

POPULATION OF DIURNAL RAPTORS (FALCONIFORMES) IN THE LAPLAND NATURE RESERVE AND ADJACENT AREAS: DYNAMICS IN 1930–2005

ALEXANDER S. GILYAZOV

Lapland Biosphere Reserve, 8 Zelyonyi per., RU–184506 Monchegorsk, Russia; Alex@lapland.ru

The 2748 km² of the Lapland Reserve represent northern taiga and alpine tundra. There occur 13 diurnal raptor species, 10 of which nest in the area. From the 1930s to the 1960s–1980s, the numbers of the Osprey *Pandion haliaetus*, the White-tailed Sea Eagle *Haliaeetus albicilla*, the Merlin *Falco columbarius*, and the Kestrel *Falco tinnunculus* were decreasing. Since then, the status of the species populations has stabilized and their abundance has been increasing. The reasons for that are reduced use of pesticides, and improved attitude towards raptors. The abundance of the wintering species, the Golden Eagle *Aquila chrysaetos*, the Goshawk *Accipiter gentilis*, and the Gyrfalcon *Falco rusticolus*, as well as that of the Peregrine Falcon *Falco peregrine* has been either stable or increasing since the 1980s. The most common species are the Rough-legged Buzzard *Buteo lagopus*, the Goshawk and the Merlin. The area of strict nature reserves is insufficient for maintaining stable populations of raptors which are naturally rare. The main risk factors in the Murmansk region are logging of old-growth forests, declining food resources, water pollution, disturbance during the breeding season, poaching, accidental trapping in baited traps, commercial exploitation, accumulation of chlorine organic compounds and other contaminants, and accidental netting. The present-day status of raptor populations in the Kola Peninsula needs to be studied better.

Key words: Kola Peninsula, raptors, conservation, change.

НАСЕЛЕНИЕ ДНЕВНЫХ ХИЩНЫХ ПТИЦ (FALCONIFORMES) ЛАПЛАНДСКОГО ЗАПОВЕДНИКА И ЕГО ОКРЕСТНОСТЕЙ: ИЗМЕНЕНИЯ ЗА 1930–2005 ГОДЫ. Гилязов А.С. Лапландский государственный природный биосферный заповедник.

В Лапландском заповеднике на территории 2748 км² представлены северная тайга и горные тундры. Встречаются 13 видов дневных хищных птиц, из них 10 гнездятся. С 1930-х гг. до 1960–1980-х гг. численность скопы *Pandion haliaetus*, орлана-белохвоста *Haliaeetus albicilla*, дербника *Falco columbarius*, пустельги *Falco tinnunculus* уменьшалась. Позже состояние популяций этих видов стабильное или их численность растет. Причина – ограничение применения пестицидов, улучшение отношения к хищным птицам. Численность зимующих видов: беркута *Aquila chrysaetos*, тетереvyтника *Accipiter gentilis*, чечета *Falco rusticolus*, а так же сапсана *Falco peregrine* стабильна или растет с 1980-х гг. Наиболее обычными являются зимняк *Buteo lagopus*, тетереvyтник *Accipiter gentilis*, дербник. Для сохранения стабильных популяций хищных птиц как естественно редких видов площадей заповедников не достаточно. Основными угрожающими факторами на территории Мурманской области являются: вырубка старых лесов, сокращение кормовых ресурсов, загрязнение водоемов, беспокойство в период гнездования, браконьерская охота, случайный отлов капканами у привады, использование в коммерческих целях, накопление хлорорганики и других загрязнителей, случайный отлов сетями. Необходимо изучение современного состояния популяций хищных птиц на Кольском полуострове.

Ключевые слова: Кольский полуостров, хищные птицы, охрана, изменения.

INTRODUCTION

Nature monitoring in the Lapland reserve started in 1930. Diurnal raptors have been studied within the "Nature Chronicles" programme only, without any *ad hoc* studies. The results were summarized in several publications (Vladimirovskaya 1948, Gilyazov 1991, Semyonov-Tyan-Shansky & Gilyazov 1991). This paper presents data gathered later from a wider area, since in 1983 the Lapland reserve had been enlarged northwestwards from 1600 km² to 2784 km², and it provides also a spatial-temporal

analysis of changes in the population of diurnal raptors in Lapland in 1930–2005. The present-day reserve territory comprises the following habitats: old-growth forests (spruce, pine, birch) 57%, alpine reindeer lichen and dwarf shrub tundra 19%, montane elfin birch woodland 7%, mires (chiefly bogs) 8%, rocky areas 6%, and waters 3%. In the region in general, forests cover 23% of the territory, elfin birch woodland 14%, mires 37% (in eastern areas, paludification rises to 60%), alpine tundra 4%, and meadows 2% (Tokarev 1964, Bianki et al. 1993).

