

## *Diet of Saker Falcon (Falco cherrug) and Eastern Imperial Eagle (Aquila heliaca) from Central Kazakhstan*

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**Abstract.** We present results from a study on the diet of Saker falcon (n = 15 nests) and Eastern imperial eagle (n = 2 nests) from south Kazakhstan, on the basis of food remains and pellets collected during the 2009 breeding season. The main prey for Saker falcon was predominantly rodents living in middle-size colonies - *Spermophilus erythrogenys* and *Rhombomys opimus*. We also present the results from the diet of two pairs of Eastern imperial eagles nesting close to Balkhash Lake.

**Keywords:** Diet, *Falco cherrug*, *Aquila heliaca*, Central Kazakhstan

### **Introduction**

The Saker falcon (*Falco cherrug*) and the Eastern imperial eagle (*Aquila heliaca*) have almost overlapping distribution ranges - they are found from central Europe to eastern Asia. Both species have high conservation status: *F. cherrug* is Endangered and *A. heliaca* is Vulnerable, with populations on the decline in recent years (BirdLife International (2014) IUCN Red List for birds).

Until the early 90s of the XX century, the Saker falcon was a common breeding bird throughout its range and it could be found everywhere in Kazakhstan. The number of Sakers decreased during last 20 year on the average by 5-6 times and currently is estimated at about 1000 pairs. The decline has been generally caused by illegal catching of birds for falconry (LEVIN, 2011). On the contrary, *Aquila heliaca*'s population in Kazakhstan stays generally stable to increasing (KARYAKIN *et al.*, 2011).

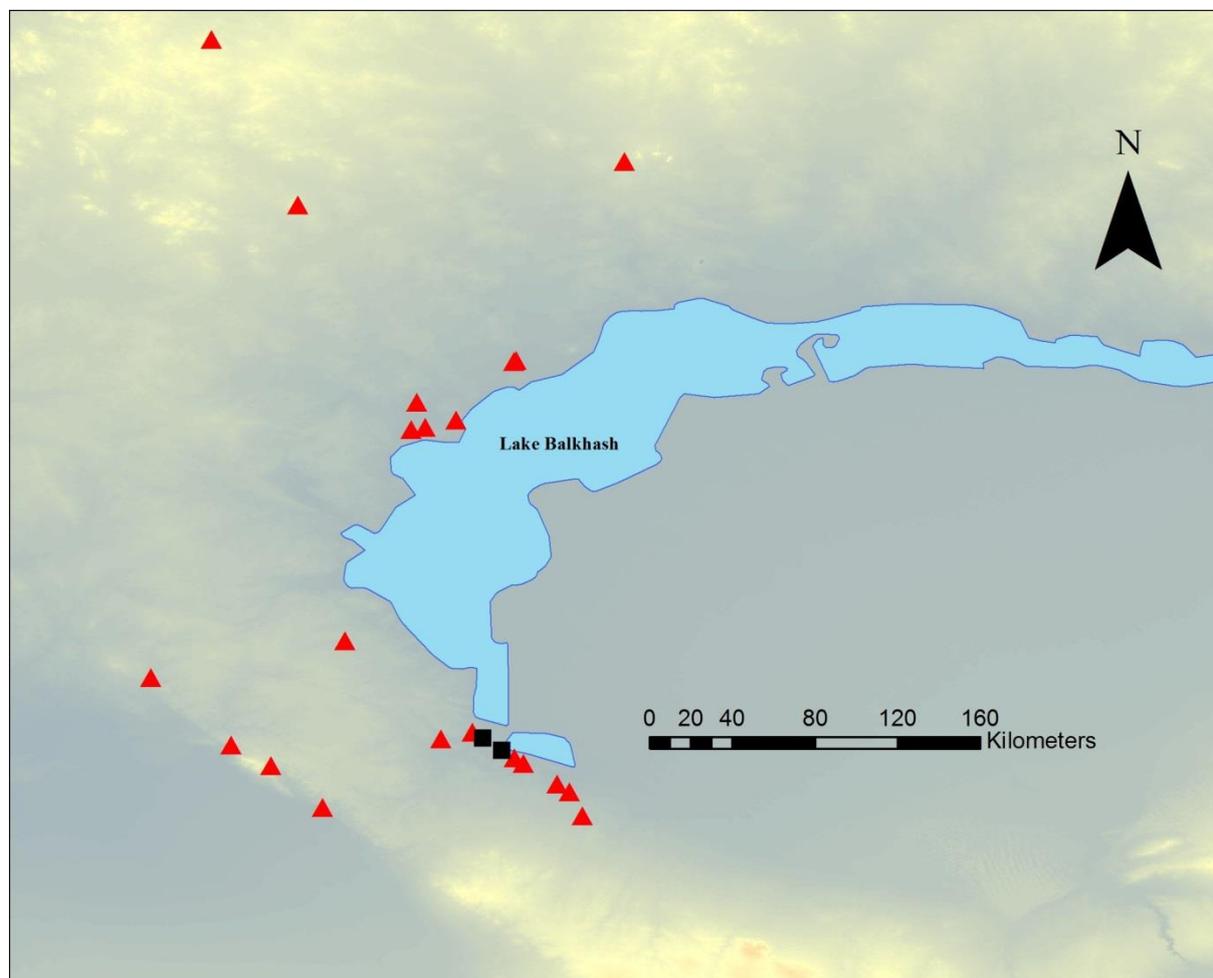
Data on their feeding and diet for both species come predominantly from the northern part of Kazakhstan, such as from the Naurzum reserve, where studies are continuing for over 70 years. Information on the diet of the Saker are provided in VOLOSHIN (1945), GIBET (1960), PERERVA (1979), SOLOMATIN (1974), BRAGIN (1986), PFEFFER (1986), WATSON & CLARKE (2000), BRAGIN (2001), and for the Eastern imperial eagle - GIBET (1960), VARSHAVSKY (1973), SOLOMATIN (1974), KATZNER *et al.* (2006). For the rest of the range of both species the data is limited. This study provides much needed and current data for the diet and the feeding ecology of both species from central Kazakhstan.

