

POPULATION DYNAMICS OF SCOPS OWL *Otus scops* AT LJUBLJANSKO BARJE (CENTRAL SLOVENIA)

Populacijska dinamika velikega skovika *Otus scops* na Ljubljanskem barju (osrednja Slovenija)

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From 1998 to 2003, the population dynamics of Scops Owl *Otus scops* was monitored at Ljubljansko barje (central Slovenia, 140 km²) in order to determine its population size, distribution and stability. Scops Owls were clustered in three areas: (1) Bevke and Blatna Brezovica, (2) central part of Ljubljansko barje along the Ljubljanica river (Robidnice, the villages of Lipe and Črna vas) and (3) Grmez and Babna Gorica. In 2001, the owls began to colonise two new areas encompassing (4) Brest, Matena, Iška Loka, and (5) Notranje and Vnanje Gorice. The species was absent from highly urbanized areas, dense woodland, areas of intensive agriculture and foothills. It was found mainly in the areas covered with traditional orchards and tree lines. Its population size, based on the number of calling males, ranged from 41 to 59. It fell by 23.7% from 1998 to 2003 but stabilized at around 45 calling males in the past three years (2001 – 2003). The density of calling males was relatively low, 0.3 – 0.4 ind./km², for which the causes could be unfavourable climate, lack of nest-sites and intensive farming.

Key words: Scops Owl, *Otus scops*, Ljubljansko barje, central Slovenia, population dynamics, population size, distribution

Ključne besede: veliki skovik, *Otus scops*, Ljubljansko barje, osrednja Slovenija, velikost populacije, populacijska dinamika, razširjenost

1. Introduction

The European population of Scops Owl *Otus scops* is estimated at approximately 83,000 pairs, with Spain and Croatia holding almost two thirds of all breeding pairs in Europe (BAVOUX *et al.* 1997). In 1995, the number of breeding pairs in Slovenia was estimated at 500 – 800 (GEISTER 1995), or approximately 0.78% of the entire European population (VREZEC 2000). The greater part of its population in Slovenia breeds in Goriška and Primorska regions (SW Slovenia). The species can also be found in the regions of Goričko, Štajerska (Slovenske Gorice, Haloze, Kozjansko, Jovsi), Dolenjska (vicinity of Novo mesto and Kočevje), Gorenjska (Bohinjska Bistrica, Kranj) and in the central part of Slovenia (Ljubljansko barje, Ljubljana; GEISTER 1995). Data on its population sizes

is available only for a few areas within the country. In 1997, a large population of 210 calling males was discovered at Goričko (ŠTUMBERGER 2000). In 1999, the number of breeding pairs in Kozjansko Regional Park was estimated at 10 – 20 (JANČAR & TREBUŠAK 2000), and at 5 pairs in Jovsi in the 1992 – 1993 period (TRONTELJ & VOGRIN 1993).

In 1994, the population size of Scops Owl on Ljubljansko barje was estimated at 50 breeding pairs (TRONTELJ 1994). The aim of the annual survey of that population in the period 1998 – 2003 was to monitor the number, distribution and stability of the Scops Owl's population on Ljubljansko barje. Some preliminary results of the surveys in years 1998 and 1999 have already been published (SENEGAČNIK 1998, DENAC 2000), but here the results from the six year period are presented.

2. Study area and methods

2.1. Study area

Ljubljansko barje (central Slovenia) is located in the southern part of the Ljubljana basin at an average height of 290 m a.s.l. The total surface area is 140 km². Ljubljansko barje began forming about two million years ago by sinking of the surface along numerous joints that traverse Ljubljansko barje. Certain parts remained raised above the surrounding plain due to slower rates of sinking and are now isolated hills (e.g. Blatna Brezovica, Bevke). The climate is continental. The average annual precipitation is over 1400 mm with a peak in autumn. Vrhnika, at the western part of Ljubljansko barje, receives most precipitation (1601 mm on average) while the village Lipe in the central part receives only 1374 mm of rainfall on average. The highest average temperatures are recorded in July (approx. 19°C) and the lowest in January (approx. -2°C). According to data from 1994, land use on Ljubljansko barje is following: 51% meadows, 24% wood, 15% fields and 10% rest (settlements, orchards, pastures). (LOVRENČAK & OROŽEN ADAMIČ 1998)