MATERIAL AND METHODS

Observations were made around the year: by regular snow mobile tours along the reserve perimeter in combination with ski trips to control sites and routes in the snow-covered period; from a boat and by walking transects in the snow-free period. The combined length of fixed routes is 130 km on water, 186 km in forest and 20 km in tundra habitats, and 160 km (40 km on lakes and 120 km in forests) by snow mobiles. Raptor nest sites known from previous years were monitored, including those in areas adjoining the reserve: westward to the Verkhnetulomskoye (Upper Tuloma) impoundment reservoir, northward to Lakes Kutskol' and Pulozero, eastward to eastern and northern foothills of the Khibines, southward along Imandra and Pirenga lake valleys. From 7 to 21 June 1990, the avifauna was surveyed in the upstream of River Jokanga (NE Kola Peninsula) in ca. 400 km² of flatland tundra with elfin birch-willow woodland and scrub along waterside.

In addition, data from the files of observations made by the reserve staff and information from interviews with visitors of different kinds (representatives of game and forest management units, hunters, fishermen, tourists) were used in the paper.

The activities and methods applied for the species were generally similar. There are, however, some distinctions necessitated by differences in ecology or behaviour. Some of the species are winter residents or start nesting earlier. They differ also in the choice of habitats, nest sites, diet, nest-associated behaviour, etc.

1. Determination of the abundance and its dynamics

Transect counts have been carried out during which individuals, nests, and traces of activity in respective habitats were recorded in the Lapland reserve and adjacent areas. First of all, information from previous years about encounters of individuals or breeding pairs, and nests found were used. Winter residents (Golden Eagle, Gyrfalcon, Goshawk) were monitored all year round, mainly from February to October, and migrants from the second half of April to October. The routes, registrations of birds and nests were mapped.

2. Determination of breeding outcomes

Nests were inspected after hatching and after fledglings had left the nest. Information was gathered on the causes of clutch and nestling death, and on the diet (cast pellets and food remains were gathered, and their composition determined).

3. Study of food resources

Food availability has been monitored through annual fixed-route counts of potential prey.

3.1 Winter transect count of wintering bird and mammal species

Potential winter prey has been monitored in forest habitats in late February – early March along 8 transects with a combined length of 103 km (Prikonsky 1965, 1973, Lindén et al. 1996, Lomanov 2000).

3.2 Counts of grouse (*Tetraonidae*) broods

Grouse were censused in forest habitats in mid-August along 9 transects with a combined length of 126 km (Stakhrovskiy & Morin 1932).

3.3 Counts of waterfowl (*Gaviiformes*, *Anseriformes*) broods

Waterfowl were censused in the second half of August along lake and river shoreline along 150 km long transects (Isakov 1952, 1963, Prikonskiy 1971).

3.4 Counts of small forest and tundra associated bird species (*Charadriiformes*, *Piciformes*, *Passeriformes*, etc.)

Smaller birds were censused in forest and tundra habitats in June along 6 transects with a combined length of 52 km (Järvinen & Väisänen 1976, 1977, Shchegolev 1977).

3.5 Small mammal counts

Small mammals were censused in June and September by kill-trapping along a 1 km transect running up a mountain slope (Kucheruk 1952, Semyonov-Tyan-Shansky 1970, Myllymäki et al. 1971, Kataev et al. 1994). (Since 1974, performed by the Leading Researcher G. Kataev.)

4. Determination of the factors limiting the abundance

Information on deaths and causes of death of adult birds, clutches and the young was gathered and analysed.

RESULTS AND DISCUSSION

All records from the Lapland reserve until year 2005 include 13 species of diurnal raptors, of which 10 are breeders. Two more species are known from the south and south-east of the Murmansk region – the Common Buzzard *Buteo buteo* and the Hobby *Falco subbuteo*, both occasionally breeding in the area (Bianki et al. 1993, 2003). Table 1 provides information on the patterns and duration of stay, nesting, abundance and tendencies of its change in the reserve in 1930–2005 for 13 raptor species. The most common ones are the Rough-legged Buzzard *Buteo lagopus*, the Goshawk *Accipiter gentilis*, and the Merlin *Falco columbarius*. Five species are listed in the Red Data Book of Russia as those of special concern (Bianki & Gilyazov 2003, Gilyazov & Kohnov 2003, Gilyazov et al. 2003). These species are described here in more detail.

Osprey *Pandion haliaetus*

In the past 15 years, like before, 2 pairs of Ospreys annually occur and breed at River Nyavka mouth and Lake Kupis'. Both localities feature a multitude of relatively shallow-water fish-rich lakes surrounded by swampy pine forests with isolated patches of treed ridges and elevations. A third pair used to nest in a similar site by the eastern boundary of the reserve until 1976. In 1967, the Leningrad-Murmansk highway was built along the reserve border, 1 km away from the nest. This apparently urged the birds to abandon the site.

