

# THE BREEDING DENSITY OF EURASIAN SCOPS OWL *Otus scops* IN URBAN AREAS OF PELJEŠAC PENINSULA IN SOUTHERN DALMATIA

## Gnezditvena gostota velikega skovika *Otus scops* v urbanih okoljih polotoka Pelješac v južni Dalmaciji

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In 1998, 18 human settlements in the area of 93 km<sup>2</sup> were searched for the Eurasian Scops Owl *Otus scops* territories (calling males) on central Pelješac Peninsula (S Dalmatia, Croatia). The playback method was used. In all settlements, 90 singing males were counted, which indicates that the total urban breeding population of Eurasian Scops Owl on Pelješac Peninsula was around 345 pairs in 1998. According to the author's opinion, the larger part of the Eurasian Scops Owl population breeds in the area within settlements. With a crude density of 10 – 15 pairs/10km<sup>2</sup> and by considering the population dynamics recorded in the village of Kuna, the total population on Pelješac peninsula was estimated at 230 to 575 pairs. Further ecological densities for several clumps of urban populations are presented. Ecological densities have found to be very variable (0.6 – 9.3 calling males/10ha), with higher densities recorded in settlements on the mainland of Pelješac Peninsula. Ecological density did not correlate with the size of the settlement.

**Key words:** *Otus scops*, Eurasian Scops Owl, crude density, ecological density, urban areas, Pelješac Peninsula, Croatia

**Ključne besede:** *Otus scops*, veliki skovik, gostota, ekološka gostota, urbana območja, polotok Pelješac, Hrvaška

### 1. Introduction

In Europe, the Eurasian Scops Owl *Otus scops* inhabits mainly semi-open cultural areas and normally avoids dense forests and open panoramas (BAVOUX *et al.* 1997). The species is often mentioned as a breeding bird in orchards, the surroundings of vineyards, in park areas, gardens, and avenues (GLUTZ VON BLOTZHEIM & BAUER 1994). Especially in southern Europe it frequently breeds in avenues and gardens in or near settlements (MIKKOLA 1983). In the Mediterranean part of Europe the species presumably is the most tolerant owl concerning its habitat selection (SARA 1990).

The population of the Eurasian Scops Owl in Croatia is supposed to be the second largest in Europe. It is estimated at 21,000 breeding pairs (BAVOUX *et al.* 1997), and approximately 25% of the whole European population, but the accuracy of this

estimate is not known (BAVOUX *et al.* 1997). For example, LUKAČ (1998) estimated only 1,000 to 5,000 pairs for Croatia, while SNOW & PERRINS (1998) referred, on the contrary, to a much higher figure for Croatia, i.e. 20,000-25,000 pairs. On the island of Krk (Kvarner Bay), a very high Eurasian Scops Owl's ecological density was found (MEBS & SCHERZINGER 2000), indicating that LUKAČ (1998) could have underestimated the Croatian population. In general, the Eurasian Scops Owl is widely distributed and a rather common species in coastal areas of Croatia (KRALJ 1997, RUCNER 1998).

Except for some short contributions (VREZEC 2000 & 2001), no data on the Eurasian Scops Owl from Pelješac Peninsula have been published so far. The aim of this article is to contribute data on the density and abundance of Eurasian Scops Owls on Pelješac Peninsula with special reference to urban areas.

