

## OCCUPATION RATES OF ARTIFICIAL NEST BOXES BY LESSER KESTREL IN SPA “SAKAR” (BG0002021), BULGARIA

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### Abstract

*Lesser Kestrel often nests in urban areas, where is provided nesting sites and the level of threat of predation is lowland. Demolition of older buildings where the birds nested is the problems of the breeding range. Due to the drastic reduction of natural habitats, the placement of artificial nest boxes provides reliable nesting sites with a low risk of predation. Over 70 artificial nest boxes were installed on the territory of SPA ‘Sakar’ part of NATURA 2000 where the Lesser Kestrel has been successfully recovered as a breeder. The installed artificial nest boxes are different types providing more breeding opportunities. In this survey our goal is to process which factors affect the occupation rate of provided artificial nest boxes. The results showed that artificial nest boxes performances (type of the nest boxes, height above ground and etc.) significantly influenced the occupancy. We conclude that artificial nest boxes are of great importance in providing safe nesting sites.*

**Key words:** endangered species, *Falco naumanni*, Natura 2000, nest boxes.

### INTRODUCTION

Lesser Kestrel (*Falco naumanni*, Fleischer, 1818) often nests in urban areas, where is provided nesting sites and the level of threat of predation is lowland.

In Europe in each decade since 1950, have occurred declines equivalent to 46% and in South Africa on the wintering grounds, in each decade since 1971 there have been declines equivalent to 25% (BirdLife International, 2004).

The problems in the breeding range are include demolition of older buildings where the birds nested, intensification of agriculture, loss of habitat through afforestation, human persecution and urbanization, pesticide poisoning and interspecific competition (Biber, 1996). In South Africa the principal threats are the loss of grassland habitat to overgrazing and pesticide effects. When the birds are attracted to outbreaks of locusts or crickets, which are sprayed by farmers (Pepler, 2000).

The best method in birds' conservation is preserving suitable habitats by restoring degraded habitats or maintaining proper management practices. This method is contributed to the increase of population size and efficient in the conservation (Newton,

1994; Avilés & Parejo, 2004; Gottschalk et al., 2011; Olah et al., 2014).

Providing artificial nesting places is therefore conservation programmes need to evaluate their efficiency and costly (Korpimäki, 1985; Lowther, 2012; Lambrechts et al., 2012; Møller et al., 2014).

The critically low number of Lesser Kestrel populations and isolation, which do not allow the species to recover naturally, is the most serious problem today. Additional conservation efforts are necessary to preserve and ensure the sustainable existence of the recovered colony. The placement of artificial nest boxes provides reliable nesting sites with a low risk of predation, due to the drastic reduction of natural habitats. The artificial nest boxes for Lesser Kestrel are common practice in Europe. Countries like Bulgaria, Croatia, France, Greece, Italy, Spain, Portugal uses them for recovery as a breeding species and strengthening existing colonies (Yaneva et al., 2022a).

Lesser Kestrel can be described as representative of farmland birds. Given the food habitats it uses is a top predator in these territories, feeding with rats, amphibians, reptiles, etc. This defines it as particularly sensitive to changes in agricultural territory, where with the intensification, the capacity of

ecosystem services from these sources has significantly decreased.

## MATERIALS AND METHODS

The field studies were fulfilled on the territory of Lesser Kestrel Release and Adaptation Module in village Levka SPA “Sakar” (BG0002021) part of European Ecological Network NATURA 2000. In this territory for the species are laid targeted conservation activities by a team of “Green Balkans - Stara Zagora” NGO within a project “Better Life for Lesser Kestrel in South-East Balkans” LIFE19 NAT/BG/001017.

From 2020 until 2022 was monitored of the occupied artificial nest boxes. When is the breeding season of Lesser Kestrel was carried out the monitoring in the period from March to September. Except standard methods we are used additionally observation with follow-up: binoculars; field scope tube; camera and video surveillance (Yaneva et al., 2022b).