Table 1. Diurnal raptor (*Falconiformes*) status, dates of stay, abundance and its tendencies in the Lapland reserve.

Species	Status	Dates of stay for migrations	Abundance	Abundance Tendencies
1. Osprey <i>Pandion haliaetus</i>	Breeder	20 May ($n=38$) – 7 September ($n=43$)	2–3 pairs	Decline until the 1980s, stable afterwards
2. Honey Buzzard <i>Pernis apivorus</i>	Vagrant	April – October	Very rare	Stable
3. Black Kite <i>Milvus migrans</i>	Vagrant	21 May – 29 September	Very rare	
4. Hen Harrier <i>Circus cyaneus</i>	Vagrant	9 June – 24 August	Very rare	
5. Goshawk <i>Accipiter gentilis</i>	Breeder	Partially wintering	Common	
6. Sparrowhawk <i>Accipiter nisus</i>	Breeder	April – October	Very rare	Lately decreasing
7. Rough-legged Buzzard <i>Buteo lagopus</i>	Breeder	26 April ($n=52$)	Common	
8. Golden Eagle <i>Aquila chrysaetos</i>	Breeder	Partially wintering	2–3 pairs + juveniles	
9. White-tailed Sea Eagle <i>Haliaeetus albicilla</i>	Breeder	18 April ($n=55$) – 3 October ($n=45$)	1–2 pairs + juveniles	Decline until the 1970s, stable thereafter
10. Gyrfalcon <i>Falco rusticolus</i>	Breeder	Partially wintering	2–4 pairs	Stable or increasing since the 1980s
11. Peregrine Falcon <i>Falco peregrinus</i>	Breeder	May – October	Very rare	Stable or increasing since the 1980s
12. Merlin <i>Falco columbarius</i>	Breeder	17 May ($n = 40$) – 31 August ($n = 31$)	Common	Decline until the 1960s, stable thereafter
13. Kestrel <i>Falco tinnunculus</i>	Breeder	May - September	Rare	Decline since the late 1960s

Single individuals are seen more or less frequently on all water-bodies, including those in the areas recently included in the reserve, but no traces of other nesting pairs have been seen in these areas. North-western parts of the reserve have a higher percent cover of mountains and forests, and a lower number of lakes and still river stretches. In total, 2 breeding pairs and 2–4 single individuals live in the reserve.

Judging by information from interviews and own observations, 1–2 Ospreys are regularly encountered outside the reserve, in the northern part of Lake Imandra. According to fisheries inspectors, the Osprey does not occur on the Verkhnetulomskoye reservoir. On surveys in the upstream of River Jokanga, near Tichka river mouth (NE Kola Peninsula) on 7–21 June 1990 we encountered no Ospreys. Shallow-water lakes rich in fish are plentiful in the area, but pine forests are lacking. One may assume that the distribution of the Osprey is related to pine forests.

All the 7 nests known from the Lapland reserve are situated on the very top of pine trees, the tops being "flat", and the branches bent sideways and downwards. Pine trees bearing Osprey nests are lower than the tallest pine trees, and grow in low parts of swampy sparse woodland. Thus, the nests are sheltered from wind and not easily visible from a far despite their size.

The Osprey is a strict specialist. In Lapland, it depends heavily on the abundance of medium-size fish weighing 0.5–1 kg at maximum, but may occasionally prey also on birds on water. The prey ranges of the Osprey and the White-tailed Sea Eagle partially overlap, so that competition may arise. On 5 August 1997, e.g., a fight between an Osprey and

a White-tailed Sea Eagle was observed during brown trout upstream and grayling downstream migration in the Upper Chuna River.

Known Osprey deaths are few: on 15 September 1961 an Osprey died in fishing nets on Lake Nyukhchi, on 22 May 1935 an adult male was killed for a collection on Lake Chuna (Semyonov-Tyan-Shansky & Gilyazov 1991).

White-tailed Sea Eagle *Haliaeetus albicilla*

The White-tailed Sea Eagle is more widespread in Lapland than the Osprey. There are 3 nest areas within the reserve. Four more are known from the reserve vicinities: by Lakes Ol'che, Osinovoye, Vumba and in Vuva river valley. The Verkhnetulomskoye reservoir harbours three more nest areas (one appears to be abandoned). The areas adjoin each other, covering a total of ca. 8000 km², i.e. each area being ca. 1000 km² in size.