## 2. Study Area and Methods

### 2.1. Study Area

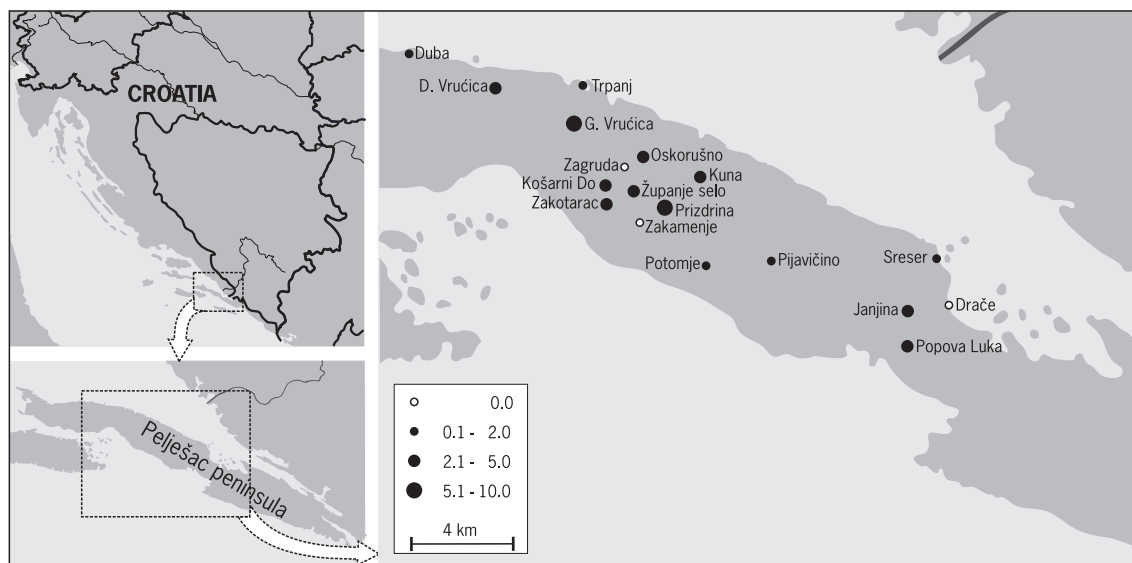
Pelješac is a 355 km<sup>2</sup> large peninsula in southern Dalmatia, Croatia (Figure 1), with 69 large settlements and villages (small isolated hamlets not included). The largest settlements are Orebić, Trpanj, Janjina and Ston. The study area is situated in the central part of Pelješac Peninsula between the villages of Duba and Drače (43°01' – 42°56' N, 17°10' – 17°29' E). In an area of 93 km<sup>2</sup>, 18 settlements were investigated (with small hamlets included in some villages): Donja Vručica (with the hamlet of D. Selo), Drače, Duba, Gornja Vručica (only part of the village called Selo was investigated), Janjina, Košarni Do, Kuna, Oskorušno (with the hamlet of Orhanovići), Pijavičino (part of the villages of D. Selo and Pantetići), Popova Luka, Potomje (with the hamlets of Doci, Gruda and Jugovići), Prizdrina, Sreser, Trpanj (including the hamlet of Dekovići), Zagrada, Zakamenje, Zakotarac and Županje Selo. Four villages are situated on the coast (Drače, Duba, Sreser and Trpanj), the rest in the mainland of Pelješac Peninsula.

The area belongs to the Mediterranean phytogeographical region with thermophilous evergreen forests of Holm Oak *Quercus ilex*, especially *Orno-*

*Quercetum ilicis* and *Ostryo-Quercetum ilicis*. In degraded areas, e. g. garigue, *Erico-Cistetum cretica* is more common. Beside the already mentioned characteristic species of forest associations, the more common tree species found in the area are: *Pinus halepensis*, *P. nigra dalmatica*, *P. pinaster*, *Acer monspesulanum*, *Quercus pubescens* etc. (JASPRICA & KOVAČIĆ 1997, own data). The most important cultural plants in the area are olive tree and vine.

### 2.2. Method

For owl censuses the playback method as suggested by SAMWALD & SAMWALD (1992) was used. The efficiency of playback was tested for some owls (e.g. Tengmalm's Owl *Aegolius funereus* and Tawny Owl *Strix aluco*; HOLMBERG 1979, REDPATH 1994), but there is no data available for the Eurasian Scops Owl. The efficiency of playback can be extremely variable between owl species (ZUBEROGOITIA & CAMPOS 1998). So far we can only speculate on the efficiency of this method for the discussed species. Still, Eurasian Scops Owls react intensively to playbacks if played near their territories (ZUBEROGOITIA & CAMPOS 1998). For the present study I censused owls in the urban areas only. Count points were selected on exposed sites, where the whole area of the settlement could be covered. Position of every singing male was drawn into the map to



**Figure 1:** Study area of Pelješac Peninsula (S Dalmatia, Croatia) with marked human settlement that were searched for Eurasian Scops Owls, with the size of dots delineating ecological density (calling males/10 ha)

**Slika 1:** Obravnavano območje polotoka Pelješac (južna Dalmacija, Hrvatska) z označenimi naselji, kjer je bil opravljen popis velikih skovikov. Velikosti pik ponazarjajo ekološke gostote (pojoči samci/10 ha).

avoid doubling. Presumably, all territorial males within the settlements investigated could be counted with the aid of the described method. Each settlement was visited once a year.

