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Recent breeding records of Saker Falcons *(Falco cherrug)* in Bulgaria

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Abstract The population of Saker Falcon *(Falco cherrug)* in Bulgaria suffered dramatic decline during the 20th century due to habitat destruction, nest robbery, illegal killing, poisoning, electrocution and other threats. The last well documented successful breeding of the species dates back to 1997. In 2011 a reintroduction program with captive-bred Saker Falcons was launched in Bulgaria to recover the species. Here, we present recent breeding records of Saker Falcons in three breeding territories in south Bulgaria. For the period 2017–2023, we recorded 7 breeding attempts in which 15 nestlings were successfully raised.

Keywords: endangered species, reintroduction, population recovery, breeding success

Összefoglalás A kerecsensólyom *(Falco cherrug)* populációja drámai csökkenést szenvedett el Bulgáriában a 20. században az élőhelyek elpusztítása, fészekrablás, illegális vadászat, mérgezés, áramütés és más veszélyeztető tényezők miatt. A faj utolsó, jól dokumentált, sikeres költése 1997-ben volt. 2011-ben Bulgáriában fogságban tenyésztett kerecsensólymokkal indítottak visszatelepítési programot. Itt bemutatjuk a kerecsensólymok legújabb költési adatait három dél-bulgáriai költőterületen. A 2017–2023 közötti időszakban 7 költési kísérletet regisztráltunk, amelyek során 15 fióka repült ki.

Kulcsszavak: veszélyeztetett fajok, visszatelepítés, populáció helyreállítása, költési siker

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Introduction

The Saker Falcon *(Falco cherrug)* is a large falcon species with wide breeding range spanning from Central Europe to Eastern Asia. Due to a rapid population decline in most of its range, the species was uplisted to Endangered species in 2012 in the IUCN Red List of Threatened Species (BirdLife International 2024).

In Bulgaria, the Saker Falcon was reported as relatively common species especially in Dobrudzha in the 19th century (Farman 1869, Elwes & Buckley 1870). Until the mid-20th century, the population is largely depleted, and the species is already reported as rare (Patev

1950). Various factors contributed for the marked decline of the population. The national campaign for extermination of birds of prey in Bulgaria that took place during the first half of the 20th century most probably was among the main factors lead to decline (Arabadzhiev 1962). Other threats for the species were habitat destruction due to changes in agricultural practices and land management, intensification of the use of chemicals, activities which lead to the decline of European Ground Squirrel *(Spermophilus citellus)* populations. In the 1970s the population was believed to be not more than 50 pairs located mostly in the low mountains and highlands (Baumgart 1971, 1977). By the mid-1980s the population declined to only 15 pairs (Michev 1985). The population decline continued over the next decades most notably due to nest robbery, poisoning and habitat destruction (Iankov *et al.* 2013). In the 2000s, it was estimated that only 4–12 breeding pairs remained in Bulgaria (Nankinov *et al.* 2004, Nagy & Demeter 2006). Despite the numerous observations of adult birds in suitable breeding habitat in the period of 2000–2015 (Iankov *et al.* 2013, Ragyov *et al.* 2014), the last well documented successful breeding of the species was in 1997 in Western Balkan Mountain, where a pair raised two chicks (Stoyanov 2001).

A reintroduction program with captive-bred Saker Falcons from European origin was initiated in Bulgaria in 2015, following preparatory activities and pilot releases from 2011, aiming to recover the species as a breeder (Dixon *et al.* 2020, Lazarova *et al.* 2021, Petrov *et al.* 2021, 2022). Here, we present the first records in 20 years of confirmed breeding of Saker Falcons in Bulgaria and data on nest occupancy and breeding success.

Materials and Methods

We carried out intensive and systematic surveys for Saker Falcons in Bulgaria in suitable habitats (based on historical data, recent observation and availability of suitable breeding habitats). The survey efforts were intensified after detecting the first occupied breeding territory in 2017. Moreover, all observations of Saker Falcons during the breeding season were registered and evaluated. As potential breeding substrates, electric pylons, trees in riverine forests and cliffs in the footsteps of the mountains were defined. In the selected regions, the suitable breeding habitats were monitored most intensively between February and July. However, sporadic observations were done throughout the year. Observations were made in optimal meteorological condition with good visibility, no strong winds or rain. The high-voltage power lines were surveyed using a transect method, while the riverine forests and rocky areas were surveyed by observations from stationary viewpoints (Anderson 2007). Special efforts were done to read the rings of the individuals and identify their origin and year of release.

A territory was defined as occupied by a pair when courtship behaviour and display were observed (Steenhof & Newton 2007). The occupied breeding territories were visited at least 3 times during the breeding season to assess the breeding success. The breeding success (number of fledglings/number of incubating pairs) was calculated.

