

STATUS OF THE KAMCHATKA GYRFALCON (*FALCO RUSTICOLUS*) POPULATION AND FACTORS AFFECTING IT

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ABSTRACT.—Kamchatka, in northeastern Russia, has an area of 432,300 km² and includes Kamchatka Peninsula, a continental portion, and some islands. An estimated 500 (330–660) pairs of Gyrfalcons (*Falco rusticolus*) breed on Kamchatka. The Kamchatka Peninsula is also an important region for migrating and wintering Gyrfalcons. Within the last 20 years, Gyrfalcons have declined on Kamchatka by a factor of 2–2.5. We have been unable to identify natural factors that would explain such a reduction. Phenological conditions in breeding areas are essentially unchanged, and the dynamics of bird and mammal prey populations appear natural. Peaks in Willow Ptarmigan (*Lagopus lagopus*) numbers have occurred every 9–11 (usually 10) years, and without synchrony of cycles on Kamchatka Peninsula and in the Koryak uplands.

Anthropogenic factors are negatively influencing the Gyrfalcon population. Whereas economic activities have irreversibly transformed only 0.3 % of places suitable for Gyrfalcon breeding, increasing road development splits large natural landscape complexes. Shooting of Gyrfalcons and casual trapping are known to occur, but poaching has produced the largest damage to the population. It began to have a commercial basis in the early 1990s with the mass collection of clutches and chicks from nests in the Koryak uplands and the northern part of Kamchatka Peninsula, and more recently, the illegal catching of birds during fall and early winter has greatly increased throughout. Annually, at least 10–15% of the Gyrfalcon population is removed from Kamchatka as contraband. Poachers prefer to catch young females and the lightest-colored birds.

We expect the condition of the Gyrfalcon population to deteriorate on Kamchatka. First, we do not expect poaching to decline. Rather, it continues to increase, despite the growth of penalties. Second, according to the ‘Strategy of Social and Economic Development of Kamchatka Through 2025,’ a priority of regional development is the mining industry, power, and transport communications. Our experience suggests that these will lead to large scale changes of natural habitats and biodiversity depletion. *Received 22 February 2011, accepted 17 April 2011.*

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Key words: Gyrfalcon, Kamchatka, Illegal trade, trapping, population, Russia, Arabian Peninsula.

WE STARTED GATHERING information on the Gyrfalcon in Kamchatka Peninsula and adjoining regions in 1971, concurrently with other studies. In 1990, the illegal trapping of the species plagued the region, and we have given more attention to Gyrfalcons since then, while trying not to publish any new information so as not to jeopardize the falcons' breeding locations. By the beginning of the 2000s it was evident that the illegal trappers had studied the Kamchatka population well enough, and our information would not be of any news to them.

In 2005–2007, within the framework of the government funded federal program “Monitoring of animals of the Red Data Book of Russia” we carried out a survey of the Gyrfalcon population in the Kamchatka Peninsula (Figure 1). We focused on the middle and southern parts of the peninsula to establish the southern limits of the species' distribution, describe nest sites, study the ecology of the species, and gather anecdotal information from local people (Lobkov et al. 2007a, 2007b, 2008). In this paper we incorporate the results of the 2005–2010 studies of the species. They include surveys of the Vyvenka River (2008), Penzhina River basin (2009), and Olytor coast at the Severnaya and Shlupochnaya bays (2010). We also include the data on birds confiscated from poachers, and discuss measures to combat illegal trapping.

METHODS

We surveyed potential breeding habitats using vehicles, helicopters, boats, and on foot using binoculars and telescopes. Some habitats were surveyed after getting tips from local people, some were surveyed on the basis of reconnais-

sance observations and the ability to reach a particular region. Most of the surveyed areas were located in isolated and difficult-to-get-to regions. In many cases heavy all-terrain vehicles were used.

While surveying river valleys, mountain slopes, and coasts, we checked cliff faces to ascertain their length and looked for the presence of white-wash, pellets, and plucked feathers, as well as the presence of birds. We also recorded the length of the survey route, and estimated the area surveyed to determine the density of birds.

We differentiated the coloration types of the Gyrfalcons as grey, light, or white. We also mapped the nests and described the nest sites. Accessible nests were searched for pellets and food remains, which helped determine the resident species if the birds were not present.