### **Material and Methods**

During the breeding season (May-June) of 2009, during monitoring of the population of the Saker falcon (*F. cherrug*) in central Kazakhstan were identified 20 pairs, and

data on diet were collected from 15 nests. Mainly pellets were studied (138), along with a small quantity of food remains. Data on diet were collected from two nests of the Eastern imperial eagle (*A. heliaca*), near the Balkhash lake (Fig. 1). In this part of Kazakhstan both species nest predominant-

ly on poles of the high-voltage electric infrastructure; three nests of the Saker falcon were found on rocks. The Saker utilizes abandoned nests of the Brown-necked Raven (*Corvus ruficollis*) and the Long-legged Buzzard (*Buteo rufinus*).



**Fig. 1.** Study area in central Kazakhstan, near the Balkhash Lake. Triangles show the locations of the 15 nests of the Saker falcon (*Falco cherrug*), squares - the two nests of the Eastern imperial eagles (*Aquila heliaca*).

The materials were collected from the nests or underneath, in a radius of 5–10 meters. The collected pellets were carefully and separately placed in paper and then in bags, to preserve their entirety. Pellet contents and prey remains were identified to the lowest taxonomic level possible based on comparison with reference materials and the minimum number of individuals (MNI) in each pellet or prey remain was estimated from body parts and from quantities of fur or feathers. The mammals were identified

based on GROMOV & ERBAJEVA (1995), SLUDSKIY (1978), as well as on a comparative collection of small mammals maintained by NN. Birds were identified based on the comparative osteological collection of the National Museum of Natural History-Sofia, Bulgarian Academy of Sciences.

#### *Study area*

The Betpak-Dala desert is situated between the lower courses of the Chu and Sarysu rivers and the western bank of the

Balkhash Lake. The eastern part is a continuation of the Kazakh Uplands (*Kazakhskiy Melkosopochnik*) and a substantial part of it is represented by a rocky desert. The western part is clay plain and is a typical example of a clay desert. The yearly amount of rain is 100–150 mm. The summer is dry and hot, the amount of rain increases from the second half of September. Snow falls from the end of November; it holds for 2.5–3 months (GVOZDETSKIY & MIKHAILOV, 1978).

