Breeding Distribution and Nest Site Diversity of Barn Owl (Tyto Alba) in the Context of Restoration of Agricultural Sector in Central South Bulgaria

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Breeding distribution and nest site diversity of Barn Owl *(Tyto alba)* in the context of restoration of agricultural sector in Central South Bulgaria

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Boyan Milchev & Gradimir Gruychev 2014. Breeding distribution and nest site diversity of Barn Owl *(Tyto alba)* in the context of restoration of agricultural sector in Central South Bulgaria. – Ornis Hungarica 22(1): 69–75.

Abstract The Barn Owl *(Tyto alba)* bred in 15 UTM squares (75%, n = 20) of the Kazanlak Valley (central south Bulgaria) at 33 localities (55% confirmed, 12% probable and 33% possible breeding). Its distribution in the Valley was found to be five times larger and its population size ten times greater during our study period than previously thought. Evidence of one to five breeding localities (mean 2.2±1.3) was detected in each occupied UTM square. A breeding density of 4.1 bp/100 km^2 was close to the average in Central Europe. Nests inside or on metal frames and ducts were typical in the region and gave possibility for its successful breeding in most of the habitable buildings. The Barn Owls were breeding mainly in poorly maintained and abandoned buildings whose supply has not decreased markedly since the agricultural restoration started in Bulgaria after it joined the European Union and intensive industrial agriculture has resumed with EU support. Currently, it appears that Barn Owl is not threatened by a 'housing shortage' over the next decade.

Keywords: Barn Owl, *Tyto alba*, breeding density, nest site selection, conservation

Összefoglalás A gyöngybagoly *(Tyto alba)* a Kazanlak-völgy 15 UTM négyzetében költött (75%, n = 20) (Dél-Közép Bulgária) 33 helyen (55% bizonyított, 12% valószínű és 33% lehetséges költés). Az elterjedési területe a völgyben ötször, állománynagysága pedig tízszer magasabb a korábbiakban véltnél. Minden elfoglalt UTM négyzetben 1-5 költőhelyet találtak (átlag: 2,2±1,3). A Közép-Európára jellemző költőállomány sűrűségéhez (4,1 pár/100 km^2) közelít ez az érték. Jellemzően a fémszerkezeteken vagy azok belsejében és a szellőzőjáratokban épültek a fészkek, ezek a szerkezetek biztosítottak sikeres fészkelési lehetőséget a legtöbb gyöngybagoly lakta épületben. Elsősorban elhanyagolt, vagy elhagyatott épületekben fészkeltek, ezek mennyisége nem csökkent jelentősen, mióta Bulgária csatlakozott az Európai Unióhoz, és EU támogatással megindult a mezőgazdaság intenzifikálása. Úgy tűnik, hogy a gyöngybagoly nem fog fészkelőhely-hiánnyal szembesülni a következő évtizedben.

Kulcsszavak**:** gyöngybagoly, *Tyto alba*, állománysűrűség, fészkelőhely-választás, természetvédelem

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Introduction

The Barn Owl *(Tyto alba)* has a stable cosmopolitan population, and the IUCN (2013) assigned it into the 'least concern' category for global protection. But, it probably has undergone a moderate decline (>10%) in Europe and was evaluated as 'declining', thus it has got an unfavorable conservation status there (BirdLife International 2004). The main negative factors in Europe and North America are related to industrialized agriculture with mechanization and use of chemicals, loss of suitable roosting and nes-

ting sites and increased mortality with the expansion of the road network and increased traffic speed (Taylor 1994, Mebs & Scherzinger 2000, Golawski *et al*. 2003, Martínez & Zuberogoitia 2004, Martin *et al*. 2010, Hindmarch *et al*. 2012, Borda-de-Águaa *et al*. 2014). In Bulgaria, the Barn Owl population has been reported to be stable but, in fact, the species is poorly studied. Gaps in good information may explain the great differences in the range intervals of population estimates over the last decade, i.e. from 150-500 pairs (BirdLife International 2004) to as many as 1300-1700 pairs (Nankinov 2004).