Every area that we surveyed in detail we treated as a study area (Figure 2) and noted the number of Gyrfalcons there. Records of birds in flight that could not be treated as breeding pairs were treated as ‘potential’ pairs. The sizes of the study areas ranged from 9 to 1630 km². They had different shapes because of the different landscapes. While surveying in protected areas we used the employees of those areas. The majority of the study areas (70%) were selected at random; the other 30% of the study areas were selected in landscapes that we assumed to be very important for Gyrfalcons.

The counts during non-breeding periods (fall and winter) were a combination of car and snowmobile counts, where the observations were made at stops in areas with good visibil-

ity. There were usually 2–3 such stops, which were selected ‘on the move.’ We always tried to make observational stops at mountain passes, in wide areas of river valleys, as well as at estuaries of rivers and lagoons. The counts were made in the Elizovsky, Ust-Bolshretsky, Milkovsky, Bystrinsky, and Ust-Kamchatsky administrative regions (Figure 1). In the Olga Bay, the observations were carried out by A. Nikanorov, an employee of the Kronoki State Nature Reserve. The survey stops lasted 1–8 h, but most frequently were 2–6 h. Some of the observation sites were visited several times. Sometimes we tried to attract the Gyrfalcons with tethered pigeons. The duration of the surveys and the distances covered are given in Table 1.

RESULTS

In the inland regions of the Koryakia, we know of more than 40 sites with territorial pairs, broods, and nests of the Gyrfalcon. For the Kamchatka Peninsula, we have the location of 29 occupied nests and more than 30 sites with possible breeding. It appears that Gyrfalcons breed on the entire Kamchatka Peninsula, with the exception of its most southern regions. There is solid evidence of nesting events at the Vachkazhitsy Volcanic massif (nest with chicks) and at the sources of the Opala River (fledged broods). The latter, at 52° 30′–53°, is the southernmost known nest of the Gyrfalcon. However, we have to stress that the breeding of the Gyrfalcon in the southern part of the Kamchatka Peninsula is sporadic.

Extrapolating from the density of Gyrfalcons recorded by the counts in the study areas, we estimate 500 (330–660) pairs (approximately 2.4 pair per 1000 km²), which constitutes 7–19% of the total number of this species in the Russian Federation and 3–8% of the entire world Gyrfalcon population. Results of the counts in 2007 demonstrated a 1.5 times decrease in the numbers of the birds breeding in the southern part of Kamchatka. The Gyrfalcon is most numerous in the mountainous parts



Figure 1. Map of the nest locations in Kamchatka Peninsula.

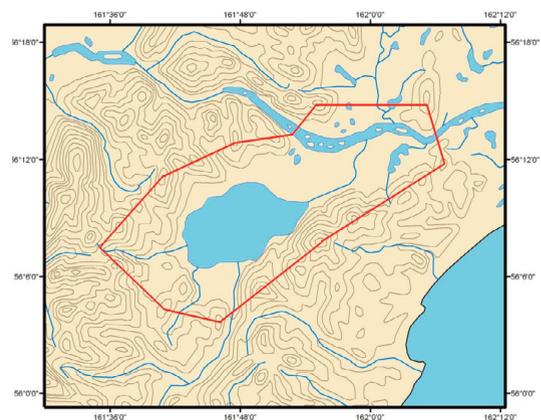


Figure 2. An example of a study area where the nests and passing Gyrfalcons were monitored (Azabachie Lake, lower Kamchatka River) in 2007.

Table 1. Gyrfalcon surveys on Kamchatka Peninsula in 2005–07.

Type of surveys	2005	Surveys 2006	2007
Road surveys, total number of sorties	31	31	35
Length of car survey routes, km	25300	16070	27670
Length of snow-machine survey routes, km	300	800	950
Length of boat survey routes, km	915	940	1530
Length of surveys on foot, km	162	150	250
Length (time in hours) of helicopter surveys, h	6	4	6
Number of study areas to determine breeding density	18	30	26
Total area of the study areas, km ²	8077	10108	8689
Study areas as a percentage of the area of Kamchatka (percent of the potential Gyrfalcon breeding area)	3.2 (3.9)	4.0 (4.9)	3.2 (4.2)
Number of observation sites used in the non-breeding period	31	10	36
Total length (time in hours) of observations during non-breeding period	278	58	221
Number of nest descriptions, including from archived data	45		
Number of Gyrfalcons with described color morphs	249		
– identified using binoculars from a close distance	146		
– identified from skins in the museums	17		
– identified in photographs	17		
– identified from among confiscated birds	105		

of Kamchatka, while its density on the plains of the peninsula is seven times lower. The Kamchatka Peninsula is one of the key wintering areas for birds breeding in the northern parts of the species' range. Kamchatka also is located on the migratory routes of Gyrfalcons breeding not only in the northern parts of Kamchatka and Koryakia, but also North America. The peninsula is perhaps similar to a large geographical "sack" which funnels Gyrfalcons from a large area. On average, one Gyrfalcon was seen every 40.6 h (25.3–58 h) during 557 h of counts in 2005–07.