Results and Discussion

The breeding of the Saker Falcon in Bulgaria was confirmed only south of the Balkan Mountains. In the period 2017–2023, we recorded three breeding territories occupied by Saker Falcon pairs in the country. In total, 7 breeding attempts were recorded, 15 chicks were successfully raised until the age of fledging and 6 nestlings died before fledging. The average breeding success was 2 fledglings/incubating pair *(Table 1)*.

Territory A was occupied in 2017 by a pair of immature birds (raised and released in 2015). For 6 consecutive years 2017–2022, the territory was occupied by a pair, but in 2023, only a single individual was recorded. We recorded two changes of partners in that period. In 2020, the female was replaced by an individual raised and released in 2016. In 2021, the new female was found with injured wing after collision with a powerline and was replaced by another female in the same year. The pair occupied a Long-legged Buzzard's *(Buteo rufinus)* nest built on an electric pylon *(Figure 1)*.

We recorded 4 breeding attempts in that territory (2018–2021), 14 nestlings (out of 14 eggs – counted by drone) hatched but only eight fledged successfully. In 2021, three nestlings hatched but due to the injury of the female, they all perished as the male was not able to provide sufficient food. In 2022, there was a new female, but the pair did not breed. All individuals that occupied this breeding territory in the period 2017–2021 were ringed and were released as part of the reintroduction program for the species in Bulgaria. In 2022, neither the male nor the female were ringed and the single individual observed in the territory in 2023 was also not wearing a ring. These findings indicate that either these individuals were captive-bred and released but managed to remove their rings or they were hatched in the wild. However, the origin of these individuals remains unknown.

Territory B was discovered in 2022 when the pair was observed in the post-fledging period hunting together with one fledgling. In 2023, four nestlings hatched and all fledged successfully. The pair used a nest built by Long-legged Buzzards on a cliff. Both the female and the male were released as juveniles in 2019 in the frame of the species reintroduction program in Bulgaria.

Table 1. Number of occupied territories and breeding performance of the Saker Falcons in the period 2017–2023

1. táblázat Az elfoglalt területriumok száma és a kerecsensólymok költési teljesítménye a 2017–2023 közötti időszakban

Year	No of occupied territories	No of pairs	No of nestlings	No of fledglings	Breeding success (fledglings/ incubating pair)
2017	1	1	0	0	0
2018	1	1	3	2	2
2019	1	1	3	2	2
2020	1	1	5	4	4
2021	1	1	3	0	0
2022	2	2	Unknown	1	1
2023	3	2	6	6	3

Figure 1. Saker Falcon occupying a nest built by a Long-legged Buzzard on a pylon
1. ábra A kerecsensólyom egy pusztai ölyv által épített fészket foglal el egy oszlopon

Territory C was discovered in 2023 and most probably it was the first year when this territory was occupied by the pair. A Raven's *(Corvus corax)* nest built on a large cliff was occupied. The pair had two nestlings (out of three eggs) in 2023, and both fledged successfully. At least one of the individuals from that pair was ringed as it was released in 2020 as a juvenile in the frame of the reintroduction program.

Our results indicate that the population of Saker Falcon in Bulgaria is slowly increasing as a result of successful reintroduction program. In the frame of this program, 160 Saker Falcons were raised and released in the wild through the method of hacking over a 12 years' period (2011–2023) (Lazarova *et al.* 2020). All three occupied territories were located 40–60 km from the release site in areas with high abundance of European Ground Squirrels, which probably is the main prey for the species during the breeding season. However, more detailed studies on the diet of this incipient breeding population are needed.

Our observations show that all registered pairs were formed by young and inexperienced individuals which can explain the low number of fledglings in the first breeding attempts. However, with the aging of the partners, the breeding success improved e.g. in **Territory A** 4 fledglings were successfully raised on the third year of breeding. Due to the young age of the breeders and the small sample size, we could not compare our results with other studies from the species range in Europe. More studies are needed in this respect to draw meaningful conclusions about the quality of the territories where the species currently occurs.

Based on the surveys and observations of Saker Falcons during the breeding season, we propose that 1–2 more pairs might be present, therefore, surveys should continue in the future. Furthermore, considering the ongoing reintroduction program for the species, we can assume that new pairs might occupy new breeding territories in the future. Identifying these territories is crucial to ensure that conservation actions will be implemented to safeguard the survival of these pairs and increase their productivity. We encourage detailed surveys of the threats for the species in the occupied breeding territories and the adjacent areas and the implementation of target conservation actions to secure the recovery of the Saker Falcon population in Bulgaria.

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