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ON THE MONITORING OF SAKER FALCONS NESTING IN THE REPUBLIC OF MOLDOVA

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Introduction

Saker Falcon - one of the most known and rare species of birds of fauna of Europe. It is brought in the Appendix 2 CITEC, the Appendix 2 Bonn Conventions, the

Appendix 2 Bern Conventions. It is included in Red books MCOII, Russia, Ukraine and Moldova. It is protected in the majority of the countries within a kind area. Last years number Saker Falcon was reduced and has the negative tendency in Russia, Ukraine, Romania, Bulgaria, Turkey that has compelled these countries to take special measures on maintenance of number of a kind and restoration of its populations. In Moldova number and distribution Saker Falcon last years have strongly changed. In the south of Moldova rather steady settlement of this kind that allows to conduct long-term monitoring of its population in the conditions of anthropogenous influence was formed.

Material and methods of study.

The territory of Republic of Moldova is presented by agricultural landscapes. In its central part there are woods, in the north and in the south small forest "islands" are available. On Dniester, Prut and some of their tributary banks there are rocky sectors. Besides in the south of the country, and also through all territory from south to the north two high-voltage transmission lines and smaller pressure set of PL pass through. All this provides Saker Falcon with enough suitable for nesting biotopes. Researches on distributions and number of Saker Falcon were accomplished in places of its former inhabiting in woods and on rocky sites of the rivers, and also the most significant PL were surveyed, the nests of all birds which were on PL support were recorded. During the field works both automobile and pedestrian routes were used from the end of March till July. Nest territories were considered the sectors where Saker Falcon nests were registered (inhabited or empty, which were used by falcons earlier), adult birds were met (male and female on PL support), nestlings, as well as young birds were met. The nests location was fixed by GPS Garmin device, the places were indicated on maps, and then put in the general register. On the basis of field data maps of Saker Falcon nest location in different years were accomplished.

The area of more detailed researches was basically limited to southern areas of the country where nesting pairs of Saker Falcon were constantly recorded. As unique place in Moldova of compact Saker Falcon population in the work process we tried to disturb as little as possible the birds during breeding, especially during egg stage. The estimation and evaluation of nesting success was spent by technique [2]. The given territory represents basically woodless landscape with forest shelter belts, small "island" of wood-shrubbery vegetation and separately growing trees on pond coasts. The basic landscape is represented by agricultural fields and uncomfortable lands, and also separate rare meadow in relief depressions. In the south of Moldova 5 territories of compact Saker Falcon nesting and inhabiting that we have presented on maps (fig. 1) have been revealed.

Area № 1 is located near Ceadir-Lunga city (Valea Perjei village), extent of 15 km along PL-400 kV, area № 2 – near Taraclia city and Copceac village – about 5 km, area № 3 – near Cairaclia village, № 4 - near Greceni village, which is crossed by the railway, and area № 5 – near Etulia village. Colonies of spotted susliks (*Spermophilus suslicus*) as basic food object for Saker Falcon during the nesting period were located mainly on slopes on field edges, near roads and localities where quite often there are waste disposal site. The estimation of spotted suslik number in the colonies located within the limits of 3-4 km from nests of the Saker Falcon was accomplished.