Of the 52 nests located, 75% were located on cliffs (Figure 3), 3.8% on sandy-pumice bluffs, and 21.2% were on trees (Figure 4). Cliff nests tended to be located on southeastern and southern exposure (71.4%), and 14.3% were facing southwest. We suspect that the white birds breeding in nests facing north have some advantages as they are more cryp-

tic in conditions where snow patches remain on north-facing cliffs.

The Gyrfalcon population of Kamchatka and Koryakia has a high potential breeding performance (average clutch size 3.9), but has only 51.6% breeding success (fledged brood size = 2).

The diet of the Gyrfalcons is based on the Arctic Ground Squirrel (*Spermophilus parryii*) (50.2%) and Willow and Rock Ptarmigan (48%). A few pairs breeding near the coastline have diets with a large proportion of waterfowl. During the non-breeding period the diet of Gyrfalcons living on the coastal plain included 90.7% birds, composed of 67.2% ducks, gulls and waders, 26.6% crows and pigeons, 4.2% ptarmigan, and 2% passerines. However some individuals may focus on small rodents.

It has become evident that during the 15–20 years before 2005, the number of breeding



Figure 3. Cliff nest site of the Gyrfalcon in Kamchatka (Photo by A. Gorovenko).



Figure 4. Tree nest site of the Gyrfalcon in Kamchatka (Photo by A. Gorovenko).

Gyrfalcons in the southern part of the Koryak highlands and their density on the Kamchatka Peninsula during winter declined by twice or more. The decline is probably continuing now.

DISCUSSION

Possible natural factors contributing to the decline of the Kamchatka-Koryakia Gyrfalcon population:

Natural Factors.—We have not found any natural factors which have a significant effect on the Kamchatka Gyrfalcon population. The environmental conditions were normal and stable. Therefore, the environmental conditions did not contribute to the decline.

Nest Site Availability.—A total of 91.2% of the Kamchatka Peninsula is suitable for Gyrfalcon breeding. In 2005–2007, we made a survey of cliff outcrops. The majority of the cliff outcrops were located in the foothills and mountains, as well as in the isolated mountain massifs and volcanoes. The sources of most of the rivers have a great abundance of cliffs. Lowlands and wide river valleys are usually forested and lack cliffs, or have a small number of cliffs on the banks. On average, there is one cliff outcrop per 32 km² of area, with some areas where there is one cliff per 0.8 km². This indicates that there is no lack of

cliffs for breeding, meaning that the typical Gyrfalcon has many nest-site options in Kamchatka. Moreover, there is no shortage of places during the winter.

Climate Change Trend.— In the past 50 years, the temperature of the cold period (October–March) in Kamchatka has increased 1.7 °C on average (Shkaberda 2009). Various regions of Kamchatka show different trends of this change. The most significant changes were in the coastal regions (Table 2). The temperature trend for the warm part of the year (April–September) was different for the continental and coastline areas. The summer change was smaller than the changes in the winter temperatures. In the southern, eastern, and western coasts of the Kamchatka Peninsula, the average temperatures increased 0.8–1.0 °C. In the mountain regions and in the Kamchatka river valley, spring and summer temperatures increased 1.6 °C, whereas the fall season saw no change. In the continental regions of Koryakia (namely for the Penzhina river valley) the increase in temperature happened only during the spring period (1.3 °C), the summer had no changes, and in the fall season it decreased 0.6 °C (Shkaberda 2009).

Despite some increase of the average temperatures in past decades, it looks like the Gyrfalcon breeding phenology in the last 15–20 years

Table 2. Temperature changes in regions of Kamchatka Peninsula over the past 50 years (Shkaberda 2009). The meteorological station name is given in brackets.