Another nest area we are aware of (in addition to those known from our colleagues' publications) is situated in the upper reaches of River Jokanga, where a nest with a fledgling was found in the downstream of River Rova on 20 June 1990. In the 1970s, staff of the "Kolmozero" weather station knew of at least three more nests in the locality. In 2005, the fish inspector A. Zhanbaliev detected 3 nests on Tersky Coast rivers.

The species abundance in the Kola Peninsula has been stable or growing in the past 20 years (Gilyazov & Kohanov 2003).

When a nest area is surveyed thoroughly enough, up to 4 nests are usually found. The smallest distance between known nests from different

territories is 22 km. Given that in some years all three nest areas (within the reserve) may be occupied, Sea Eagle pairs can be said to stick to their home ranges.

Of known nests, 19 were situated on the upper storey pine trees close to or on the top, 2 on ledges of sheer cliffs (rivers Vaikis' and Nyavka), 4 on birch trees (in forest tundra where pine trees were missing), and, as a rule, close to the shoreline. Of the 22 nest occupation records, 1 offspring hatched and fledged in each of 9 nests, one of the fledglings dying on the day it left the nest, one nest produced 2 juveniles, three nests were abandoned with clutches, two nests were ravaged by a bear, the fate of the remaining 7 nests is not known.

Over the past 40 years, remains of 9 Sea Eagles have been found. Within the reserve one bird was shot, the remains of four (bones and feathers) were found in different parts of the reserve. Outside the reserve one bird was found entangled in nets in northern Karelia in May 1996; an adult female was trapped in a baited trap in Lavna tundra in late April 1997; a starved bird was found dead by Verkhnetulomskiy village on 29 September 1997; an adult was found dead due to an unknown reason on ice of Voche-lambina Bay, Lake Imandra on 1 June 1994.

The White-tailed Sea Eagle specializes on larger fish than the Osprey – usually heavier than 1 kg. The largest pike known to have been taken by the Sea Eagle was 12–15 kg (10 August 1986), the largest brown trout ca. 5 kg (6 July 1990). The diet includes also water animals, carrion, and even forest animals, medium-sized birds (Semyonov-Tyan-Shansky & Gilyazov 1991). The latter fact is probably related to the openness of forests in Lapland. The White-tailed Sea Eagle is more of a generalist, and its diet overlaps that of both the Osprey and the Golden Eagle.

Golden Eagle *Aquila chrysaetos*

In contrast to the Osprey and the White-tailed Sea Eagle, the Golden Eagle is a permanent resident in Lapland, at least part of its population, and occurs throughout. Wintering and, perhaps, breeding opportunities are directly related to the availability of ungulates, reindeer and moose, and their predators, wolves, wolverines and bears, which supply food for wintering Golden Eagles by carcasses of their prey. As reported by Finnish ornithologists (Tuomo Ollila, Teuvo Hietajärvi), unbanded young Golden Eagles are sometimes encountered in Northern Finland and Finnish Lapland, and Finnish researchers believe them to come to their area from Russia, attracted by abundant domestic reindeer.

We failed to find any patterns in the distribution of Golden Eagle nests (9 found), except that they were located in pine forests: 8 nests were built on the highest pine trees, 3 of which were in "witches brooms", and one on a ledge of a sheer cliff under Seida-pahta. Unlike White-tailed Sea Eagles and Ospreys, Golden Eagles are cautious and secretive around their nests, and the nests are more difficult

to spot. Therefore, on many occasions nesting in the reserve remains unrecorded. So far, no nesting Golden Eagles have been recorded from outside the reserve and areas adjoining it. There is a relatively stable population of wild reindeer, and common northern taiga species, including grouse, in the eastern part of the Kola Peninsula, within the forest zone. These areas are little disturbed, with human settlements present along the seacoast only.

Judging by the distance between the nests and registrations of pairs and juveniles there are 2–3 pairs and 2–4 young Golden Eagles in the reserve. This has been the situation for many years.

Of the 12 known nest occupation cases, 6 nests produced 1 fledgling each, in one of the nests a second juvenile was killed by a bear; 2 other nests were ravaged by a bear; 4 nests were abandoned because of human disturbance, the fate of three is unknown. Seven cases of breeding success are known also from brood registrations in other years. In the ten years of the 1990s there were 10 cases of breeding, and in each of 1987, 1989, 1990 and 1991 two breeding attempts were recorded. These were the years when reindeer abundance in the reserve was increasing. In 2000–2005, as reindeer moved westwards, no signs of breeding were recorded in the reserve. Reindeer herds and moose are regularly accompanied by 1–2 wolf families, which facilitate Golden Eagle overwintering and breeding. Stable abundance is demonstrated also by the bear (30–50 animals) and wolverine (10–20).