2.2. Methods

The census method (playback method) was adopted from SAMWALD & SAMWALD (1992). For the purpose of the Scops Owl survey we divided Ljubljansko barje into nine census units. On each of them a transect was chosen in such a way that it covered the entire surface of the census unit. Count points along transects were spaced 500 – 1000 m apart, depending on the openness of the terrain. At each point we first listened for spontaneously calling owls and then we used a playback of a male call for one to two minutes. We waited another three minutes for a response. Locations of calling males and females were marked on a 1:50,000 map. Censuses were carried out in the first half of May (5 – 18 May) with the exception of 2003, when they were finished in the beginning of June. We conducted each survey after sunset, at approximately 21.00. Census nights were dry (preferably unclouded) with little or no wind.

In 1999 one census unit remained unsurveyed (Kremenica, Želimlje, road under Pijava Gorica, Škofljica, road Ig – Škofljica; Figure 2), and another census unit was surveyed only partly (Brest, Matena, Iška Loka, Ig, Staje, Iška vas, Vrbljene). In 2001 the census unit covering Črna vas, Matena and part of Lipe was not surveyed (Figure 2). In 2002 the census

unit in the SW of Ljubljansko barje (Vrhnika, Verd, Bistra, Borovnica, Pako, and Goričica; Figure 2) was not surveyed. Densities of calling males were calculated on the basis of the surface area of the census units surveyed. We estimated the number of calling males also on unsurveyed census units. We calculated the ratio between the number of males in successive years for the census unit of Bevke which was surveyed each year. The same ratio was applied when calculating the missing numbers for unsurveyed units. These numbers were used in estimating the population size for each year, along with taking into consideration the pattern of colonization.

3. Results

3.1. Population size and distribution

The number of registered Scops Owl males on Ljubljansko barje fluctuated as follows (with surveyed surface area in parentheses for each year): 59 in 1998 (140 km²), 39 in 1999 (122 km²), 50 in 2000 (140 km²), 37 in 2001 (127.5 km²), 42 in 2002 (125.2 km²) and 45 in 2003 (140 km²). However, we presumed that the actual numbers were larger in some years due to data missing from unsurveyed census units. The estimates of population size for each year are presented in Figure 1 and should be considered as minima. Only 2.5 – 20.0% of males were heard hooting with females.

There were three distinct areas of calling male clusters (Figure 2): (1) in the western part, (2) in the central part along the Ljubljana river, and (3) in the eastern part of Ljubljansko barje. The majority of males (around 80% in each year) were hooting in settlements and the rest outside suburban and rural areas.

3.2. The density of calling males

When calculating the density of calling males the surface of unsurveyed census units in separate years was subtracted from the total surface area. The density of calling males ranged from 0.3 – 0.4 ind./km². However, ecological densities in areas of concentration were up to three times higher. They were calculated on the basis of census unit surfaces. In the western part (Bevke, Blatna Brezovica; 13 km²) they ranged from 0.6 – 1.2 ind./km²; in the central part (Lipe, Črna vas; 25 km²) from 0.5 – 1.0 ind./km², while in the eastern part (Grmez, Babna Gorica) they did not exceed the average density calculated for the whole surface of Ljubljansko barje.