Regions of Kamchatka	Average temperature changes, °C	
	Cold period (October-March)	Warm period (April-September)
Southern peninsula (Lopatka Cape)	0.9	0.8
Western coast (Sobolevo, Ust-Khayrusovo, Icha)	2.0	1.0
Eastern coast (Petropavlovks, Ossora)	2.6	0.8
Continental regions (Kamenskoe)	1.3	0.6
Kamchatka river valley (Dolnovka)	2.1	0.7
Mountain regions (Nachiki)	1.2	0.6

has not changed significantly. It is important to note, however, that the snow melt dates showed some tendency to be earlier.

Dynamics of the Major Prey Species.—Small mammals and birds that are the prey species of the Gyrfalcon are either in their natural state, demonstrate periodic fluctuations in numbers, or have somewhat declined.

Ptarmigan.—Regular counts (1972–1995) of Willow Ptarmigan (*L. l. koreni*) in the Kronoki Nature Reserve detected cyclical peaks of abundance at 5–6 year intervals, with large peaks registered at 10 (9–11) years. This cyclicity was regular, and there was no declining trend detected. The numbers of Rock Ptarmigan (*L. m. pleske*) were not high enough to detect any cyclicity. It was noted that the cyclicity patterns of ptarmigan in the southern parts of the peninsula and in the continental regions are different. The population density of Willow Ptarmigan in the mountain parts of the continental regions of Koryakia at peak abundance reaches 5.7–30 pairs per km² in different habitats (Oklan highlands, Penzhina basin, 2009), which is higher than maximum numbers reported for the southern regions (10–12 pairs per km²). We do not have reliable data to compare the numbers of ptarmigan in the Koryakia for the last 50 years. However, anecdotal informa-

tion from the local people states that the peak numbers of ptarmigan in the region have declined somewhat.

Waterfowl.—In the past 10–15 years, we have reported some decline in the wintering numbers of waterfowl in inland waters (Lobkov 2003). However, this decline is not drastic and, in our opinion, not impacting Gyrfalcons.

Arctic Ground Squirrels and Other Small Mammals.—We do not have any data on population trends of these species.

Geomorphology.—Since Kamchatka Peninsula is located in an active seismological zone and exposed to severe weather conditions (lots of precipitation, sudden changes in temperatures), earth-slides off cliffs, and fast erosion of the sandy-pumice faces used for nesting by Gyrfalcons are quite frequent. We recorded cases when the fallen rocks partially or completely covered the nests (Gorovenko 2003). We also know of cases where nests in trees disappeared during forest fires. However, the rarity of these cases lets us rule out their significant role in the population dynamics of the species.

Possible anthropogenic factors contributing to the decline of the Kamchatka-Koryakia Gyrfalcon population:

Habitat Degradation.—Nest-cliff faces in mountains, along rivers, and along coastlines are usually located in remote areas, and often are out-of-reach by people. Transformation of river valleys and mountain slopes happened only in limited places such as active mines and quarries, which at the moment are not that numerous (7–8) and are usually located near populated places. A rough estimation of such places returned only 0.3% of all suitable Gyrfalcon areas (0.2% cliffs and 0.1% of forested habitats). Roads and utility lines are expanding, and thus fragmenting the natural continuity of the landscapes. Roads also facilitate forest fires. As a result, the traditional Gyrfalcon areas along the Anavgay-Palana road, and the Tolmachevo hydroelectric dam are affected. However, due to the early stages of these developments, the real impact of the mentioned factors has yet to be observed.

Disturbance.—The disturbance factor is progressing, following the construction of roads and communication lines, use of natural resources, and tourism development. We estimate that in at least 20% of potential nesting areas, Gyrfalcons have experienced a progressive disturbance. The nests along the Icha road to the Shanuch copper-nickel mine, in the Uzon caldera and in the Geyzer valley were abandoned due to human disturbance.

Illegal Shooting.—We have three documented and 12 undocumented cases of illegal shooting of Gyrfalcons by local people (mostly pigeon fanciers), revealed by questionnaires in 1972–2005. This is not a large figure compared to the shooting rate in other species. Sometimes wounded Gyrfalcons were given to the Kamchatka Zoo (Elizovo).

By-catch in Traps.—Wintering Gyrfalcons sometimes get into the traps set for Arctic Fox (*Vulpes lagopus*) in the Commander Islands (Artukhin 1991) and for Red Fox (*Vulpes vulpes*) in Kamchatka (Lobkov unpublished data).