Some of the factors influencing the Golden Eagle population outside the reserve are: 1) disturbance, especially at the onset of the breeding season before eggs hatch, because of the species prudence; 2) trap hunting: we know of 6 cases when Golden Eagles were trapped – the last ones took place in January 1992 and the winter of 1993/1994. Besides, a starved young female was found dead on Lake Chunozero on 23 September 1979, and a young male was taken down for a collection on 23 September 1931.

Gyr Falcon *Falco rusticolus*

One may encounter the species anywhere in the Kola Peninsula: in the forest, in the mountains, in the tundra, over a lake, and in the non-breeding period – even in a city with 80,000 inhabitants and a well-developed industry. A flying pair (male and female) was seen in the city on 27 July 1990 (unpublished communication, O. Semyonov-Tyan-Shansky). In 1994–2000 (20 October 1996 – 28 February 1997; 12 September 1997 – 18 January 1998; 7–12 November 1998, 19 August – 16 October 2000), a light-morph Gyr Falcon overwintered there. Like the Goshawk, the Gyr Falcon is attracted here by synanthropic bird species: Feral Dove *Columba livia*, Hooded Crow *Corvus corone*, House Sparrow *Passer domesticus*, etc. Although widely spread, the Gyr Falcon is rare in the Kola Peninsula. In the first 44 years of observations in the Lapland reserve be-

tween 1930 and 1988 (the reserve was closed for the war years 1941–1945 and in 1951–1958 following a governmental resolution), 81 Gyrfalcons were seen, and 4 cases of breeding were noted (Semyonov-Tyan-Shansky & Gilyzov 1991). In 16 years between 1988 and 2005, Gyrfalcons were encountered more often, and 16 occupied nests were recorded. Here, the following factors that have presumably influenced the number of Gyrfalcon registrations and nest finds should be taken into account:

1. Until the 1960s, extermination of some raptor species (Goshawk *Accipiter gentilis*, Marsh Harrier *Circus aeruginosus*) was encouraged in Russia as they were claimed to be harmful both for the nature and for people. People's skills in distinguishing between species being poor, they killed all "raptors". This phenomenon had a massive scope. We are not aware of any cases when Gyrfalcons were killed or nests were destroyed. Outside the reserve, however, the Golden Eagle, White-tailed Sea Eagle and other raptors were sometimes trapped (accidentally in animal traps) or shot for collections, but more often only for fun. There has been no official persecution of raptors for over 40 years now, and this fact could not but tell on their population. Some winter residents among raptors may wander during the non-breeding period in search of food, away from the reserve, too.

2. Gyrfalcon's main food, the grouse (*Tetraonidae*), declined in number during the last 52 years: the Capercaillie to a third, the Willow Grouse by 60%, the Hazel Grouse to a quarter (Semyonov-Tyan-Shansky 1989). The declining trend is continuing. The most probable reason for that is habitat deterioration or destruction (forest logging and fires, road and industrial construction, etc.). Human population in the Murmansk region increased from 27,000 in 1927 to 1,000,000 in 2000 (Gilyazov 2000). Grouse are prey for large raptors: the Golden Eagle, White-tailed Sea Eagle, Goshawk, and the Peregrine Falcon.

3. More data on the reserve territory are becoming available with times going on. Since Gyrfalcon nests are situated in difficult-to-access mountainous areas, it is not easy to spot the nests, and the search requires specialized activities.

All the three factors could act simultaneously. Nonetheless, the fact that the status of the Gyrfalcon population did not worsen is encouraging.

Up to 2006, 9 nest sites are known from the reserve: 8 on cliffs, 1 on a pine tree. In 1986, 1997, 1999, 2002 and 2003 Gyrfalcons nested in two sites simultaneously. The distance between the closest nests is 3, 10, 13, 23, 40 and 27 km. In areas adjoining the reserve we observed single Gyrfalcons north of the Khibines in 1994 and 1995, and south of Lake Pirenga in 2003. An interesting fact is the winter residence of a single light-morph Gyrfalcon in the city in 1994–2000.

Two Gyrfalcon pairs nested north of the reserve in 1986, and 1 pair prior to that (A. Kosyakov, unpublished). Between 1993 and 2001, the Gyrfalcon

nested in the same area 6 times (in 1994, 1996 and 1997 nests were not inspected) (Yu. Bychkov, unpublished). All of the nests were situated on cliffs.

The Gyrfalcon and Goshawk diets are shown in tab. 2. The data are based on observations of hunting birds, remaining fragments of the prey and cast pellets from nests.