Census work was carried out in spring time 1998 from the end of April to the beginning of May, which seems to be the best time for censusing Eurasian Scops Owls (ZUBEROGOITIA & CAMPOS 1998, DENAC 2000, ŠTUMBERGER 2000). Weather conditions could have affected vocal activity of owls significantly (CLARK & ANDERSON 1997, ZUBEROGOITIA & CAMPOS 1998), so fieldwork was performed only on calm and clear nights. Additional censuses took place in 1997, 2000 and 2001, but not all settlements were included in those years. As reference areas for the calculation of ecological densities, the entire area of the settlements including non-urban and rural habitats in its immediate vicinity (gardens, parks, avenues, surrounding vineyards, etc.) was used. The correlation between ecological density and size of the settlements was tested with the Pearson correlation coefficient. The size of the Eurasian Scops Owl population in urban areas for the whole Pelješac Peninsula was estimated by using the average number of owls

**Table 1:** Results of the Eurasian Scops Owl *Otus scops* calling males census in settlements of Pelješac Peninsula for the years 1997, 1998, 2000 and 2001 (– = no data)

**Tabela 1:** Rezultat popisa pojočih samcev velikega skovika *Otus scops* v vaseh Pelješa v letih 1997, 1998, 2000 in 2001 (– = ni podatka)

Settlement/ Naselje	1997	1998	2000	2001
Donja Vrućica	-	3	-	-
Drač	-	0	-	-
Duba	-	1	-	-
Gornja Vrućica	-	12	-	-
Janjina	-	7	-	-
Košarni Do	-	1	-	-
Kuna	10	15	25	24
Oskorušno	-	9	9	9
Pijavičino	-	5	7	-
Popova Luka	-	4	-	-
Potomje	-	12	14	-
Prizdrina	-	7	5	5
Sreser	-	1	-	-
Trpanj	-	9	-	-
Zagruda	-	0	1	-
Zakamenje	-	0	3	-
Zakotarac	-	1	-	-
Županje selo	-	3	2	-

counted in the investigated settlements extrapolated to the whole number of settlements in the area. Differences between sampling area and the whole area of the Peninsula in proportion to human settlements situated on the coast were tested with  $\chi^2$ -test.

### 3. Results

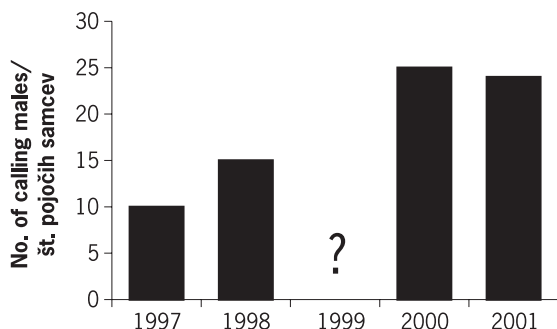
During 1998, 90 calling males of Eurasian Scops Owl were counted in 18 settlements of central Pelješac Peninsula (Table 1). On the average,  $5.0 \pm 4.8$  calling males were found per settlement. Settlements with large numbers of Eurasian Scops Owls were surrounded with cultivated areas, mostly by vineyards and gardens. The highest Eurasian Scops Owl ecological densities were found in Prizdrina (9.3 calling males/10ha) and Gornja Vrućica (8.3 calling males/10ha), the lowest at Sreser (0.6 calling males/10ha), Duba (0.8 calling males/10ha) and

**Table 2:** Overview of settlement sizes, altitudes and breeding densities of the Eurasian Scops Owl *Otus scops* calling males in urban habitats of central Pelješac Peninsula in 1998

**Tabela 2:** Pregled velikosti naselij, nadmorskih višin in gostot pojočih samcev velikega skovika *Otus scops* v urbanih okoljih na osrednjem delu Pelješa v letu 1998

