвостой неясыти (*Strix uralensis*) – 600, мохноногого сыча (*Aegolius funereus*) – 900. Стабильная низкая численность отмечена для дербника (*Falco columbarius*) – 200 пар, воробьиного сыча (*Glaucidium passerinum*) – 200, кобчика (*Falco vespertinus*) – 100, бородатой неясыти (*Strix nebulosa*) – 100, болотного луны (*Circus aeruginosus*) – 50, ястребиной совы (*Surnia ulula*) – 40. К видам численность которых повсеместно растет относятся: сапсан (*Falco peregrinus*) – 100 пар, орлан-белохвост (*Haliaeetus albicilla*) – 80, скопа (*Pandion haliaetus*) – 60. В последние 10–15 лет в регионе появились степные виды: сплюшка (*Otus scops*) – 80 пар и степной лунь (*Circus macrourus*) – 10. Для болотной (*Asio flammeus*) совы характерен некоторый рост количества птиц в последние годы до 1500 пар. Особую озабоченность вызывают виды, численность которых сокращается: филин (*Bubo bubo*) – 120 пар (в 1980-е годы 330), серая неясыть (*Strix aluco*), – 30 (60), большой подорлик (*Aquila clanga*) – 5 (20), беркут (*Aquila chrysaetos*) – 6 (12). Эти птицы нуждаются в разработке специальных мер по стабилизации и восстановлению численности, в том числе в создании фонда искусственных гнездовий.

Ключевые слова: хищные птицы, совы, состояние численности, Пермский край.

MATERIAL AND METHODS

Systematic studies of diurnal raptors and owls in the Kama area of the Perm region and Komi-Perm autonomous district have been conducted since 1975. The region is situated in the Western Pre-Urals (Middle and Northern Urals) and occupies an area of 160,600 km². The western, larger part of the region is a slightly uplifted, heavily eroded portion of the Russian plain; the eastern part comprises the foothills and western ranges of the Ural mountain belt (Korotaev 1962). It lies in the forest zone and forests cover ca. 50% of the territory, mostly in northern and eastern parts. In the 1950s, Danilova (1958) delineated six natural forest districts, which have changed somewhat by present (Ovesnov 1997). There are numerous rivers in the region – over 550 – and extensive Kama and Votkinsk impound-

ment reservoirs covering 3000 km². Farmland occupies 2,870,000 ha. (Status and conservation of the Perm Region environment in 2004).

The main research plot with an area of 100 km² is situated in the Kishert and Kungur districts of the region. According to Maksimovich (1950), it is a piece of an ancient strongly uplifted plain cut by the Sylva river valley and numerous ravines. Maximum elevations are 240–250 m a.s.l., minimum ones 110 m a.s.l. There are many calcareous cliffs shaped as pillars, ridges and scallops along the steep banks of River Sylva. Their tops rise 70–80 m above the river level. The research plot is the contact zone of southern taiga, Kungur forest steppe and mixed broad-leaved-coniferous forests. According to Ponomarev (1950) there occur typical spruce-fir taiga, broadleaved lime and elm-maple-lime forests, pine forests of the Siberian and forest-steppe types, as

well as birch forests. Timber harvesting early in the 20th century has led to wide distribution of secondary forests: birch forests, aspen forests and mixed stands of spruce, fir, birch and lime. About 50% of the plot is forested, 23 km² is the area of the "Pre-duralie" nature reserve.

Absolute abundance of the birds inhabiting the research plot was determined by continuous registration of all diurnal raptors, including breeding and non-breeding individuals, as well as by detecting nests and territories. Owl counts were made using all applicable methods. Birds were counted by pre-breeding calling in spring and by owl solicitation in summer, nests were detected by con-

centration of brood cast pellets, total "combing" was applied to search for *Athene* and *Aegolius* owls. The cliffs and shores suitable for breeding of the Eagle Owl were selectively checked. Results of the counts are shown in table 2.