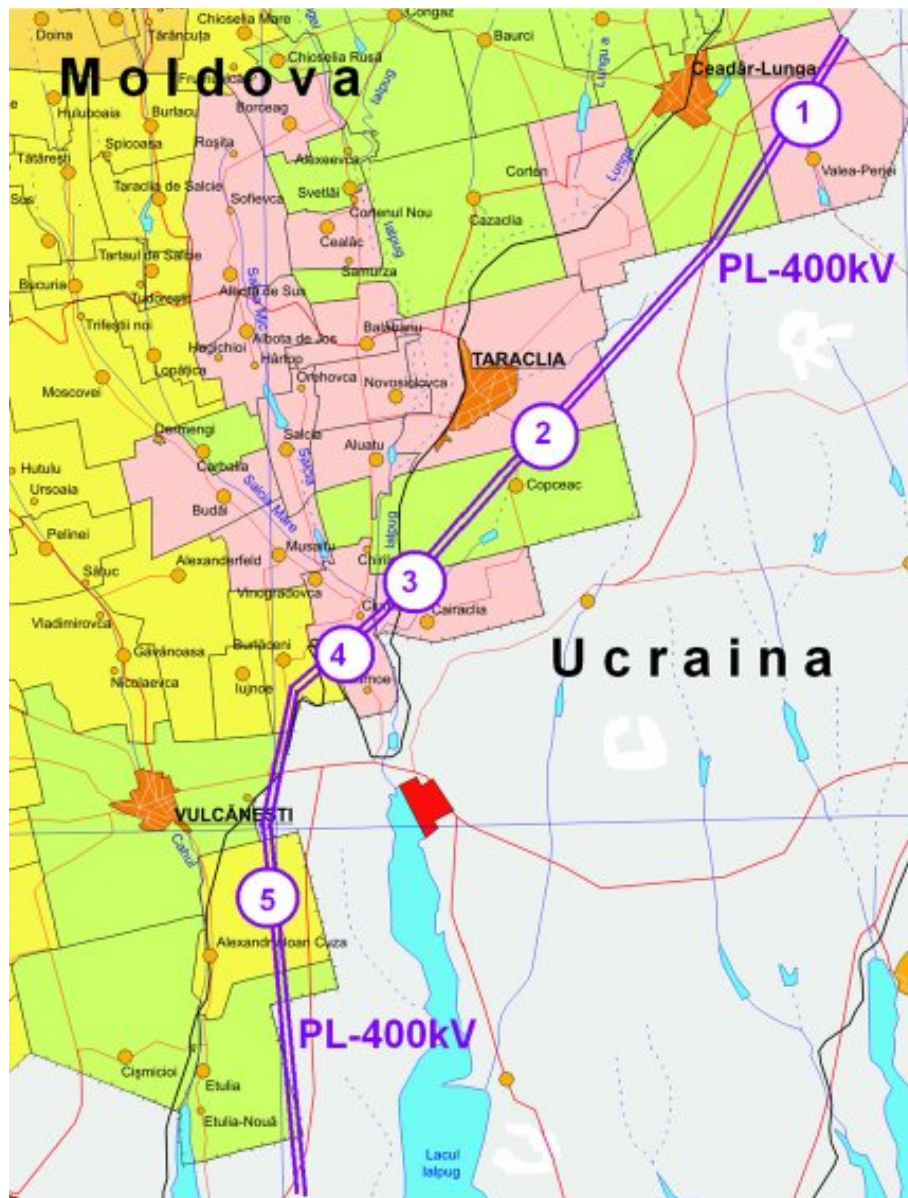


Fig. 1. Places of compact Saker Falcon nesting in the south of Moldova.

In the south of the republic in the researches area only the spotted spotted suslik (*Spermophilus suslicus*) inhabits in group settlements (colonies), which occupy the areas from two-three tens of hectares and located on sites with natural vegetation where sheep are usually grazed. Spotted susliks live in small groups by 2-10 and more individuals. Their inhabited holes (spring holes) are situated near one from another and are connected by system of footpaths.

We have supervised five colonies of spotted suslik. The first settlement is located in a beam 3 km to the west from the first site of compact Saker Falcon inhabiting. Here susliks are distributed by groups on low sites of the beam with density 25-40

”holes” per hectare (in spring). The second settlement is located on northwest of Valea Perjei village and occupy the area of several hectares. The density of spotted susliks after awakening from hibernation was about 50-60 individuals per hectare. The third settlement of spotted susliks was located on a beam near Copceac village, has the area about 20 hectares and density of spotted susliks was 20-25 individuals per hectare. This colony is in depression. The fourth settlement is located in Ialpuh river valley, near Cairaclia village, occupy the area of 30-40 hectares with well developed grassy cover. The density of spotted susliks after awakening was varying within the limits of 40-60 individuals per hectare. The fifth colony with the area about 20 hectares is near Etulia village. The density of spotted susliks is of 20-25 individuals per hectare. The first, second and fourth colonies are approximately in 3 km from Saker Falcon nests, the third and the fifth ones - near to nests.