The composition of pellets is described separately, as they include small food items that cannot be detected using other methods of food range determination. The Gyrfalcon's diet in the reserve is similar to that of birds from other inland, non-coastal parts of the Gyrfalcon's distribution range, e.g. Norway (Oien et al. 1998). In winter, the Gyrfalcon's diet is chiefly composed of grouse: Ptarmigan *Lagopus mutus*, Willow Grouse, Capercaillie *Tetrao urogallus*, and Black Grouse *T. tetrix*. In summer, the species additionally preys on ducks, wading birds, gulls, voles and lemmings. The diet of the Goshawk is similar to that of the Gyrfalcon, but being a forest-dwelling bird, the Goshawk in winter preys more on the Capercaillie, Black Grouse, Hazel Grouse, other forest birds. The summer diet of the Goshawk also includes more of small forest bird species and far more insects (ants, beetles, etc.) than the Gyrfalcon diet, whereas the proportion of ducks, waders and gulls is lower. The reason is the Gyrfalcon's manner to hunt in open treeless areas. The similarity between the Gyrfalcon and the Goshawk diets probably arises from the openness of Lapland forests, with rather low stocking density.

In the city, the Gyrfalcon preyed on Feral Doves (*Columba livia*) only, whereas "urban" Goshawks hunted on Doves as well as Hooded Crows and Sparrows. It is possible, however, that the information is biased because there are more observations of the Goshawk.

Peregrine Falcon *Falco peregrinus*

This is the rarest among the species under consideration (Semyonov-Tyan-Shansky & Gilyazov 1991). Nonetheless, bird pairs and a breeding attempt were observed for the first time in the period between 1987 and 1997. In June–July 1988, a pair of Peregrines stayed by a cliff where Gyrfalcons used to nest. When the site was inspected on 6 July 1988, one of the birds was constantly swooping at the intruder and the other one also demonstrated anxiety, but in a more cautious way. The nest was empty. On 9 August 1988, 1 bird was sighted in the area. On 16 August 1993, a pair of Peregrines pursued by a Rough-legged Buzzard was seen in a river valley, also near a cliff with a Gyrfalcon nest (Yu. Goryaev, unpublished). These contacts suggest that the Peregrine Falcon may be breeding in the western part of the Kola Peninsula as well. Single individuals were seen on 14 June 1990 and on 17 June 1990 near Tichka river mouth and in the upstream of River Jokanga: once sitting on a perch, and the other time carrying prey southwards, presumably to the nest.

Table 2. Gyrfalcon and Goshawk diet judging by prey remains and cast pellets.

Prey species	Composition of prey remains, %		Composition of cast pellets, %	
	<i>F. gyrfalco</i> <i>n</i> = 193*	<i>A. gentilis</i> <i>n</i> = 226*	<i>F. gyrfalco</i> <i>n</i> = 111	<i>A. gentilis</i> <i>n</i> = 307
<i>Rangifer tarandus</i>	-	0.2	-	-
<i>Sciurus vulgaris</i>	-	0.6	-	3.5
<i>Lepus timidus</i>	0.6	2.8	-	-
<i>Lemmus lemmus</i>	3.4	-	5.4	-
<i>Clethrionomys, Microtus</i>	1.7	0.6	56.1	29.6
<i>Mustela nivalis</i>	0.6	-	-	1.3
<i>Aves sp.</i>	-	2.8	14.3	11.1
<i>Anatinae sp.</i>	8.4	2.9	-	0.3
<i>Buteo lagopus, Accipiter sp.</i>	1.1	1.1	-	1.3
<i>Tetraonidae sp.</i>	-	-	2.7	1.6
<i>Lagopus lagopus, L. mutus</i>	42.1	56.4	10.7	7.2
<i>Tetrao tetrix</i>	2.3	5.6	-	-
<i>Tetrao urogallus</i>	9.0	12.3	-	0.3
<i>Bonasa bonasia</i>	0.6	0.6	-	0.3
<i>Charadriiformes</i>	1.2	5.0	-	1.0
<i>Larus sp., Sterna sp.</i>	10.6	2.9	8.0	-
<i>Uria aalge</i>	1.1	-	-	-
<i>Columba livia</i>	0.6	-	-	-
<i>Cuculus canorus</i>	0.6	-	-	-
<i>Strigiformes</i>	2.9	-	0.9	0.7
<i>Piciformes sp.</i>	2.3	0.6	-	1.3
<i>Passeriformes sp.</i>	6.1	4.5	0.9	18.2
<i>Corvidae</i>	4.4	1.1	-	0.3
<i>Insecta</i>	-	-	1.0	22.0
Total:	100	100	100	100

*Note: the data do not include birds killed in the city in winter: 17 Feral Doves taken by the Gyrfalcon, 45 Feral Doves and 4 Hooded Crows taken by the Goshawk.