The Barn Owl inhabits open agricultural landscapes where modernization of agricultural machinery, renovation of the agricultural buildings, and recultivation of abandoned lands has been underway since Bulgaria joined the European Union in 2007. This study aims to determine its present breeding distribution and types of nest sites in the context of the restoration of agricultural sector in the Kazanlak Valley in central south Bulgaria. The Barn Owl has been recently reported as a breeding bird in three localities in the Valley (Iankov 2007). It has not been included among 'other important species' in the Natura 2000 protected sites there (MOSW 2013). This must be changed in order to its protection as 'vulnerable' bird in the Bulgarian Red Data Book (Golemanski 2011).

Materials and methods

The Kazanlak Valley lies between the Stara Planina Mountains (highest local peak Triglav 2276 m a.s.l.) on the north and the Sredna Gora Mountains (peak Bratan 1236 m a.s.l.) on the south and it encompasses an area around 800 km^2. Its western border is the transverse Krastetz Hill (N 42°35` E 25°00`, 540 m a.s.l.) and the eastern one is the Mejdenishki Gorge (N 42°35` E 26°05`, 190 m a.s.l.) of the Tundzha River. The mostly flat valley floor is interrupted by superficial cones formed by rivers flowing down from the two mountains and the Tundzha River that drains the valley. Two reservoirs and irrigation channels are presented. The climate is moderate continental with mean temperatures ranging from 0 °C up to +1 °C in January (Kopralev 2002). Open habitats with prevalence of cultivated areas and low-intensity grazing pastures dominate the Valley. Major agricultural crops are wheat, barley and sunflower. The rose fields, which confer the popular name Rose Valley to the area, and lavender fields cover larger area of the northwestern and the western parts of the region. The forests are broad-leaved deciduous and comprise a small area, remaining mostly in riparian zones. Human settlements are mostly villages, with the exception of few small towns as the regional center Kazanlak, without any strongly developed industry now.

Data on Barn Owl's presence in the valley were collected in mid-June and early September 2012. Additional information was collected for three settlements in UTM square LH51 in mid-July 2013. We followed the methods described in Miltschev *et al*. (2002): (1) to look for pellets, faeces markings, feathers and nests of Barn Owls mainly in agricultural and stock-breeding compounds and separate buildings (n = 62 places). These sites were easier to access than residential and other buildings and were situated in the periphery of or away from settlements, but close to owl hunting grounds in nearby open habitats; (2) to search for Barn Owl remains (bones, feathers) in the Eagle Owl *(Bubo bubo)* pellets; (3) rocky slopes, single rocks and rocky gorges, quarries and steep riverbanks (n = 46) were stu-

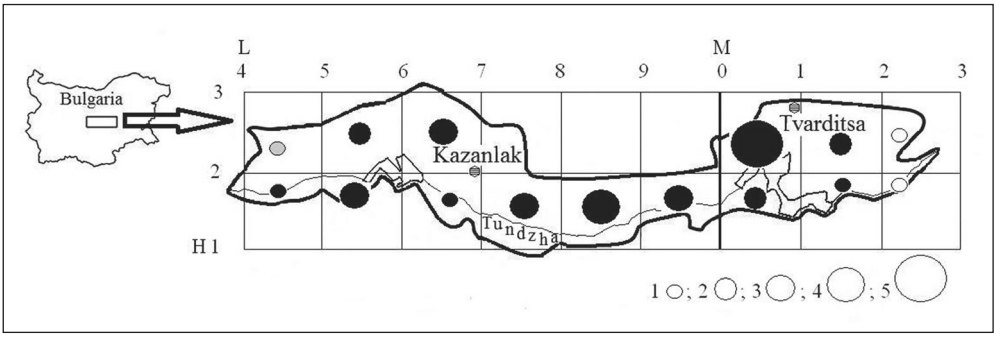

Figure 1. Breeding distribution and number of the Barn Owl *(Tyto alba)* in the Kazanlak Valley (CS Bulgaria): the five dimensions of circles (1–5) specify the number of breeding localities in the respective UTM square: 1 locality/square (6 squares, 30%, *n* = 20); 2 localities/square (3 squares, 15%); 3 localities/square (4 squares, 20%); 4 localities/square (1 square, 5%), 5 localities/square (1 square, 5%); the highest level of the breeding evidence in the respective square: black circle – confirmed breeding (12 squares, 60%, *n* = 20); grey circle – probable breeding (1 square, 5%); empty circle – possible breeding (2 squares, 10%)