Results and Discussions

Results of Moldova territory study in search of Saker Falcon nesting places for the period of 2005 – 2009 have shown that the behaviour of the species during nesting period has strongly changed. Route accounts have revealed only one compact settlement in the south of the country. Three Saker Falcon meetings were registered (2007, 2008 and 2009) in Prut river valley near Brinzeni village, however its nests it weren't found in this place [1]. It is necessary to notice, that potential nesting places for Saker Falcon in republic are available in enough quantity. In these biotops there are available raven nests in woods and on support of PL-330 kV, passing through all territory from the north to the south, and colonies of spotted susliks (*Spermophyllus europaeus*, *Spermophyllus suslicus*) nearby, however, on nesting this species in the study areas is not yet recorded. In 2005 on electric main PL-400 kV 15 nesting sectors of Saker Falcon (10-12 nesting pairs) were registered, in 2006 were revealed - only 12 (7-8 nesting pairs), in 2007 - 8 nesting sites (5 nesting pairs), in 2008 - 5 nesting pairs, in 2009 - 4 nesting pairs (tab.1).

Table 1. Distribution of nesting territories and nesting pairs in different years in the south of Moldova

Area of compact inhabiting	Area km ²	2005	2006	2007	2008	2009	Total nest pair (2005-2009)	Average nesting pairs per annum
№1	56	2/1	3/2	4/3	5/4	5/3	13	2,6
№2	40	5/4	2/1	2/1	1/0	1/0	6	1,6
№3	32	3/2	3/2	1/1	2/1	1/1	7	1,4
№4	24	3/3	2/2	2/0	0/0	1/0	5	0,8
№5	40	2/2	2/1	1/0	0/0	0/0	3	0,8
Total	192	15/12	12/8	8/5	7/5	7/4	34	

As it can be seen from the table, the general number of Saker Falcon nesting pairs is constantly reducing. We consider as one of principal causes of the given phenomenon the number decreasing of susliks. As it has been specified earlier [1, 3] the Saker Falcon in Moldova consume almost exclusively susliks. The obtained data on suslik accounts in the south of Moldova have shown that its number has really drastically decreased approximately by 20-30% due to droughty years of 2005-2006. However, an important

role had the gradual decrease of raven number, as nest supplier for Saker Falcon (personal and colleagues observation). Old nests are quickly destroyed and, although the Saker Falcon tries to nest in them, these attempts often appear unsuccessful. Distribution of Saker Falcon nests in the south of Moldova shows that the reduction of places of local inhabiting and number falling goes in a direction from the south to the north. It can be seen on the year average of nesting pairs number (see table). In area of Valea Perjei village a relative stable outbreak of this species inhabiting is preserved. Probably, in favorable after humidity years and increase in number of spotted suslik the Saker Falcon number will also increase on its sites of compact inhabiting in opposite direction. It is necessary to mention, that at reduction of general number nesting Saker Falcon, the efficiency of their nesting changes (tab. 2) a little.

Table 2. Number of flying off nestlings of Saker Falcon

Area of compact habitats	2005	2006	2007	2008	2009	Total nestlings	Average per annum on 1 pair
№1	4	8	9	14	11	46	3,54
№2	12	4	3	0	0	19	3,17
№3	7	7	4	5	3	26	3,71
№4	8	6	0	0	0	14	2,80
№5	5	3	0	0	0	8	2,67
Total	36	28	16	19	14	113	3,32
Average on 1 pair	3,0	3,5	3,2	3,8	3,5	3,3	

The average of the fledged nestlings on 1 nesting pair remains approximately at the same level with fluctuations from 3,0 up to 3,8 at average value of 3,3 fledged nestlings on 1 pair. The greatest reproductive success was recorded in 2008 (3,8 young birds), 2009 and 2006, the least – in 2005. The beginning of egg laying is noted at the end of March. The average size of 5 laying was 4 eggs (varying from 1 up to 5 eggs). One laying has been left at a stage of 1 egg (Fig. 2, 3). All the pairs finished the egg laying by the end of April. At whole 5 pairs had been postponed 20 eggs, 3 eggs were lost, the withdrawal was of 15%.