DISCUSSION

Changes in the population of raptors in the Lapland reserve since 1930 are generally similar for all species, and mostly negative. The primary reason for that is human-induced destruction of natural habitats. In the 1960s, the Leningrad–Murmansk highway was constructed along the eastern boundary of the reserve. Forest fires accompanied road construction. Areas crossed by the highway became more easily accessible. As a result large raptors, the White-tailed Sea Eagle, Golden Eagle and Osprey, which nests had earlier been known, stopped breeding in the area since the 1960s–1970s. When not persecuted and disturbed by people, and when foods is available, any raptor species is potentially capable of adapting to life in human vicinity. An example is regular wintering of the Goshawk and, occasionally, the Gyrfalcon in cities of the Murmansk region.

The abundance of most raptor species showed a decline until the 1960s–1980s, with stabilization or an upward tendency thereafter. This is the case for migratory species, the Osprey, White-tailed Sea Eagle, Kestrel and Merlin. The situation is apparently due to an improving attitude towards the nature in general, as well as to factors such as the ban on pesticide use and termination of the raptor fighting campaign. For the Rough-legged Buzzard – a mi-

grant – no decline has been recorded. It is only lately that the number of breeding pairs has become low, like in adjacent areas of Finland (Koskimies 2003), the reason being low vole abundance. Vole abundance has been decreasing in the Lapland reserve since 1987 (Kataev 2003). The numbers of sedentary species, and the Golden Eagle, Goshawk, and Gyrfalcon in the reserve remained more stable than that of migrants. In the past two decades, these species have demonstrated the same upward tendency in the abundance as migrants do, and the reasons are the same, too.

The finds of previously unknown nests, even of very noticeable species such as the White-tailed Sea Eagle, which live close to fish-rich waters often visited by people, prove the coverage of the Kola Peninsula territory by ornithological studies is insufficient.

The limiting factors for raptors in the Murmansk region area include the following:

Osprey – logging of old-growth forests, decreasing food resources, water pollution, disturbance during breeding, poaching, accidental netting;

Golden Eagle – food deficit, especially in the winter season, accidental trapping in baited traps, disturbance (the species is the most cautious of all the raptors at nest), logging, poaching;

White-tailed Sea Eagle – same factors as for the Osprey and Golden Eagle;

Gyr Falcon – food deficit, commercial exploitation, disturbance during the breeding season;

Peregrine Falcon – accumulation of chlorine organic compounds and other contaminants along flyways and in wintering grounds, food deficit, commercial exploitation, disturbance during the breeding period.

The factors influencing other raptor species are generally the same.

Acknowledgements. The author is sincerely grateful to people of the Murmansk region who voluntarily collect and transfer information about bird contacts and nest finds.

Especially valuable data were presented by the fish inspector A. Zhanbaliev concerning previously unknown White-tailed Sea Eagle nests and encounters.