Counts in the region were made in 40 administrative districts. Activities were planned so that all geobotanical districts are covered every year with regard to seasonal variations. In contrast to Danilova (1958) and Ovesnov (1997), we distinguish five geobotanical districts (tab. 1), since mid-taiga pine forests, which have been nearly totally logged by now, are not considered as a separate group.

Table 1. Characteristics of the Perm region geobotanical districts.

Geobotanical district	District area, km ²	Area suitable for breeding, km ²	Proportion of forest, %
Fir-spruce montane taiga	25600	8300	90
Fir-spruce middle taiga	57900	18800	80
Fir-spruce southern taiga	46100	23200 (33700)*	60
Mixed broadleaved-coniferous forest	19200	13500 (15400)	30
Kungur forest steppe	10800	7600 (8600)	30
Total in the region	160000	71400	60

*Note. Figures in brackets stand for the area suitable for breeding of the most flexible species: Common Buzzard, Kestrel, Hen Harrier, Long-eared and Short-eared Owls, which are more likely to use anthropogenic landscapes than other species.

Table 2. Diurnal raptor and owl abundance in the main research station (registered number of breeding pairs per 100 km²).

Species		1976–1989	1990–2004
Species with stable abundance (4 species)			
Honey Buzzard	<i>Pernis apivorus</i>	1–2	1–2
Hobby	<i>Falco subbuteo</i>	1	1
Long-eared Owl	<i>Asio otus</i>	2–4	2–4
Tengmalm's Owl	<i>Aegolius funereus</i>	2–3	2–3
Species with growing abundance (6 species)			
Common Buzzard	<i>Buteo buteo</i>	5–6	8–9
Black Kite	<i>Milvus migrans</i>	1–2	4–5
Hen Harrier	<i>Circus cianeus</i>	2–3	6–7 (3–4)
Sparrowhawk	<i>Accipiter nisus</i>	2–3	3–4
Goshawk	<i>Accipiter gentilis</i>	1–2	2–3
Peregrine Falcon	<i>Falco peregrinus</i> – 1984*	0–1	2–3
Irregularly breeding species (7 species)			
Montagu's Harrier	<i>Circus pygargus</i>	0–1	0–1
Pallid Harrier	<i>Circus macrourus</i> – 1992*	0	0–1
Short-eared Owl	<i>Asio flammeus</i>	0–2	0–3
Ural Owl	<i>Strix uralensis</i>	0–1	0–1
Great Grey Owl	<i>Strix nebulosa</i>	0–1	0–1
Pygmy Owl	<i>Glaucidium passerinum</i>	0–1	0–1
Red-footed Falcon	<i>Falco vespertinus</i>	0–1	0–1
Species with decreasing abundance (1 species)			
Kestrel	<i>Falco tinnunculus</i>	6–12	3–4
Locally extinct species (1 species)			
Eagle Owl	<i>Bubo bubo</i>	1–2 (1988)*	0

*Note. Years for the Peregrine Falcon and Pallid Harrier are the first breeding registrations from the research plot, for the Eagle Owl the last registration.

Two to four sample plots were established in an administrative district, and a team of 3–4 people worked there for 4–5 days. Each person surveyed a sector, searching for nests and registering all raptors contacted. In addition to breeding pairs we counted also single birds, which normally stay in the territory throughout the breeding period. As it is a common practise in the literature, the results were recalculated per number of pairs, wherefore some tables contain fractional numbers standing for abundance values. Sample plots had a mean size of 120 km², with a range of 60 to 200 km², depending on geobotanical characteristics, scope of human activities and meteorological conditions.