According to data collected in 2009, we tried to estimate the breeding success of Saker Falcon in the south of Moldova in incubatory and nesting periods and the probability of its survival in the given conditions. As basis of these calculations the Mayfield [2] technique was used, after which, as the author testifies, a more objective estimation of death rate of the species during the nesting period is given. As the Saker Falcon is a rare species not only of Moldova fauna, but also in the Europe fauna, we have decided to apply the given technique, to judge more objectively the condition of this species in our country. From the studied bibliography we did not find cases of this technique use with reference to Saker Falcon. For comparison simple calculation of survival rate on empirical data was given, when the quantity of successful nests, eggs, nestlings was divided on the general number of active nests (tab. 3).

Data from table 3 shows that at simple calculation of destruction percent and survival rate of Saker Falcon in incubatory and nesting periods the percent of destruction is slightly underestimated and the survival rate – is a little overestimated.



Fig. 2. Incubating female and male near a nest.



Fig. 3. Laying eggs of Saker Falcon (nest 1 and 6).

Table 3. The Basic parameters of survival rate of Saker Falcon during reproduction in 2009

	Exposure days	Losses	Losses, %		Survival probability,%	
			Mayfield	Simple	Mayfield	Simple
Nests	243	3	61,9	42,8	38,1	57,2
Nestlings	728	2	13,2	14,2	86,8	85,8
Eggs	560	3	13,1	15,0	86,9	85
Average			28,7	24	71,3	76

For example, the withdrawal of eggs at empirical calculation was of 15%, while after Mayfield method – only 13,1%. This also concerns the nestling period - 14,2% and 13,2%. It is the result of the fact that at simple calculation some risk factors during all incubations and developments period of nestlings are not considered. By Mayfield [2] technique the probability of destruction or a survival for the concrete period was taken into consideration, during which the nest, the laying or nestlings were under supervision. Besides the given technique allows avoiding data acquisition by backdating. In our opinion, in spite of the fact that it has been applied on passerine birds, the given technique estimates the situations more objectively and offer statistically correct estimation of death rate and survival rate of the species when applied to the

Saker Falcon. The control of statistical reliability of the obtained results on death rate of Saker Falcon in incubatory and nestling periods showed that the given situation occurs in nature at probability level of $P > 0.02$, that is in 98% of cases, which is quite acceptable for zoological researches (tab. 4).

Table 4 it is created to estimate the Parson x-square test, whether there is a real distinction in death rate between the period of incubations and the period of nestlings. Observable distinction in this case can be possibly expected as significant and real, statistically significant. In case of more data this real distinction can be specified.

Table 4. Comparison of mortality in incubation and nestling periods in Saker Falcon in 2009

	Nest-days with losses	Nest-days without losses	Total nest-days
Incubation period	84	476	560
Nestling period	104	676	780
Total	188	1152	1340
$\chi^2 = 6.037, P > 0.02$			

Conclusions

Results of inspection of territory of Moldova in search of nesting places Saker Falcon have shown that the behaviour of a kind during the nested period has strongly changed. Routeing accounts have revealed while only its one compact settlement in the south of the country. Three have been fixed (2007, 2008 and 2009) meetings Saker Falcon in the Rod valley near with Brinzeni village, however its nests it has not been found in this place. It is noticed that total number of nesting pairs Saker Falcon is constantly reduced. We consider as one of principal causes of the given phenomenon decrease in number of gophers. We consider as one of principal causes of the given phenomenon decrease in number of gophers. Thus an important role gradual decrease in number of a raven, as supplier of nests for Saker Falcon has played also. It is necessary to notice that at reduction of an aggregate number nesting Saker Falcon, efficiency of their nesting changes a little. The average of the taken off baby birds on 1 nesting pair remains approximately flush with fluctuations from 3,0 to 3,8 at average value of 3,3 taken off baby birds on 1 steam. The greatest success of reproduction has had for 2008 (3,8 young birds), 2009 and 2006, the least? For 2005. It is necessary to notice that potential places for nesting Saker Falcon in republic are available in enough.

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