Settlement/ Naselje	Altitude/ Nadm. višina (m)	Area/ Površina (ha)	Ecol. density/ Ekol. gostota (calling males/10ha)
Donja Vrućica	180	12,1	2,5
Drač	0	13,0	0,0
Duba	30	12,4	0,8
Gornja Vrućica	130	14,5	8,3
Janjina	120	35,5	2,1
Košarni Do	320	3,5	2,9
Kuna	370	64,1	2,3
Oskorušno	300	21,4	4,2
Pijavičino	290	30,6	1,6
Popova Luka	120	9,8	4,1
Potomje	270	72,3	1,7
Prizdrina	320	7,5	9,3
Sreser	0	17,7	0,6
Trpanj	0	93,6	1,0
Zagruda	280	5,0	0,0
Zakamenje	320	4,2	0,0
Zakotarac	290	2,7	3,7
Županje selo	280	7,2	4,2
AV. / povp.		23,7	2,7
SD / std. odklon		26,4	2,6

Trpanj (1.0 calling males/10ha) (Table 2). The latter three villages are situated on the coast (Figure 1). Ecological density did not correlate with the size of the settlement ( $R = -0.22$ , ns).



**Figure 2:** Population dynamics of Eurasian Scops Owl *Otus scops* in the years 1997, 1998, 2000 and 2001, as established in the village of Kuna in central part of Pelješac Peninsula (in 1999, census was not carried out)

**Slika 2:** Populacijska dinamika velikega skovika *Otus scops* v letih 1997, 1998, 2000 in 2001 v vasi Kuna v osrednjem delu Pelješca (v letu 1999 ni bilo popisa)

In the village of Kuna, a long-term study on the Eurasian Scops Owl numbers was carried out. The population increased for at least 2/3 during the 1997 to 2001 period (Figure 2), but no significant changes could be found in other villages, e.g. Oskorušno and Prizdrina (Table 1).

The sampling area was representative for the entire Pelješac Peninsula with 1.9 settlements/10km<sup>2</sup>, the same as on the whole of Pelješac Peninsula. Of the 18 investigated human settlements, four were situated on the coast (22%). On the entire Pelješac Peninsula more settlements are situated on the coast (38%), but differences with sampling area were not significant ( $\chi^2=1.5$ , ns). According to my calculations, around 345 breeding pairs may have bred in 1998 in all urban areas of the entire Pelješac Peninsula.

#### 4. Discussion

The present study was restricted to the breeding population of the Eurasian Scops Owl on Pelješac Peninsula, with special emphasis on its ecological densities in human settlements. According to accidentally collected data, I speculate that the main

**Table 3:** Comparison of data on the Eurasian Scops Owl *Otus scops* crude and ecological densities (data converted into calling males/10ha)

**Tabela 3:** Primerjava podatkov o splošnih in ekoloških gostotah velikega skovika *Otus scops* (podatki so preračunani na enoto pojoči samci/10ha)

Location / Lokacija	Density /Gostota (calling males/10ha)	Reference area/ Referenčna površina	Source / Vir
<b>Crude density</b>			
Croatia (Pelješac)	0.1 - 0.15	93 km <sup>2</sup>	this work / to delo
Slovenia (Goričko)	0.05	442 km <sup>2</sup>	ŠTUMBERGER (2000)
Slovenia (Ljubljansko barje)	0.02 - 0.04	163 km <sup>2</sup>	SENEGAČNIK (1998), DENAC (2000)
Austria (Steiermark)	0.005	204 km <sup>2</sup>	SAMWALD & SAMWALD (1992)
Slovakia (Krupinska planina)	0.008	150 km <sup>2</sup>	GLUTZ VON BLOTZHEIM & BAUER (1994)
France (Ile d'Oleron)	0.03 - 0.04	175 km <sup>2</sup>	BAVOUX <i>et al.</i> (1991)
<b>Ecological density</b>			
Croatia (Pelješac)	0.6 - 9.3	2.7 - 93.6 ha	this work / to delo
Croatia (Krk) <sup>1</sup>	50.0	2 ha	GLUTZ VON BLOTZHEIM & BAUER (1994)
Slovenia (Goričko)	0.2 - 0.6	1 - 25 km <sup>2</sup>	ŠTUMBERGER (2000)
Austria (S Tyrol) <sup>1</sup>	50.0	1 ha	GLUTZ VON BLOTZHEIM & BAUER (1994)
Austria (Steiermark)	0.3	2.4 km <sup>2</sup>	SAMWALD & SAMWALD (1992)
Switzerland (Valais central)	1.7 - 2.4	100 ha	MEBS & SCHERZINGER (2000)
Italy (NE Italy)	0.2 - 0.4	400 ha	BAVOUX <i>et al.</i> (1997)
Romania (Reghin) <sup>1</sup>	83.0	0.6 ha	GLUTZ VON BLOTZHEIM & BAUER (1994)
France (Port-Cros)	0.4 - 0.5	306 ha	GLUTZ VON BLOTZHEIM & BAUER (1994)