Through field standard observation methods audition have been carried out direct inspections of artificial nest boxes to following the occupied range and breeding success. Which are implemented during a certain period in order to determine the exact number of hatched chicks.

All information from the monitoring of observation from breeding seasons is filled in electronic data base of “Green Balkans - Stara Zagora” NGO.

With specialized electronic tape measure were measured all the artificial nest boxes placed near the Lesser Kestrel colony in village Levka SPA “Sakar” (BG0002021). The data are recorded in a specially developed form. In the artificial nest boxes form fill in number, type, type of the building on which it is installed and height above ground.

## RESULTS AND DISCUSSIONS

At the territory of the Lesser Kestrel colony in village Levka SPA “Sakar” (BG0002021) have been identified three types of artificial nest boxes:

- Type 1 - Classical wall artificial nest box;

- Type 2 - Cavity wall artificial nest box;
- Type 3 - Under-roof artificial nest box.

After data processing it was found that a total of 76 artificial nest boxes were installed as follows:

- Type 1 were installed 30 artificial nest boxes;
- Type 2 were installed 20 artificial nest boxes;
- Type 3 were installed 26 artificial nest boxes (Figure 1).

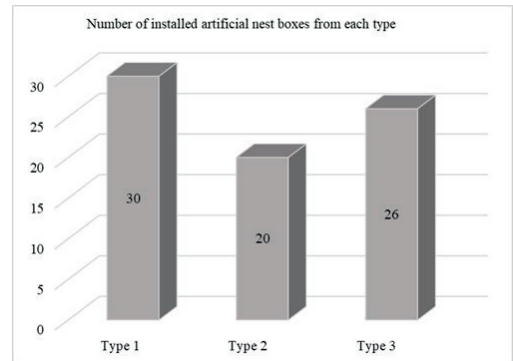


Figure 1. Number of installed artificial nest boxes from each type

All 76 installed artificial nest boxes in the territory of Lesser Kestrel colony were measured the height above ground in meters at which they are mounted. We obtain the following results:

- 4 artificial nest boxes are mounted at a height between 3.00-3.50 m;
- 7 artificial nest boxes are mounted at a height between 3.50-4.00 m;
- 32 artificial nest boxes are mounted at a height between 4.00-4.50 m;
- 16 artificial nest boxes are mounted at a height between 4.50-5.00 m;
- 17 artificial nest boxes are mounted at a height between 5.00-5.50 m (Figure 2).

From the field studies and the monitoring carried out during the breeding seasons of Lesser Kestrel in 2020, 2021 and 2022 are established 27 successful breeding pair in artificial nest boxes. These are 35.53% of the total number of all installed artificial nest boxes for Lesser Kestrel (Figure 3).

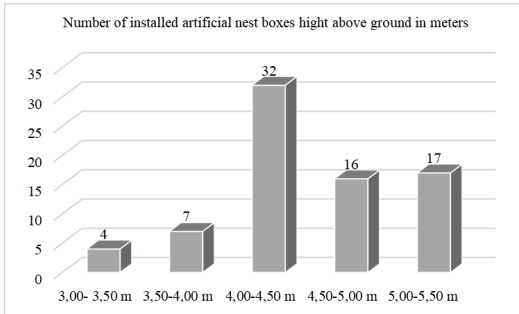


Figure 2. Number of installed artificial nest boxes height above ground in meters

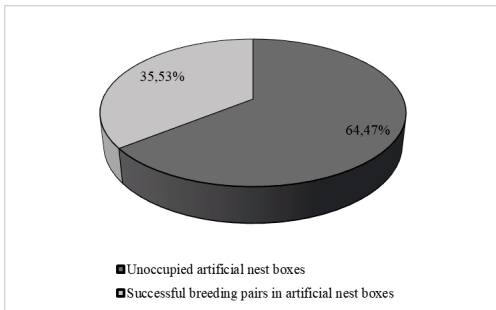


Figure 3. Successful breeding pairs and unoccupied artificial nest boxes in percents