The area of suitable breeding habitats was determined from 1:100 000 topographic maps and turned out to be 32–70% of the area of individual geobotanical districts and 45% of the region in general, i.e. 71,400 km². For the Common Buzzard *Buteo buteo*, Kestrel *Falco tinnunculus*, Hen Harrier *Circus cianeus* and Long-eared Owl *Asio otus*, which are more tolerant of human impact, the area suitable for breeding is larger – it is shown in brackets in table 1. The specific number of pair registra-

tions was summed up for each geobotanical district and then extrapolated to the area suitable for breeding, since counts in sample plots were made exactly in suitable breeding habitats. Attention was given also to the limits of distribution of certain species. Thus, e.g., the Tawny Owl *Strix aluco* does not live throughout mid-taiga, but occurs in an area of 12,600 km² only, the area of its suitable breeding habitats being 5100 km². Having calculated the number of bird pairs for each district we interpolated the value per 1,000 km². The total number of pairs in the region was determined as the sum of those found in individual districts. For rare red-listed species systematic efforts were taken to detect proper nest sites. Basic activities for determination of the density of the raptor population were implemented in the 1980s. Since then, selective control counts have been made annually in sample plots and individual geobotanical districts. Eagle Owl and Peregrine Falcon nests are checked regularly, every year. The results are shown in table 3.

The material is presented following the taxonomic approach of Stepanyan (1990).

Table 3. Diurnal raptor and owl abundance in the Perm region (calculated number of breeding pairs per 160,000 km²).

Species		1980–1989	1990–2004
Species with stable abundance (13 species)			
Common Buzzard	<i>Buteo buteo</i>	5500	5500
Hen Harrier	<i>Circus cianeus</i>	3000	3000
Kestrel	<i>Falco tinnunculus</i>	3000	3000
Black Kite	<i>Milvus migrans</i>	2500	3000
Long-eared Owl	<i>Asio otus</i>	2000	2000
Sparrowhawk	<i>Accipiter nisus</i>	1100	1500
Honey Buzzard	<i>Pernis apivorus</i>	1000	1000
Short-eared Owl	<i>Asio flammeus</i>	1200	1500
Goshawk	<i>Accipiter gentilis</i>	700	1000
Hobby	<i>Falco subbuteo</i>	700	1000
Montagu's Harrier	<i>Circus pygargus</i>	600	600
Ural Owl	<i>Strix uralensis</i>	600	600
Tengmalm's Owl	<i>Aegolius funereus</i>	700	900
Uncommon species with stable abundance (6 species)			
Merlin	<i>Falco columbarius</i>	200	200
Pygmy Owl	<i>Glaucidium passerinum</i>	200	200
Red-footed Falcon	<i>Falco vespertinus</i>	100	100
Great Grey Owl	<i>Strix nebulosa</i>	100	100
Marsh Harrier	<i>Circus aeruginosus</i>	50	50
Hawk Owl	<i>Surnia ulula</i>	Singular contacts	40
Species with abundance growing throughout the region (3 species)			
Peregrine Falcon	<i>Falco peregrinus</i>	13	100
Osprey	<i>Pandion haliaetus</i>	20	60
White-tailed Sea Eagle	<i>Haliaeetus albicilla</i>	10	80
Species first registered from the Kama area in the 1990s (2 species)			
Scops Owl	<i>Otus scops</i>	0	80
Pallid Harrier	<i>Circus macrourus</i>	0	10
Species with abundance decreasing throughout the region (4 species)			
Eagle Owl	<i>Bubo bubo</i>	330	120
Tawny Owl	<i>Strix aluco</i>	60	30
Spotted Eagle	<i>Aquila clanga</i>	20	5
Golden Eagle	<i>Aquila chrysaetos</i>	12	6

RESULTS AND DISCUSSION

Judging by the breeding density, nest spacing, tendencies in abundance and species composition, the raptor population is now fluctuating in the Perm region's Kama area under the influence of both natural and anthropogenic factors acting within the Kama area, in adjacent territories and in Europe at large.