REFERENCES

- Bianki, V.V. 1996. Nature of the Kola – White Sea region. / Ed. Efimova, G.P. Flora and vegetation of the White and Barents Seas. Murmansk. P. 4–57. [in Russian]
- Bianki, V.V., Gilyazov, A.S., Kohanov, V.D. 2003. The Peregrine Falcon. / Eds. Konstantinova, N.A., Koryakin, A.S., Makarova, O.A. Red Data Book of the Murmansk Region. Murmansk. P. 318–320. [in Russian]
- Bianki, V.V., Kohanov, V.D., Koryakin, A.S. et al. 1993. Birds of the Kola – White Sea region. Russian Journal of Ornithology. 1993, vol. 2, № 4. P. 491–586. [in Russian]
- Gilyazov, A.S. 1991. Data on red-listed species of the Lapland reserve. / Ed. Galushin, V.M. Proceedings of the 10th All-Union Ornithological Conference, Vitebsk, 17–20.09. 1991. Minsk, Part 2, Vol. 1. P. 144–145. [in Russian]
- Gilyazov, A.S. 2000. Important Bird Areas in the Murmansk region. /Eds. Sviridova, T.V., Zubakin, V.A. Important Bird Areas in Russia, Vol. 1. Moscow, Russian Bird Conservation. P. 61–73, 572–700. [in Russian]
- Gilyazov, A.S., Kohanov, V.D. 2003. The Osprey. The Golden Eagle. The White-tailed Sea Eagle. / Eds. Konstantinova, N.A., Koryakin, A.S., Makarova, O.A. Red Data Book of the Murmansk Region. Murmansk. P. 313–318, 321–323. [in Russian]
- Gilyazov, A.S., Shklyarevich, F.N., Krasnov, Yu.V. 2003. The Gyr Falcon. / Eds. Konstantinova, N.A., Koryakin, A.S., Makarova, O.A. Red Data Book of the Murmansk Region. Murmansk. P. 316–318. [in Russian]
- Isakov, Yu.A. 1952. Methods for estimating waterfowl abundance. / Ed. Formozov, A.N. Methods for estimating the abundance and geographic distribution of terrestrial vertebrates. Moscow, USSR Academy of Science publishers. P. 280–293. [in Russian]
- Isakov, Yu.A. 1963. Estimating and forecasting waterfowl abundance. / Eds. Isakov, Yu.A., Formozov, A.N. Organization and methods of bird and harmful rodent inventories. Moscow, USSR Academy of Science publishers. P. 36–82. [in Russian]
- Järvinen, O., Väisänen, R.A. 1976. Estimating relative densities of breeding birds by the line transect method. I. Geographical constancy of the proportion of main belt observations. "Ornis fenn.", Vol. 53, № 3. P. 87–91.
- Järvinen, O., Väisänen, R.A. 1977. Line transect method: a standard for field-work. Pol. Ecol. Stud. №3, part 4. P. 14–18.
- Kataev, G.D., Suomela, J., Palokangas, P. 1994. Densities of microtine rodents along a pollution gradient from a copper-nickel smelter. Oecologia, Vol. 97. P. 491–498.
- Kataev, G.D. 2003. On the cycle in lemming and vole abundance dynamics in northern taiga of the Kola Peninsula. / Eds. Soloviev, M., Tomkovich, P. Arctic birds. Newsletter. № 5, 2003. P. 44–47. [in Russian]
- Koskimies, P. 2003. Finnish Lapland. Locality reports. / Eds. Soloviev, M., Tomkovich, P. Arctic Birds, № 5. P. 3–4.
- Kucheruk, V.V. 1952. Counts of the most significant species of harmful rodents and shrews. / Eds. Formozov, A.N., Isakov, Yu.A. Methods for estimating the abundance and geographic distribution of terrestrial vertebrates. Moscow, USSR Academy of Science publishers. P. 9–46. [in Russian]
- Lindén, H., Helle, E., Helle, P., Wikman, M. 1996. Wildlife triangle scheme in Finland: method and aims for monitoring wildlife populations. Finnish Game Res., Vol. 49. P. 4–11.
- Lomanov, I.K. 2000. Winter transect counts of game animals in large territories: results and prospects. Journal of Zoology, Vol. 79. P. 430–436 [in Russian]
- Myllymäki, A., Paasikallio, A., Pankakoski, E., Kanervo, V. 1971. Removal experiments on small quadrants as a means of rapid assessment of the abundance of small mammals. Ann. Zool. Fennici, Vol. 8. P. 177–185.
- Nature Chronicles for years 1959–2005 (41 volume). Manuscripts. Lapland Reserve Archives. [in Russian]
- Øien, I., Aarvak, T. & Tømmerraas, P.J. 1998. Dverggås og jaktfalk på Nordkalotten. Nordkalotrådets Rapportserie: Rapport nr. 49, pp. 4–5, 29–45. [in Norwegian]
- Priklonsky, S., Panchenko, V. 1971. Estimating waterfowl numbers. / Ed. Gusev, O. "Hunting and game management", № 6. P. 6–8. [in Russian]
- Priklonsky, S.G. 1965. Coefficients for the analysis of data obtained during winter track counts of game animals. Bulletin of the Moscow Naturalists Society, Biology Series, № 70 (6). P. 5–12. [in Russian]
- Priklonsky, S.G. 1973. Transect counts of game animals in winter / Ed. Rak, A.S. Methods for censusing game animals in the forest zone (Proceedings of the Okskij State Reserve, vol. 11). Moskovskij Rabochij, Ryazan. P. 35–62. [in Russian]
- Semyonov-Tyan-Shansky, O.I. 1970. Cyclic patterns in Clethrionomys vole populations. / Bulletin of the Moscow Naturalists Society, Biology Series, № 75 (2). P. 11–26. [in Russian]
- Semyonov-Tyan-Shansky, O.I., Gilyazov, A.S. 1991. Birds of Lapland. Moscow, 288 p. [in Russian]
- Shchegolev, V. I. 1977. Bird censusing in the forest zone. / Eds. Zajantshkauskas P.A., Noskov G.A., Bolotnikov A.M., Volskis G.I. & Rashkevich N.A. Methods of investigating the productivity and species structure of birds within their distribution ranges, part 1. Vilnius, Lithuania: Mokslo. P. 95–102. [in Russian]
- Stakhrovskiy, V.G., Morin N.A. 1932. Goshawk and Hazel Grouse counts. Transactions of the Northern Methodological Game Management Survey, № 1. P. 196–222. [in Russian]
- Tokarev, V.A. (Ed.) Nature of the Murmansk Region. 1964. Murmansk. 223 p. [in Russian]
- Vladimirkaya, M.I. 1948. Birds of the Lapland Reserve. / Ed. Nasimovich, A.A. Transactions of the Lapland Reserve. Moscow, RSFSR Council of Ministers, № 3. P. 171–245. [in Russian]