1. ábra A gyöngybagoly fészkelések eloszlása és száma a Kazanlak-völgyben (Dél–Közép Bulgária) fekete kör – biztos költés, szürke kör – valószínű költés, fehér kör – bizonytalan költés

died as potential Barn Owl breeding places in conformity with a rock nest in SE Bulgaria (Milchev 2013). In this way, the variety of known breeding places in the country was covered. Species breeding was assessed as 'certain', 'probable' or 'possible' following Hagemeijer and Blair (1997) with specifications of Miltschev *et al*. (2002). All food remains and egg shells were deposited in the collections of the National Museum of Natural History (Milchev 2012). Breeding localities were mapped on a 10×10 km Universal Transverse Mercator (UTM) grid. Statistical differences in the frequency of the nest site types were calculated by chi-square tests.

Results

The study area falls within 20 UTM squares and Barn Owl bred in 15 of them (75%, *n* = 20), *(Figure 1)*. We discovered 33 breeding localities (55% confirmed, 12% probable and 33% possible breeding), and 31 of these localities (93.9%) were found in buildings. Two localities (6.1%, *n* = 33) were identified by finding the remains of five (one fledgling) and two specimens of Barn Owls respectively in the Eagle Owl pellets, which were assigned to the nearest settlement. One breeding pair per settlement was the average, and only two settlements (8.3%, *n* = 24 settlements) hosted two breeding sites. These nests were situated in the opposite ends of the settlements at distance 1.2 and 1.8 km respectively. One to five breeding localities (mean 2.2±1.3) were detected in the UTM square which having evidence of breeding. The breeding density in the Valley was 4.1 bp/100 km².

Barn Owls bred more often in habitable buildings (52.9%, *n* = 17), *(Table 1)*. The difference in the frequency of their use in the valley and neighbouring SE Bulgaria was insignificant. The most common nest sites in the Valley was inside rigid metal frames (41.2%, *n* = 17). Their use and breeding inside or on ventilation ducts were significantly more frequent in the Valley while

Nest site	Nest number		Number of buildings/bridges	
	CS Bulgaria (%, *n*=17)	SE Bulgaria (%, *n*=33)	abandoned CS Bulgaria (SE Bulgaria)	habitable CS Bulgaria (SE Bulgaria)
inside a rigid metal frame*	7 (41.2%)			7 (0)
on a cross-beam*	4 (23.5%)	9 (27.3%)	4 (5)	0 (4)
in an attic*	2 (11.8%)	12 (36.4%)	0 (7)	2 (5)
inside a ventilation duct*	3 (17.6%)	1 (3.0%)	3 (1)	
on a flat-topped ventilation duct	1 (5.9%)	1 (3.0%)	1 (1)	
between roofing plates		5 (15.2%)	0 (3)	0 (2)
niche with a ventilator		1 (3.0%)		0 (1)
on an interior wall		1 (3.0%)		0 (1)
under a bridge		2 (6.1%)		0 (2)
historical ruin		1 (3.0%)		0 (1)

Table 1. Barn Owl *(Tyto alba)* nest sites in Kazanlak Valley (CS Bulgaria) and neighboring SE Bulgaria (Miltschev *et al*. 2002, B. Milchev unpubl. data). * – a destroyed brood in a respective nest site in the Valley

1. táblázat A gyöngybagoly *(Tyto alba)* fészkelőhelyei a Kazanlak-völgyben Dél–Közép-Bulgáriában és a szomszédos Délkelet-Bulgáriában (Miltschev *et al*. 2002, B. Milchev unpubl. data)

the attics were preferred in SE Bulgaria ($\chi^2 = 25.20$, $df = 10$, $P < 0.01$).

Inside buildings darker places were selected as nest sites and their height was between 2.5 m and 6 m (mean 3.9±1.0). Barn Owls accessed them through missing windows, doorways and holes in walls (58.8%, $n = 17$) or through existing openings in the design of buildings (41.2%). Nest sites ranged from almost inaccessible to highly accessible for people. Four broods appeared to have been destroyed by mammalian predators (23.5%, $n = 17$), *(Table 1)*. The discrepancy between the observed and expected frequency of destroyed broods in different nest sites was statistically insignificant ($\chi^2 = 0.64$, $df = 4$, $P > 0.05$). Workers found between one and four fledglings under three nests located inside rigid metal frames, but only once two fledglings died because of inadequate human care. The owners and the workers in all inhabitable buildings with nests have a positive attitude towards the Barn Owls despite the necessity of regular cleaning of their pellets and excrement.

