

Current distribution of Chukar Partridge (*Alectoris chukar* J.E. Gray, 1830) in Sakar Mts, Southeast Bulgaria

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Abstract. The distribution and degree of breeding evidence of Chukar Partridge was identified by field observations in the period 2019-2023 in the area falling within the natural habitats of the species in Sakar Mountain. For the entire study period, a total of 22 different localities of the species with a certain breeding category were established and in 8 of them there was confirmed breeding. The average number of fledglings per successfully bred pair is 8.37 ± 2.2 (6-12 ind.). Non-pairing and non-breeding birds were also observed in 2021/2022 at sites where breeding success data were collected.

Key words: breeding density, breeding category, fledglings, reproductive success.

Introduction

The Chukar Partridge (*Alectoris chukar*) was noted as a mass and numerous species in the early 1930s (Sokachev 1931). This trend continued until the beginning of the 1950s (Patev 1950). After the 1960s, releases of large number of farm birds started and continued in the following decades (Simeonov *et al.* 1990). The number of the species has been declining since the late 1950s. The population decline persisted until the beginning of the new century and continued in the first decade of the 21st century (Patev 1950, Simeonov *et al.* 1990, Aebisher 1997, Birdlife International 2004, Nankinov *et al.* 2004, Stoychev *et al.* 2007, Delov 2015, Gruychev 2016). In Bulgaria, even at the present time, averages of about 6.000 individuals are released per year. Nevertheless, survival of these birds is low, with single individuals surviving to reproduction (Gruychev 2012). Although, hunting is very limited and hunting is mainly done on released birds into the wild, in the last decade there is no data on the breeding distribution of the species. In the past, 18 squares (10x10 UTM) with the presence of the Chukar Partridge were reported in the Sakar Mountain (Iankov 2007), and in the period 2007-2011, probable breeding was found in only one square (Gruychev 2016).

This study presents new data on the breeding distribution of the Chukar Partridge in the Sakar Mountain, SE Bulgaria.

Material and Methods

Study area

The study area includes thirteen 10x10 km UTM squares from Sakar Mountain (Fig. 1). Sakar is a low mountain in Southeastern Bulgaria, enclosed by the rivers Maritsa, Sazlijka, Tundja and Sinapovsa (Stoychev *et al.* 2008). The relief is hilly and slightly folded, and the climate is continental-Mediterranean. The average annual precipitations are between 8 and 13.5°C and the average amount precipitation is 500-900mm, with winter maximum and summer autumn minimum (Koprarev 2002). The natural vegetation in chukar habitats is represented by xerothermic Oak forest and secondary vegetation by Christ Thorn (*Paliurus spina-christi*) mixed with Jasminum (*Jasminum fruticans*) and

xerothermic grass formations with Belize (*Dichantieta ischaemi*) (Bondev 1991). Every year, fires break out in different parts of Sakar, destroying part of the native vegetation. In many places, plantations of black pine (*Pinus silvestris*) and cedar have been established on eroded and rocky terrain. In recent years, these crops are in poor condition and some of them have dried up. The avifauna of Sakar is represented by 253 bird species and it is one of the most important bird areas in Bulgaria (Stoychev *et al.* 2008).

Field methods

The distribution and degree of breeding evidence of Chukar Partridge were identified by field observations in the period 2019-2023 in the area falling within the natural habitats of the species in Sakar Mountain (as described by Simeonov *et al.* 1990; Gruychev 2014). Breeding evidence has been determined according to the standard 16-degree scale by Hagemeyer & Blair (1997). Thirteen squares in a 10-km Universal Transverse Mercator (UTM) grid, Lehrer & Delchev 1978) was visited 1 to 3 times every year between March and July. We used transect point's method with playback stimulations to determine the distribution of the species in 24 transects with total length of 164.667 km (Fig.1).