Several plant associations are found in the desert, the main being *Artemisia terrae albae* – it participates in the formation of almost all plant complexes, *Artemisia sublessingiana* – characteristic of the rocky and clay habitats, *Salsola laricifolia* – the predominant landscape and vegetation cover in the Betpak-Dala desert, *Anabasis salsa* – characteristic of the salinized areas. In the desert, 59 species of mammals have been identified, with 36 of these (63%) being rodents (ISMAGILOV, 1961).

## Results

### *Diet of Saker falcon*

In the diet of the Saker falcon were identified 164 food components (Table 1). Mammals occupy the predominant portion (87.8%), followed by birds (9.15%). A major part of the diet is composed of medium-sized colonial rodents – Red-cheeked Souslik (*Spermophilus erythrogegnys*) and Great gerbil (*Rhombomys opimus*) form 66.6%. The Gerbils (*Meriones* sp.) also compose an important part of the diet – 10.91%; the rest of the mammals are represented by single individuals. A large portion of the rodents (19.39%) are unidentifiable to the species level because of the poor state of the material in the pellet, but they are from rodents with the size between a Souslik and a Gerbil.

Birds represent a relatively small part of the diet of the Saker (9.15%); the predominant portions were larks (*Melanocorypha*, *Calandrella*).

Two specimens of snakes (Serpentes) were also found, but could not be identified to the species level.

**Table 1.** Diet of the Saker falcon (*Falco cherrug*) from central Kazakhstan, based on 15 nests.

Species	N	N%
<i>Crocidura</i> sp.	1	0.61
<i>Ochotona</i> sp.	1	0.61
<i>Allactaga elater</i>	1	0.61
<i>Allactaga major</i>	1	0.61
<i>Spermophilus erythrogegnys</i>	47	28.48
<i>Rhombomys opimus</i>	30	18.18
<i>Meriones lybicus</i>	6	3.64
<i>Meriones meridianus</i>	6	3.64
<i>Meriones</i> sp.	6	3.64
<i>Microtus socialis</i>	2	1.21
<i>Mus musculus</i>	1	0.61
<i>Ellobius talpinus</i>	2	1.21
Rodentia ind. Jerbil/Souslik size	32	19.39
Mammalia ind.	9	5.45
<i>Falco cherrug</i>	1	0.61
<i>Peridix perdix</i>	1	0.61
<i>Coturnix coturnix</i>	1	0.61
<i>Melanocorypha</i> cf. <i>calandra</i>	3	1.82
cf. <i>Melanocorypha</i>	1	0.61
cf. <i>Calandrella</i> sp.	1	0.61
Aves (Passeriformes)	7	4.24
Serpentes	2	1.21
Coleoptera	1	0.61
Ortoptera	2	1.21
<b>Total</b>	<b>165</b>	<b>100.00</b>

### *Diet of Eastern imperial eagle*

In the pellets and food remains of the two pairs of the Eastern imperial eagles were identified the remains of 33 prey items (Table 2). The diets of the two pairs differ greatly – one pair has specialized in hunting over or near the Balkhash lake. In its diet are prey items, linked with wetland habitats: egrets (*Ardea cinerea*, *Ardea alba*), Cormorants (*Phalacrocorax carbo*), and the Muskrat (*Ondatra zibethicus*). The second pair hunts predominantly rodents, with the Great gerbil (*Rh. opimus*) composing 38.1%. Remains of one Horsfield's tortoise (*Testudo [Agrionemys] horsfieldi*) were also identified.

**Table 2.** Diet of the Eastern imperial eagle (*Aquila heliaca*) from the region of the Balkhash Lake, based on two nests.