The subspecies *Tyto alba guttata* breeds in the Kazanlak Valley according to feathers of molting owls and prey remains from Eagle Owls and from four well observed birds in a total 21 localities.

Discussion

The secretive lifestyle of the Barn Owl has hampered locating them considerably as subjects for ornithological research (de Bruijn 1994, Taylor 1994), and Iankov (2007) noted the insufficient knowledge about the distribution of owls and other nocturnal birds in Bulgaria. Therefore, the fivefold broader breeding distribution and tenfold higher population size in the present study than previously thought (Iankov

2007) is not a surprise. This study corroborates the results of Miltschev *et al*. (2002), Milchev *et al*. (2006) and Boev *et al*. (2007) that the flat and hilly agricultural landscapes in south Bulgaria is the most suitable area for Barn Owls breeding in the country.

The breeding density in optimal regions of Europe can reach as high as 10-30 bp/100 km², but usually their density is only 5 bp/100 km² of Central Europe (Mebs & Scherzinger 2000, Golawski & Kasprzykowski 2006). In the Kazanlak Valley, Barn Owl density was close to the norm for Central Europe, but a comparison with data within Bulgaria is difficult. The entire Bulgarian population with 500-1000 pairs bred in 152 squares (10 km UTM grid, Iankov 2007). Therefore, the average density should be 3.3-6.6 bp/square, but it is several times greater than 'single or up to 2-3 bp/square' as a norm according to Iankov (2007).

The Barn Owl adapts to human presence and highly depends on man-modified habitats especially in Europe (Glutz von Blotzheim & Bauer 1994, Hagemeijer & Blair 1997, Mebs & Scherzinger 2000). Accordingly, our study identified some diverse characteristics of nest site in the region. Barn Owls have continued to breed mainly in poorly maintained and abandoned buildings similar to the situation in SE Bulgaria ten years ago (Miltschev *et al*. 2002). Their presence has not decreased significantly since Bulgaria has joined the EU and farm subsidies have been introduced. The number of buildings with potential breeding and roosting sites in villages earlier had increased as a result of the national and world economic crises and the demographic exodus from the countryside. The widespread availability of suitable nest sites inside villages corresponds to the large number of localities with probable and possible breeding in this study (45%, $n = 33$), where agricultural and stock-breeding compounds were used for roosting only. These results combined with the predominant positive attitude of local people towards the Barn Owl do not portend a negative population trend on account of the loss of suitable roosting and nesting sites in the Valley.

The nest site characteristics for dimensions and height coincided with published information (Simeonov *et al*. 1990, Glutz von Blotzheim & Bauer 1994, Taylor 1994, Miltschev *et al*. 2002). The nests inside or on metal installation were typical for the Barn Owl in Kazanlak Valley and may indicate the potential to breed successfully in more of the habitable buildings. But, nest types that afforded more protection from mammalian predation were not in evidence. But, there were not any definite kind of nest site that protects significantly better the broods from mammalian predation.

The finding that *Tyto alba guttata* is the only breeding subspecies in the Kazanlak Valley confirms that the hybrid zone with *Tyto a. alba* occurs just in SE Bulgaria (Georgiew 1998, Miltschev *et al*. 2002).

Barn Owls breed mainly in settlements in the valley, but their population depends greatly on the food supply of their main prey, small mammals, in open non-forest habitats (Glutz von Blotzheim & Bauer 1994, Taylor 1994, Miltschev *et al*. 2004). Nevertheless their nest and roost sites are usually in buildings outside Natura 2000 protected sites in the Kazanlak Valley, the hunting ranges of 22 pairs fall partially or wholly into sites BG0000203, BG0000261, BG0000612, and BG0002052 (MOSW 2013). The Barn Owl is categorized as a 'vulnerable' bird in the National Red Data Book (Golemanski 2011) and needs to be included among the 'other important species' in the Natura 2000 protected sites. The preparation of management

plans for these sites has already started but they do not consider measures for Barn Owl protection. This forecast an uncertain future of its population in the Kazanlak Valley as industrialized agriculture is intensified. Agricultural intensification has been associated with decrease of Barn Owl populations elsewhere in Europe (Glutz von Blotzheim & Bauer 1994, Mebs & Scherzinger 2000, Martin *et al*. 2010).

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