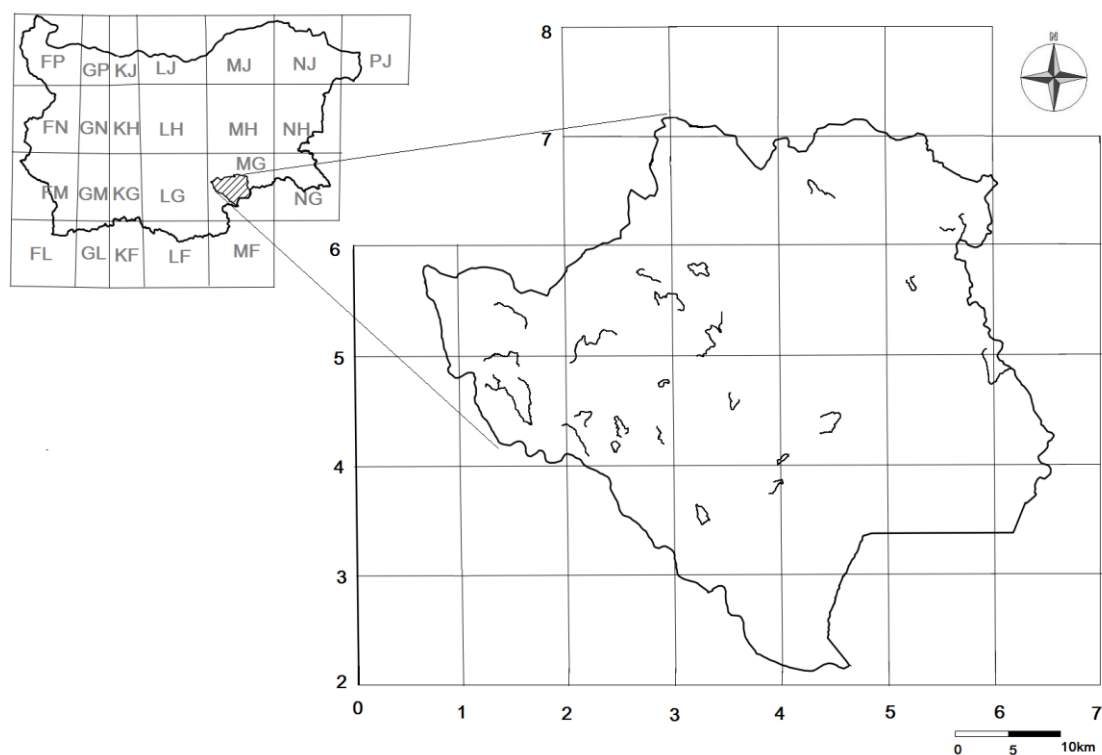


Fig. 1. Study area: in left – location of Sakar Mountain in the MG 35T UTM grid square, and in right location of transects in which the Chukar Partridge (*Alectoris chukar*) was studied.

At each transect, we played sound stimulation across 500 m at points from the start of transect. Observers stayed silently for 2 minutes and conducted count surveys for 10 minutes. Each survey was carried out in calm weather, without precipitation, between 4:30 am and 9:00 am. If the presence of the species is recorded, each transect was visited two more times to establish reproduction. During visits to determine breeding success, movement was accomplished by walking the entire length of the transect. Information about the release of captive-bred Chukars was obtained from hunting associations.

Results

Distribution

In 2019, one breeding site was registered with the category “confirmed breeding”. In 2020, a total of five sites were registered, and in three of them we had confirmed breeding, and in two probable breeding. Seven localities were registered in 2021, and in two of them we found confirmed breeding, and in four probable breeding. In 2022, seven breeding sites were registered – two with confirmed breeding and five with probable breeding and four breeding sites were registered in 2023, two with confirmed breeding and two with probable breeding (Fig.2A, B).