<sup>1</sup> See the text for explanation / za razlago glej besedilo

part of the Pelješac Peninsula population is actually concentrated in urban areas and their surroundings, for which I have two explanations: (1) large areas of Pelješac Peninsula are covered with dense forests (which are unsuitable for the species BAVOUX *et al.* 1997), and (2) due to roadside lamps, which are mainly restricted to settlements and attract large numbers of insects, the density and availability of large insects are higher in and around human settlements. Therefore the total number of breeding pairs for the entire area of Pelješac Peninsula is probably not significantly higher than the calculated one (345 pairs). According to the population dynamic recorded in the village of Kuna, we could conclude that total size of the Eurasian Scops Owl population on Pelješac Peninsula is between 230 to 575 pairs. Estimate of crude density of the species population on the Peninsula amounts to 10 - 15 pairs/10km<sup>2</sup>. These are very high values in comparison to other studies (Table 3), indicating that the Eurasian Scops Owl is a very common and well distributed bird species on Pelješac Peninsula.

One of the characteristics of the species is that it can be locally very concentrated in some areas (CRAMP 1985) or it can form calling groups (ŠTUMBERGER 2000). All high estimates of breeding densities published in literature were acquired from such clumps. Densities in clumps are higher than those calculated for larger areas; > 50 km<sup>2</sup> (Table 3), so densities of clumps could be treated as ecological density (the number per unit of habitat space - available area that can actually be colonised by the population; ODUM 1971). Ecological densities of Eurasian Scops Owls established on Pelješac in different clumps (e.g. breeding population in settlements) are high to middle ranged in comparison with values from other studies (Table 3). Extremely high ecological densities on the island of Krk (Croatia), in S Tyrol (Austria) and Reghin (Romania) were acquired from small sized reference areas ranging in size from 0.6 to 2 ha, which could be the reason for the extreme density values in these areas.

Due to the suitability of surrounding habitats of the settlements investigated on Pelješac, ecological densities in clumps were highly variable (0.6 – 9.3 calling males/10ha). From the collected data it can be concluded that settlements inside the Peninsula (1.6 – 9.3 calling males/10ha) are more suitable than those on the coast (0.6 – 1.0 calling males/10ha). The results proved that ecological density was not correlated with the size of the settlements, so other ecological parameters seem to be more important. The highest ecological densities were recorded in

settlements surrounded by extensive cultivated landscapes mixed with maquis and small woods, which seems to be, according to many other researchers, the most suitable breeding habitat for this typically Eastern European-Mediterranean species (MIKKOLA 1983, CRAMP 1985, SARA 1990, MEBS & SCHERZINGER 2000).

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## 5. Povzetek

Leta 1998 so bili na polotoku Pelješac (južna Dalmacija, Hrvaška) popisani pojoči samci velikega skovika *Otus scops* v 18 naseljih na območju, velikem 93 km<sup>2</sup>. Uporabljena je bila metoda izzivanja s posnetkom. Prešteti so bili 90 pojočih samcev velikega skovika. Avtor ocenjuje, da je populacija velikih skovikov, gnezdečih v urbanih okoljih, leta 1998 na celotnem polotoku štela okoli 345 parov, ki naj bi po njegovem mnenju sestavljala tudi večji del na Pelješcu gnezdeče populacije z ocenjeno gostoto 10 – 15 parov/10km<sup>2</sup>. Celotna populacija velikega skovika na Pelješcu je ocenjena na 230 do 575 parov. V delu so predstavljene tudi ekološke gostote urbano gnezdeče populacije v različnih skupinah. Ekološke gostote so med skupinami zelo nihale (0.6 – 9.3 pojočih samcev/10ha), vendar so bile skupine z višjimi ekološkimi gostotami najdene le na celinskem delu polotoka. V raziskavi soodvisnost med velikostjo naselja in ekološko gostoto ni bila potrjena.

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