The Black Kite *Milvus migrans* and Hobby *Falco subbuteo* will further continue to colonise the northern part of the region, and following a period of increase, their abundance will stabilize in the coming 10–20 years. After the stabilization and saturation of breeding biotopes with birds, however, they may decrease in abundance and recede southwards due to regeneration of harvested areas.

The number of breeding pairs of the Goshawk *Accipiter gentilis* and Sparrowhawk *Accipiter nisus* is likely to increase unless their persecution will recover. They have not fully occupied potential breeding areas yet. The Long-eared Owl *Asio otus* abundance may increase in southern and central parts of the region, in areas with agricultural activities maintained.

The Short-eared Owl (*Asio flammeus*) has lately demonstrated some increase in the number of breeding birds from 1200 to 1500 pairs.

The Pallid Harrier *Circus macrourus* and Scops Owl *Otus scops*, which appeared in the region in the past 10 years (Lapushkin et al. 1995, 2003), are colonising southern districts, and their abundance is likely to increase.

Three species of "grey" harriers: the Hen *Circus cyaneus*, Montagu's *Circus pygargus* and the Pallid *Circus macrourus* harriers, show frontal expansion into taiga forests, where they have colonized a new breeding biotope offered by cut-over sites and forest edges. Given the declining abundance of the species in many parts of Europe, especially southern ones, one can say that the forest zone is a salvation for them. Overgrowing of cut-overs and farmland in

the past decade, however, is likely to cause spatial redistribution of their breeding grounds and a decline in abundance in some districts, as indicated by observations in the main research plot.

The abundance of the Osprey *Pandion haliaetus* and White-tailed Sea Eagle *Haliaeetus albicilla* will increase, although slowly; that of the Sea Eagle in southern parts of the region, as birds disperse from the Lower Kama reservoirs, that of the Osprey in northern parts, as drift floating of timber on rivers has been terminated. The increase in the Peregrine Falcon *Falco peregrinus* population density in the southern half of the region and the species' northwards expansion will continue.

The abundance of the Common Buzzard *Buteo buteo* and Honey Buzzard *Pernis apivorus* will remain invariably high; that of Tengmalm's Owl *Aegolius funereus*, Pygmy Owl *Glaucidium passerinum*, Ural Owl *Strix uralensis*, Great Gray Owl *Strix nebulosa*, Merlin *Falco columbarius*, Red-footed Falcon *Falco vespertinus*, Marsh Harrier *Circus aeruginosus* and Hawk Owl *Surnia ulula* will retain stability at a low level.

The abundance of the Spotted Eagle *Aquila clanga* will keep declining because of its rarity in Europe and lack of potential sources for replenishment of the Kama area population.

The abundance of the Golden Eagle *Aquila chrysaetos* will fully depend on conservation measures. There is a good chance of stabilization of the species abundance if the salvation programme is implemented.

Another species in need of conservation measures (organisation of artificial nest sites) is the Tawny Owl *Strix aluco*.

The breeding performance of the Eagle Owl *Bubo bubo* is very low (tab. 4, 5), wherefore its abundance has dropped nearly by two thirds over the past twenty years. Special measures to stabilize and restore the numbers are needed for this species also.

Table 4. Breeding success of diurnal raptors and owls in the Perm region Kama area.

Species		Proportion of fledged young per total clutch size, %
White-tailed Sea Eagle	<i>Haliaeetus albicilla</i>	80–90
Peregrine Falcon	<i>Falco peregrinus</i>	80–90
Hobby	<i>Falco subbuteo</i>	70–80
Honey Buzzard	<i>Pernis apivorus</i>	60–70
Montagu's Harrier	<i>Circus pygargus</i>	60–70
Black Kite	<i>Milvus migrans</i>	60–70
Goshawk	<i>Accipiter gentilis</i>	60–70
Sparrowhawk	<i>Accipiter nisus</i>	60–70
Common Buzzard	<i>Buteo buteo</i>	60–70
Hen Harrier	<i>Circus cyaneus</i>	50–60
Kestrel	<i>Falco tinnunculus</i>	50–60
Long-eared Owl	<i>Asio otus</i>	50–60
Short-eared Owl	<i>Asio flammeus</i>	50–60
Eagle Owl	<i>Bubo bubo</i>	< 50 %

Table 5. Breeding success of the Eagle Owl and Peregrine Falcon in the Perm region Kama area in different years.