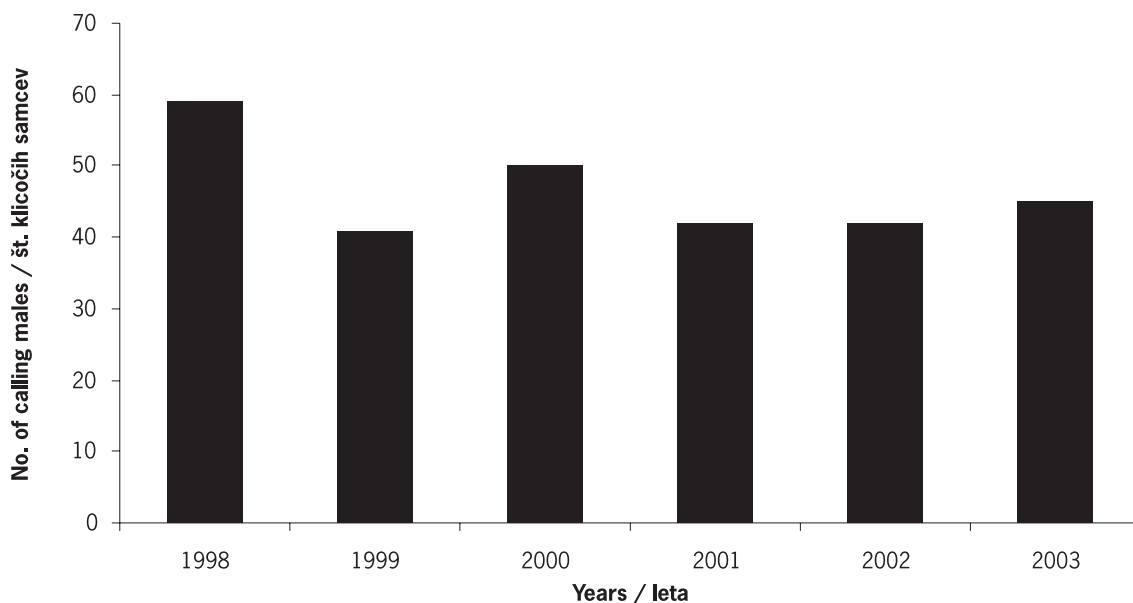


Figure 1: Estimated population size of Scops Owls *Otus scops* on Ljubljansko barje in the period 1998 – 2003 (in 1999, 2001 and 2002 not all census units were surveyed – see 2.2. for details)

Slika 1: Ocena velikosti populacije velikega skovika *Otus scops* na Ljubljanskem barju med letoma 1998 in 2003 (v letih 1999, 2001 in 2002 niso bile pregledane vse popisne ploskve – glej poglavje 2.2.)

4. Discussion

4.1. Distribution of Scops Owls on Ljubljansko barje

The Scops Owl is a species with an Eastern European-Mediterranean distribution. With regard to its choice of habitat it is a thermophilic lowland species (VREZEC 2000). On Ljubljansko barje it inhabits both lowland and isolated hills such as Bevke, Blatna Brezovica, Sinja Gorica, Grmez and Babna Gorica. It can be considered a highly synantropic species, since roughly 80% of calling individuals in each year were recorded in settlements. Its distribution throughout Ljubljansko barje is not uniform but has three distinct areas of aggregation. The first is located in the western part (Bevke, Blatna Brezovica), the second in the central part along the Ljubljanica river (Lipe, Črna vas) and the third in the eastern part of Ljubljansko barje (Babna Gorica, Grmez). These three areas are regularly inhabited by Scops Owls although there are yearly fluctuations in the number of recorded individuals. There are some locations with distances between calling males of only 50 – 100 m, e.g. in Lipe and Blatna Brezovica. This could accord with GLUTZ VON BLOTZHEIM & BAUER (1980) who stated that

Scops Owls can form loose colonies where conditions are favourable. On the other hand, such formations of calling groups might serve a more efficient attraction for females as they arrive from overwintering sites (B. ŠTUMBERGER *pers. comm.*). These male calling groups are clearly reflected in the species' distribution, with the three areas of aggregation described above. But they are also evident on a smaller scale, for example on isolated hills in the western part (Bevke, Blatna Brezovica). In the first five years (1998 – 2002) there was a large calling group of up to 12 males at Blatna Brezovica and a smaller one at Bevke which normally consisted of two to four males. But in 2003 the situation was reversed: a larger calling group formed at Bevke and a very small one at Blatna Brezovica. The formation of calling groups in Slovenia has been observed before in Goričko, NE Slovenia (ŠTUMBERGER 2000), and Opatje selo, SW Slovenia (KLJUN 2002).