Illegal Removal of Chicks and Clutches from Nests.—Information on illegal chick removal from Gyrfalcon nests was first reported to us by local people from the Olutorsky region of Koryakia in 1984–85. In the 1980s, the illegal nest robbing in Koryakia reached an industrial scale. According to our questionnaire returns in the Tilichiki and Korf settlements in 1988–1991 from the Koryak highlands, a total 20–30 nests were robbed (however the real figure is probably higher). The number of Gyrfalcons there declined and, in some regions, they ceased to exist.

In 1992, when we surveyed our study area (5000 km²) set in 1989 in the Goven peninsula and the Vyvenka basin, we found all 16 known nests empty and found no territorial pairs. The local people said that the nests were visited by poachers using helicopters and the services of local guides. With the decline of Gyrfalcons in this region, the range of poachers spread to the northern regions of Kamchatka including the Uka river. In the continental parts of the peninsula, they made attempts to penetrate into the Penzhina ridge and central regions of the Koryak mountains.

Thus, at the end of the 1980s and beginning of 1990s, the illegal removal of chicks from their nests became a factor which started to affect the population size of Gyrfalcons in the north of the Kamchatka peninsula and started the decline of the population.

The removal of chicks and the trapping of adults at nest sites is currently occurring in various regions of Kamchatka, including its southern regions. In many places in southern Kamchatka, where the breeding of Gyrfalcons became known only recently, they ceased to exist, and the distribution of the Gyrfalcons in these regions has become sporadic.

Illegal Trapping in Fall and Winter.—During the 1990s, illegal chick removal in the north of Kamchatka was coupled with the trapping of adults on migration routes and at their wintering

Table 3. Number of Gyrfalcons confiscated in Kamchatka. These data are not verified, as the records used were from different governmental agencies which count the confiscated birds independently. This table does not include birds that were smuggled from Kamchatka and confiscated elsewhere. Data for 2010 are not complete, as the season was not over at the time of preparing this paper.

Year	Confiscated Gyrfalcons	Examined by us		Young, %
		Total	Including young	
1991	2	-	?	?
1995	2	-	?	?
1999	13	13	8	61.5
2000	36	36	29	80.6
2001	25	22	19	86.4
2002	54	42	38	90.5
2003	19	17	17	100
2004	29	15	15	100
2005	32	22	22	100
2006	23	22	20	90.9
2007	25	25	24	96.0
2008	54	34	34	100
2009	38	-	?	?
2010	17	-	?	?
Total:	369	248	226	91.1

grounds. The trapping effort took the form of an industrial operation. At the moment, this is the main method of illegal Gyrfalcon removal from wild populations. The rough estimates of the number of Gyrfalcons confiscated from poachers were provided by the Kamchatka Regional Authority of the Federal Natural Resources Bureau for the Russian Federation, the Agency in charge of the conservation and use of wildlife in the Kamchatka District, regional police departments, and the State Security Bureau of

the Kamchatka District (Table 3). These data do not reflect the recent numbers of birds caught and exported from Kamchatka. These are only confiscated birds.

Gyrfalcons began to be confiscated in 1999, as soon as the regional police departments and State Security Service (FSB) began their operation to search for and detain illegal trappers. Previously, illegal trappers came to the attention of the police only by chance. However the employees of airlines knew about passengers with ‘parrots.’ To date, a total of 40 people have been arrested. Among them were individuals who were trying this ‘business’ for the first time, as well as organized groups who were doing it regularly. It is evident that the confiscated Gyrfalcons were a small proportion of the birds captured. Many birds die while in transport. Trappers try to find new ways to conceal the birds in the safe zones of the airport and bribe their way through. More and more passenger and cargo planes were used to smuggle the birds; there were even attempts to send the Gyrfalcons by post.

The range of illegal trapping is growing. There is no region of Kamchatka where the illegal trappers have not been known to operate. They catch falcons near the Petropavlovsk-Kamchatski, near settlements, and in extremely remote places. In the inlets of Olutor Bay near the northern administrative border of Kamchatka, trappers use fishing camps after the fishermen have left. The local population plays an active part in trapping, and ‘jobs’ at the trapping camp have become a usual routine. The smuggling is very well organized. According to the current estimates, a total of tens (Gordienko and Nechitailov 2000) to hundreds (FSB estimate) of Gyrfalcons leave Kamchatka annually. To date (2008–10), our estimate of annual Kamchatka take is 150–200 birds. The real figure is unknown. The largest confiscated shipment of Gyrfalcons was 38 birds (11 November 2008, Milkovo), whereas the ‘usual’ shipment is 2–8 birds.