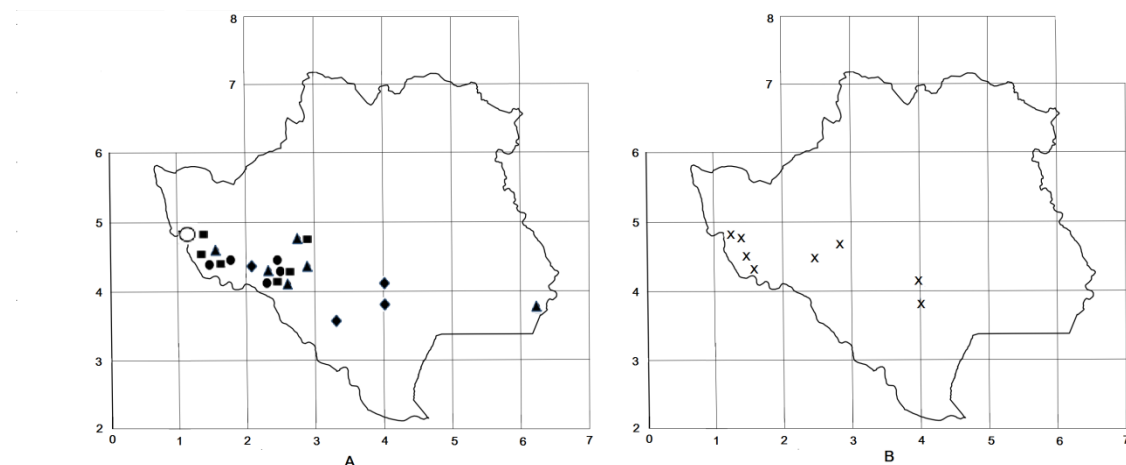


Fig. 2. Distribution of breeding localities (A) and sites with confirmed breeding (B) for the entire study period. (A: with a white circle are the breeding site in 2019; with a diamond in 2020; triangle in 2021; square in 2022 and with a black circle in 2023. B: X indicates places with confirmed breeding of Chukar Partridge).

Reproductive success

In eight breeding sites successful breeding was confirmed (Fig.2B). In 2019, the first successful nest site with 6 juveniles was established. Only eight successful breeding pairs were observed for the entire study period (Table 1).

Table 1. Number of fledglings by year and sites.

Year	Date	Site	Fledglings	Adult
2019	20,07	Balgarin	6	2
2020	11,07	Levka	8	2
2020	11,07	Levka	8	2
2021	5,07	Balgarin	12	2
2021	7,07	Balgarin	0*	2
2021	7,07	Izvorovo	0*	2
2022	23,07	Rogozinovo	7	2
2022	23,07	Balgarin	6	2
2023	15,07	Rogozinovo	9	2
2023	16,07	Dositeevo	11	2

Notes: * - Unsuccessful breeding pair; Site is the name of the nearest settlements to the corresponding breeding place.

The average number of fledglings per successfully bred pair is 8.37 ± 2.2 (6-12 ind.). Non-pairing and non-breeding birds were also observed in 2021/2022 at sites where breeding success data were collected.

Discussion

This study reported a distribution of Chukar Partridge with a specific breeding category in 6 UTM squares, and in 4 of them we had at least one confirmed breeding of the species for the entire study period. According to the recent studies in the Sakar Mountains (period 2007-2011), the species was found in 4 UTM squares, of which only 1 had a certain breeding category (Gruychev 2016). During the period 1995-2005, the Chukar Partridge was reported in 18 UTM squares in Sakar (Iankov 2007). These results show that there is inevitably a decline in the distribution of the species compared to the 1990s and the beginning of the new century, despite the fact that annually hunting associations released farm chukars in almost all suitable habitats for the species in Sakar. Some studies indicate changes in the habitats related to their fragmentation and reduction of productivity as one of the reasons for the condition of the species in the Sakar Mountains (Gruychev 2014). On the other, the released of farm chukars is accompanied by great losses (Gruychev 2012) and risks of disease transmission (Stoychev *et al.* 2007). The continued critical low level of distribution is likely due to negative impact factors that continue to limit population development. The distribution of the Chukar Partridge in the present study confirms some localities reported in the past (Stoychev *et al.* 2008; Gruychev 2012, 2016). All of the UTM square in which a confirm breeding of chukars was found in this study had farm birds released in the hunting grounds, therefore likely to be breeding of surviving single farm birds. Unfortunately, the number of birds found is too small and breeding density cannot be determined, rather we can talk about single breeding pairs.

For the entire study period, we were able to track the breeding success of 8 pairs. The average number of fledglings per successfully bred pair is 8.4. This result is close to the reported 9 juveniles of a successfully bred pair in the natural range of the species in Bulgaria between 2006-2011 years (Gruychev 2014). In the USA, long-term studies in the past have shown average brood size to range from 8.5 to 12.4 chicks per successfully breeding pair (Christensen 1970). The author also reports groups of 19 and 20 juveniles, which is probably the upper limit of a brood. The brood size found in this study is at the

lower limit of that known for the Chukar Partridge. This is probably due to the farmed origin of the birds, but further studies are needed on this matter.

This study establishes a limited distribution of Chukar Partridge in Sakar Mountain and confirms the results of previous studies (Stoychev *et al.* 2007, 2008, Gruychev 2016). Although farmed chukars are released annually by hunting associations, no increase in distribution has been observed. All this is probably due to negative factors that limit the development of the population and need for effective measures to restore the species in the wild.

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