In the last three years (2001 – 2003), Scops Owls appeared to have colonized two new areas on Ljubljansko barje. The first is represented by settlements Brest, Matena and Iška Loka (southern part of Ljubljansko barje), while the second encompasses the Notranje and Vnanje Gorice settlements (central part of Ljubljansko barje). The

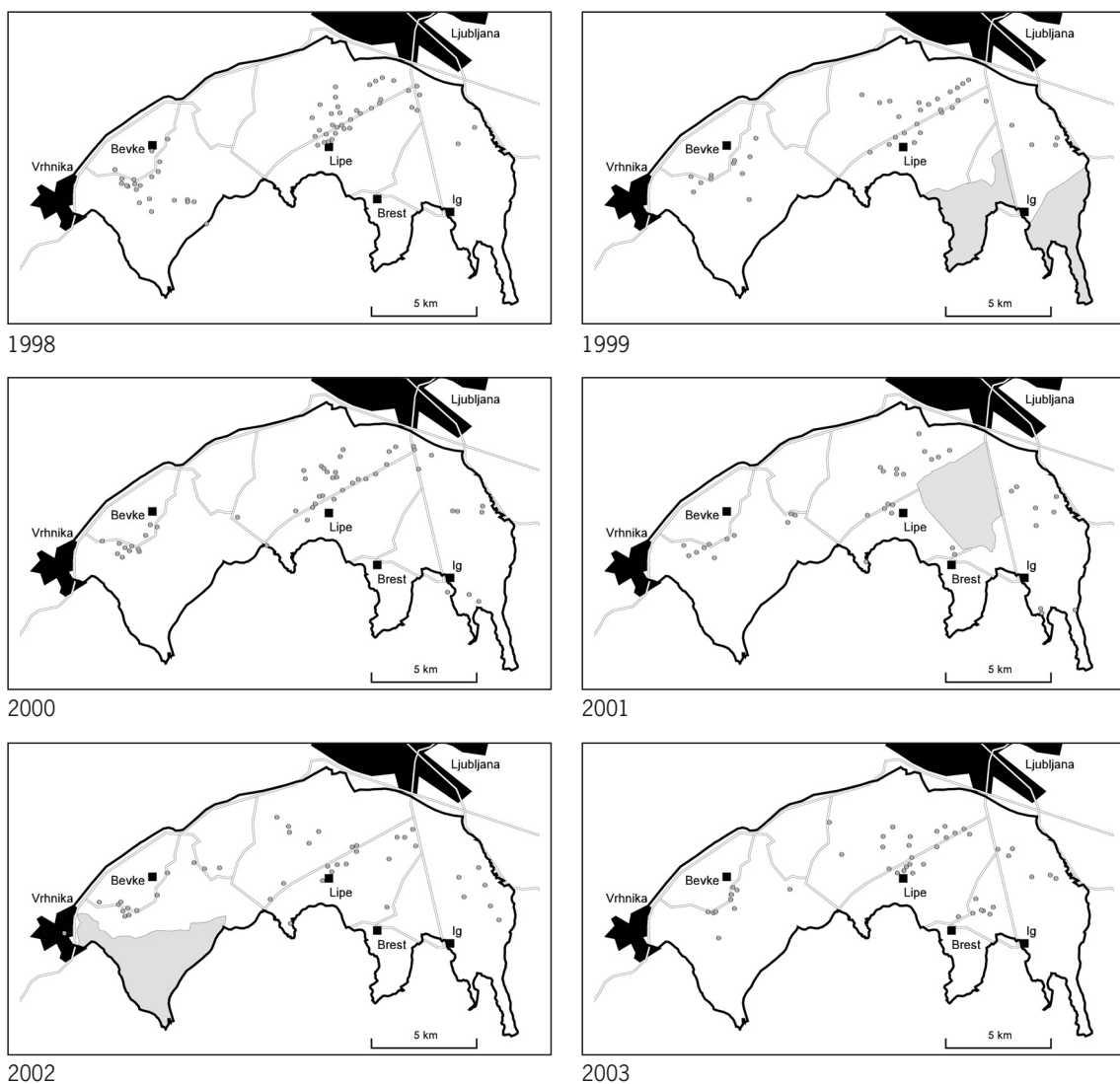


Figure 2: Distribution of calling Scops Owl *Otus scops* males on Ljubljansko barje in the period 1998 – 2003 (grey areas are unsurveyed census units)

Slika 2: Razširjenost klicočih samcev velikega skovika *Otus scops* na Ljubljanskem barju med letoma 1998 in 2003 (sivo so označene nepopisane popisne ploskve)

species is absent from highly urbanized areas (along the road from Brezovica to Vrhnika), dense woodland (Log), areas of intensive agriculture (north of Ig), and foothills (southern edge of Ljubljansko barje which borders Mt. Krim). Some locations of calling males remained identical from year to year, which might indicate their use by the same individual for many years. But as shown by GALEOTTI & SACCHI (2001) the same territory can be defended by different males in successive years. This territorial turnover can involve as much as 55 – 78% of all territories. In order to

determine the identity of males from different years a spectrographic analysis of their calls would be needed (GALEOTTI & SACCHI 2001) or individuals should be marked with colour rings.