Taxon/Nest	AH1		AH2		Total	
	N	%	N	%	N	%
<i>Spermophilus erythrogegnys</i>	1	4.8	1	8.3	2	6.1
<i>Rhombomys opimus</i>	8	38.1	1	8.3	9	27.3
<i>Ondatra zibeticus</i>			4	33.3	4	12.1
Rodentia (Jerbil/Souslik size)	3	14.3	2	16.7	5	15.2
<i>Phalacrocorax carbo</i>			1	8.3	1	3.0
<i>Ardea alba</i>			1	8.3	1	3.0
<i>Ardea cinerea</i>			1	8.3	1	3.0
Aves ind.	8	38.1	1	8.3	9	27.3
<i>Testudo horsfieldi</i>	1	4.8			1	3.0
<b>Total</b>	<b>21</b>	<b>100.0</b>	<b>12</b>	<b>100.0</b>	<b>33</b>	<b>100</b>

### Discussion

Data from previous studies on the diet of the Saker falcon from the region of Dedpak-Dala are provided by PFEFFER (1986). From the analyzed 54 pellets from three nests, mammals composed the predominant portion of the diet (82.8%), followed by birds (4.7%). The main diet component were Tamarisk jerbil (*Meriones tamariscinus*) (46.9%) and Red-cheeked Souslik (32.8%), comprising 78.7% of the food of the Sakers. These differences with the data presented in this study might be connected with dynamics in the population abundance, better pronounced with the Gerbils (*Rh. opimus*, *Meriones sp.*) than with the Souslik (*Spermophilus sp.*). This is mainly due to different climatic factors, as well as to epizootic disease with this group, which serves as a reservoir for plague, tularemia and others (PALVINOV *et al.*, 1990; ISMAGILOV, 1961). The abundance of the Great gerbil (*Rh. opimus*) exhibit substantial fluctuations in the periphery of its range, and the Bedpak-Dala desert is in the northern extreme of its distribution (ISMAGILOV, 1961).

Another explanation is that in the desert there is a well-pronounced zonal separation amongst the different rodents. Tamarisk jerbil (*M. tamariscinus*) demonstrates an intra-zonal distribution,

inhabiting wetter areas in the desert, in close proximity to water sources – wells, rivers, etc. (ISMAGILOV, 1961). Considering the small sample size of only three nests, it is possible that they were situated in close proximity to a colony of *M. tamariscinus*.

One case of cannibalism was documented. In the nest of a pair with three juveniles an almost complete skeleton of an adult Saker falcon was located. Cases of cannibalism are rare, and so far have been recorded in Kazakhstan (WATSON & CLACK, 2000) and Slovakia (OBUCH & CHAVKO, 1997).

A predominant part of the diet of the Saker falcon in Kazakhstan is composed of Sousliks (*Spermophilus sp.*). Data from the Naurzum reserve collected systematically since 1936 show an almost doubling in the quantity of Sousliks in the pellets of the Saker (VOLOSHIN, 1946; GIBET, 1960; SOLOMATIN, 1974; BRAGIN 2001).

This is completely different when compared to the situation in central Europe, where the Souslik numbers are decreasing and it has almost disappeared; this prey item has been substituted with pigeons (*Columba sp.*) (FREY & SENN, 1980; BAGYURA *et al.*, 1994; HORAK, 1997; OBUCH & CHAVKO, 1997).

Data on the diet of the Eastern imperial eagle are available from the northern part of

Kazakhstan – the Naurzum reserve (SOLOMATIN, 1974). The reserve contains two lakes. The author separates the eagles there in two categories based on diet: “lake” and “steppe” eagles. Some pairs are specialized in hunting birds, connected with wetlands and feeding on aquatic prey such as fish (“lake” eagles), other pairs are specialized in hunting rodents (“steppe” eagles). According to SOLOMATIN (1974), the Eastern imperial eagle hunts predominantly injured or old large waterfowl. Although limited material exists, the two pairs from central Kazakhstan described in this study vary in their diet and each of pairs can be attributed to one of the two categories, proposed by SOLOMATIN (1974). From the desert parts of north of the Aral Sea, VARSHAVSKY (1979) identified the gerbils as a major component of the Eastern imperial eagle’s diet.

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