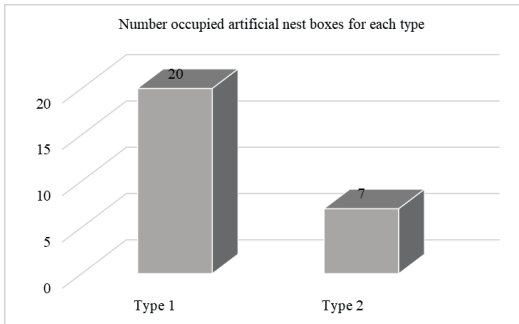


Figure 4. Number occupied artificial nest boxes for each type

During the study period we didn't record successful breeding pair in Type 3 (Under-roof nest box). In that reason we continued to consider only the two types that have been registered successful breeding pairs. 27 successful breeding pair are 54% of the total number of 50 installed artificial nest boxes of Type 1 and Type 2 for Lesser Kestrel (Figure 5).

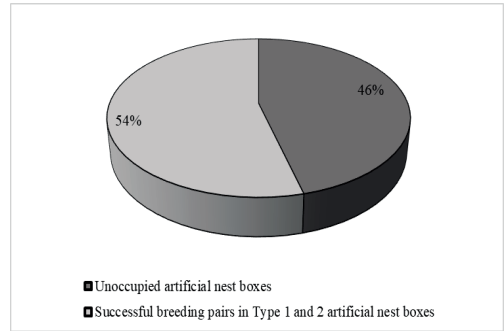


Figure 5. Successful breeding pairs and unoccupied artificial nest boxes of Type 1 and Type 2

All successful occupied artificial nest boxes we classified into three categories as occupied once, occupied twice and occupied three times.

For Type 1 - Classical wall nest box:

- Occupied once - 12 times;
- Occupied twice - 6 times;
- Occupied three times - 2 times.

For Type 2 - Cavity wall nest box:

- Occupied once - 3 times;
- Occupied twice - 3 times;
- Occupied three times - 1 time (Figure 6).

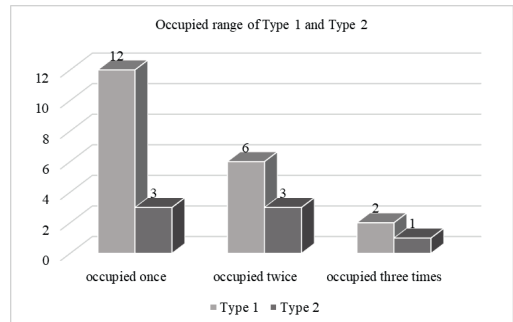


Figure 6. Occupied range of Type 1 and Type 2

According to the occupancy of the artificial nest boxes height above the ground during the study we found the following results (Figure 7):

- 3.00-3.50 m were occupied 1 time;
- 4.00-4.50 m were occupied 4 times;
- 4.50-5.00 m were occupied 10 times;
- 5.00-5.50 m were occupied 12 times

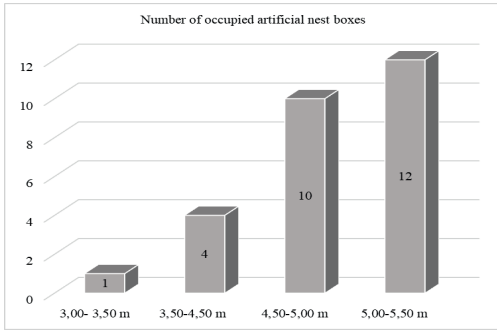


Figure 7. Number of occupied artificial nest boxes

For the parameters Fledging success, Breeding success and Eggs laid we obtain the following results:

For breeding season 2020 (Table 1) (Figure 8):

Table 1. Occupied rate per height above ground 2020

Breeding Season 2020			
Height above the ground	Fledging success	Breeding success	Eggs laid
3.00-3.50 m	0	0	0
3.50-4.00 m	5	5	5
4.50-5.00 m	22	24	28
5.00-5.50 m	32	35	41