Years of observations	Mean clutch size	Mean no of hatchlings	Mean no of fledglings	Breeding success (proportion of fledglings per total clutch size) (%)
Eagle Owl (<i>Bubo bubo</i>)				
1977–1989	2.2	1.6	1.3	59.0
1990–2004	1.5	1.1	0.7	47.0
Peregrine Falcon (<i>Falco peregrinus</i>)				
1995–2004	3.0	2.8	2.7	90.0

It appears difficult to forecast the situation for the Kestrel *Falco tinnunculus*, the abundance of which remains more or less stable in the Kama area in general, but halved in the main research plot.

An object of special attention among diurnal raptors and owls are species listed in the national and regional Red Data Books, wherefore we tried to find out why the abundance of some of them declined, and that of others increased.

The presumed reasons for the rise in the abundance of the Peregrine Falcon *Falco peregrinus* in the Perm Kama area are the following: 1) effective conservation at the international, national and local levels; 2) stable and rich food resources constituted mainly by Black-headed Gulls *Larus ridibundus* and *Columbidae*; 3) significant nesting facilities available; 4) adaptation to disturbance factors, nesting in the immediate vicinity of sites regularly visited by people; 5) high breeding success.

The factors for the Osprey *Pandion haliaetus* and White-tailed Sea Eagle *Haliaeetus albicilla* are: 1) effective conservation at the international, national and local levels; 2) ban on drift floating of timber along rivers and reservoirs; 3) ban on logging in the waterside protection zone since the early 1990s; 4) stable and rich food resources; 5) high infestation of *Cyprinids* with *Ligula parasites*; 5) adaptation to disturbance factors, nesting in the immediate vicinity of sites regularly visited by people; 6) high breeding success.

Presumed reasons for the decline of the Eagle Owl *Bubo bubo* are: 1) disturbance by local people, fishermen and hunters in the breeding period; 2) unfavourable weather conditions (spring frosts and forest fires caused by dry weather in the period) destructive for clutches and hatchlings; 3) killing of young by predatory mammals; 4) killing of adult birds by poachers; 5) deaths in traps; 6) killing of owls for taxidermy, since stuffed animals have lately become fashionable; 7) transformation of some breeding habitats as the result of mining of silinite and other minerals.

The factors for the Spotted Eagle *Aquila clanga* and Golden Eagle *Aquila chrysaetos* are: 1) no adaptation to the disturbance; 2) deficit of nesting facilities; 3) logging in areas with nests and felling of trees with artificial nest platforms; 4) poaching; 4) death in traps.

CONCLUSIONS

Thus, among the 26 raptors of the Perm region Kama area the breeding density of 12 species is invariably high, that of 6 species invariably low.

Having appeared in the region in the 1990s, steppe-related species, the Scops Owl *Otus scops* and Pallid Harrier *Circus macrourus*, are now colonising the southern half of the Perm region, the territory with mosaic forests.

The abundance of the Peregrine Falcon *Falco peregrinus*, Osprey *Pandion haliaetus* and White-tailed Sea Eagle *Haliaeetus albicilla* has been growing steadily in the past 10–15 years owing to high breeding success, adaptation to disturbance factor and rich food resources.

Especially alarming is the decrease in the breeding density of the Eagle Owl *Bubo bubo*, Tawny Owl *Strix aluco*, Spotted Eagle *Aquila clanga* and Golden Eagle *Aquila chrysaetos*. For these species specialised measures need to be developed to stabilize and restore the abundance, one of them being building of artificial nest sites.

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