Table 4. Percent of females (by color variation) among confiscated Gyrfalcons. We used only birds which were sexed reliably.

Years	N	Number of females					
		Total	%	Color variations			
				White	%	Grey	%
1999–2000	33	25	75.8	?	?	4	16
2001	5	3	60.0	–	–	3	100
2002	13	13	100	13	100	–	–
2005	18	10	55.6	6	60.0	–	–
Total :	69	51	73.9	19	73.1	7	26.9

The trapping of Gyrfalcons in Kamchatka is done with the goal of their subsequent export to the Arabian Peninsula, where the birds are used for falconry. Russia is the exclusive supplier of Gyrfalcons to the black market (Sorokin 2005), and a majority of these birds, in our opinion, are from Kamchatka.

Selectivity in Illegal Trapping.—The most expensive Gyrfalcons on the black market are large, well-built, white females. This demand is reflected in the selective trapping of the birds in Kamchatka (Table 4). In total, 73.9% of the Gyrfalcons were females, and 73.1% of the females were white. In general, about 90% of the birds attempted to be smuggled from Kamchaka were young (Table 2). The proportion of young individuals in the past 6 years (i.e., from the time we started to collect the statistics) has increased, and from 2003 we have seen mostly young individuals in the shipments (90–100%). This observation suggests that the Kamchatka-Koryak population is getting younger.

The Fate of the Confiscated Birds.—Despite large numbers of confiscated birds, Kamchatka does not have a specialized rehabilitation center. As a result, the majority of confiscated Gyrfalcons are released into the wild as soon as possible. If that does not happen, the ornithologists have to feed and treat the confiscated birds at their own expense. In the period from 2001–2007, a huge amount of work was

done by the non-commercial partnership “Kamchatka Rare Raptors Rescue Center.” Over 7 years, a total of 48 Gyrfalcons were rehabilitated, and 35 of these were released back to the wild (Table 5). Now the Center has stopped its work due to a lack of funds.

Recently, the Cackling Geese Propagation Center, Elizovo, which is run by the Kamchatka Branch of the Pacific Institute of Geography, Far Eastern Division of the Russian Academy of Sciences, has served as a rehabilitation center for Gyrfalcons. The center is underfunded, and is unlikely to continue such work for the indefinite future.

In 2006, 18 Gyrfalcons, probably of Kamchatka and Koryakia origin, were confiscated at Moscow airports and rehabilitated at the Russian Falconry Center (All-Russian Institute of the Nature Conservation and Nature Protection, Sadki-Snamenskie, Moscow and the Center for Wild Animal Rescue, Losiniy Ostrov, Moscow) and re-introduced to the wild. Another shipment of eight birds confiscated in Moscow from a plane arriving from Kamchatka was released in Kamchatka in 2010.

Forecast of the Dynamics of the Kamchatka Gyrfalcon Population.—If the speed of change and the amplitude of the average atmospheric temperature in Kamchatka continues to rise at the same rate as was measured over the past 50 years (Shkaberda 2009), there will be pheno-

Table 5. Rehabilitation by “The Kamchatka Rare Raptors Rescue Center,” Petropavlovsk-Kamchatskiy, of Gyrfalcons confiscated in 2001–2007.

Year	Gyrfalcons confiscated			Rehabilitated in the rescue center		
	Total	Released upon confiscation	Admitted to the rescue center	Total	Release	Died
2001	25	22	3	3	3	0
2002	54	42	12	12	8	4
2003	19	17	2	4	4	0
2004	29	15	4	5	1	4
2005	32	22	10	11	8	1
2006	22	1	5	5	5	0
2007	8	0	8	8	6	0
Total:	189	119	44	48	35	9

logical changes in Gyrfalcon habitats, and subsequent shifts in their breeding dates towards earlier dates. We think that it is possible that this might alter the genetic structure of the population, as the cryptic quality of the birds of various morphs is not the same. However, climate change will be hardly noticeable in the coming decade. Whether climate change might affect the Gyrfalcons’ prey species (ptarmigan and small mammals) is not clear.

We forecast that the Gyrfalcon population in Kamchatka will continue to decline more because of the activities of humans. Such a conclusion is inevitable if you consider the following:

High Level of Illegal Trapping and Lack of Measures to Combat It.—There is no evidence that illegal trapping will stop in Kamchatka. It seems that it is increasing, despite the fact that the penalties for taking a Red Data Book-listed species have increased. Illegal trapping seems to increase recruitment which is fueled by:

1. Social and economic conditions

- Sustainable demand for Gyrfalcons on the international black market, mostly in the

countries of the Arabian peninsula where the species is used for falconry.