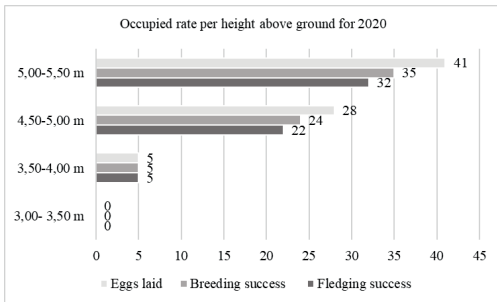


Figure 8. Occupied rate per height above ground 2020

For breeding season 2021 (Table 2) (Figure 9):

Table 2. Occupied rate per height above ground 2021

Breeding Season 2021			
Height above the ground	Fledging success	Breeding success	Eggs laid
3.00-3.50 m	0	0	0
3.50-4.00 m	2	2	3
4.50-5.00 m	16	16	18
5.00-5.50 m	15	16	28

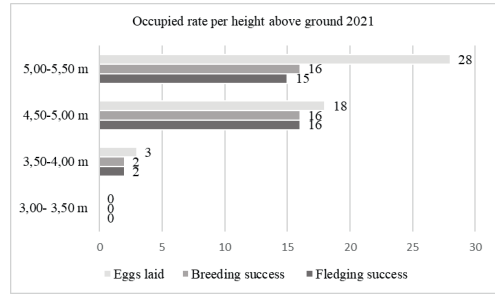


Figure 9. Occupied rate per height above ground 2021

For breeding season 2022 (Table 3) (Figure 10)

Table 3. Occupied rate per height above ground 2022

Breeding Season 2022			
Height above the ground	Fledging success	Breeding success	Eggs laid
3.00-3.50 m	4	4	5
3.50-4.00 m	12	13	14
4.50-5.00 m	18	19	24
5.00-5.50 m	20	22	27

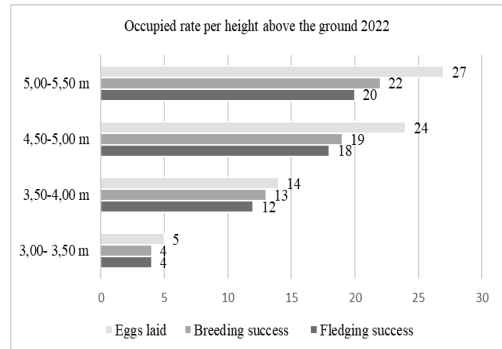


Figure 10. Occupied rate per height above ground 2022

For all the period of the study (Table 4) (Figure11)

Table 4. Occupied rate per height above ground 2020-2022

Breeding Season 2020-2022			
Height above the ground	Fledging success	Breeding success	Eggs laid
3.00-3.50 m	4	4	5
3.50-4.00 m	19	20	22
4.50-5.00 m	56	59	70
5.00-5.50 m	67	73	96

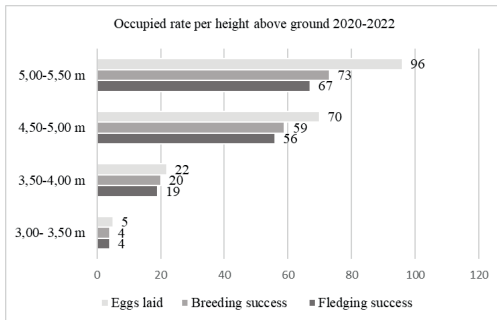


Figure 11. Occupied rate per height above ground 2020-2022

## CONCLUSIONS

The current study establishes that 35.53 % from the total 76 installed artificial nest boxes Lesser Kestrel breeding successful. It was found that 54 % of the total number of 50 installed artificial nest boxes of Type 1 and Type 2 are used successful from Lesser Kestrel.

From each parameters the height between 4.50-5.50 m was the most preferred for occupied rate.

Lesser Kestrel adapts extremely successfully to artificial nest boxes and this is a major way to conserve the species as well as increase its numbers all studies conducted show that.

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