- High level of incentives, which makes this business in Kamchatka very profitable.
- Corrupt governmental officials, aviation crews, as well as other people who facilitate the smooth delivery of trapping teams into the wilderness, provide high-tech equipment, provide legislative support and information on the whereabouts of rangers, and manage to bring the trapped birds through safety checks in airports.
- High unemployment rate in the local population and low standards of living in remote settlements.

2. Geographical and demographical features of the Kamchatka Gyrfalcon population

- The highest proportion of white and light color morphs in Eurasia, which have high commercial value.
- High concentration of breeding population (highest in Russian Federation), and high concentration of migrating and wintering Gyrfalcons in fall and winter.
- Suitability of landscapes for commercial harvest (roads) and concentration of birds in the coastal areas.

3. Lack of integral system to combat illegal trapping, in particular

- Lack of preventive measures; governmental officials tend to react only if the crime has happened.
- Low (and sometimes sincerely weak) punishment for trappers and accessory people; the penalties could be easily covered by the next trapping episode.

4. Insufficient legislation

- Concerned scientists began trying to increase penalties long ago. Finally they have succeeded. Order #107 of the Minister of the Natural Resources of the Russian Federation on 28 April 2008 made a significant increase in the penalties for damage to Red Data-listed species. The Gyrfalcon is ranked for 250,000 Roubles (> \$9,000). This is a large penalty. However, it is used only in the case of “destruction, illegal procurement, and removal from the wild.” As a result, trappers, people hired by them to transport the birds, or people keeping them on their property, are not covered by the current law because it is impossible to prove “destruction, illegal procurement, and removal from the wild.” They say, “we did not remove the birds, but were asked to bring the birds to such and such person who will meet us at the destination.”

5. Lack of rehabilitation center for keeping confiscated birds.

Priorities of the Socio-Economic Development.—According to the “Strategy of the socio-economic development of the Kamchatka Kray [District] to 2025” adopted on 21 July 2010 by the assembly of the Kamchatka government, the priority was set to develop marine industries, mining, energy, transport, and others. The experience of the previous years suggests that wide development of natu-

ral resources usually triggers noticeable changes in the landscape and land use, and thus leads to reduction in the biodiversity of Kamchatka. Nevertheless, the problems of nature conservation and sustainable use were not mentioned in the “Strategy” and the necessity for development of protected areas and optimizing the existing nature reserves was largely ignored.

Priority Suggestions for Gyrfalcon Conservation in Kamchatka.—In order to overcome unfavorable development of the situation, we think it is necessary to:

- Amend the Decree of the Minister of the Natural Resources #107 of 28 April 2008 to include making it illegal to “buy, sell, transport, keep, possess, exchange, etc. Gyrfalcons.” The latest legislative initiative of the Kamchatka Regional Parliament, which was supported by the Governor of Kamchatka to amend the Criminal Code of the Russian Federation with the articles dealing with illegal trapping of animals listed in the Red Data Book of the Russian Federation, was most welcomed. The foundation of this legislative initiative was the situation with the Gyrfalcon in Kamchatka. Finally the MPs and the Governor have listened to ornithologists.
- Create a regional rehabilitation center within the Kamchatka regional agency of the Ministry of Nature Resources of Russian Federation. Such a task can be carried out by the non-commercial partnership “Kamchatka Rescue Center” which was established in 2001 and has the necessary experience.
- Carry out a complex program on the sustainable use of the Kamchatka-Koryakia Gyrfalcon population, which includes limited, but scientifically justified quotas on the commercial use of the population. Such a program has already been drafted by us and adopted by the Scientific Council of the Pacific Institute of Geography.
- Create new protected areas, including seasonal ones in the areas that have significant

numbers of breeding Gyrfalcons. At the moment, all Kamchatka protected areas have no more than 50 breeding pairs of Gyrfalcons, i.e., less than 10% of the population, which is not enough for the conservation of this population.

- Develop a database of Gyrfalcon nest sites in Kamchatka and carry out long-term monitoring of the population to assess its breeding potential. Such monitoring has been carried out in the Kronoki Nature Reserve (Lobkov 1990, Lobkov 1991) and in the South-East Kamchatka (Lobkov 2002).

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