4.2. Population size and density of calling males

The population of Scops Owl on Ljubljansko barje declined by 23.7% from 1998 to 2003, based on the number of calling males. In the last three years (2001 – 2003) it appears to have stabilized at around 45

calling males. Reductions in population size from year to year can either be a reflection of deteriorating ecological conditions on Ljubljansko barje or merely normal population fluctuations. In some years not all census units were surveyed (in 1999, 2001 and 2002; see 2.2. for details). Therefore the actual number of calling Scops Owls in those years was probably higher. Depending on which census unit remained unsurveyed the mistakes in population size differed between years. For example, in 2002 a unit in the SW of Ljubljansko barje was left out. In previous years a single male, at the most, was found calling there, which makes the mistake negligible. The situation was different in 2001 when a very important census unit, which in other years held 5 – 14 Scops Owl males, remained unsurveyed. Therefore, in 2001 the actual population size was most probably larger by 14 – 38% (42 – 51 calling males altogether). In 1999, one census unit in the SE part remained unsurveyed, which held up to three males in the period 2000 – 2001 but none in 1998, and one was partly censused. In the latter, no Scops Owls were recorded in 1998 and 2000, but a colonisation of this area began in 2001 with two males. In 2003 there were already seven males calling there. We presume that the population in 1999 was larger by 5 – 8% (41 – 42 calling males altogether). In spite of that, the density of calling Scops Owl males on Ljubljansko barje is relatively low compared to those recorded in Goričko (ŠTUMBERGER 2000), Pelješac peninsula (VREZEC 2001) or Rosandra valley near Trieste (BENUSSI *et al.* 1997; Table 1). An explanation could be that Ljubljansko barje receives more precipitation than the

above mentioned areas whereas Scops Owl prefers dry and warm places where invertebrate prey is more abundant (SNOW & PERRINS 1998). In Rosandra valley all Scops Owl territories had a SW exposure (GALEOTTI & GARIBOLDI 1994). Another reason could be the lack of suitable nest-sites. Scops Owls throughout Slovenia predominantly use tree cavities for breeding. The only exception to this is SW Slovenia where tree cavities are very scarce and limited to tree species such as Mulberry *Morus* sp. For this reason, Scops Owls in that part of Slovenia predominantly use holes in walls, places under the roofs of abandoned and inhabited houses and also rocky walls of Kraški rob area (T. MIHELČ *pers. comm.*). In Rosandra valley (Italy) the preferred habitat types of this species were rocky hillsides, bushwood (mainly consisting of European Hop Hornbeam *Ostrya carpinifolia* and Downy Oak *Quercus pubescens*) with rocks and vineyards (GALEOTTI & GARIBOLDI 1994). Breeding in a hay barn in Bela Krajina (SE Slovenia) has also been reported (PRESETNIK 2002). Calling males on Ljubljansko barje were often heard in extensively managed old orchards or on isolated large trees such as Horse Chestnut *Aesculus hippocastanum*, Lime *Tilia* sp. and Common Ash *Fraxinus excelsior*. The distribution of Scops Owls plotted on the map of habitat types of Ljubljansko barje (KOTARAC & GROBELNIK 1999) in some parts coincides very well with the locations of old orchards, tree lines and scrubs or other tree vegetation, apart from dense woodland. It is obvious that Scops Owls inhabited parts of Ljubljansko barje which have enough trees

Table 1: Comparison of calling male densities of Scops Owl *Otus scops* from different parts of Europe

Tabela 1: Primerjava gostot klicočih samcev velikih skovikov *Otus scops* iz različnih delov Evrope

Area/	Calling males' density (ind./km ²)	Study area surface/	Year of study/	Source/
Območje	Gostota klic. samcev (os./km ²)	Površina	Leto raziskave	Vir
Ljubljansko barje (central Slovenia)	0.3 – 0.4	140 km ²	1998 – 2003	this work
Goričko (NE Slovenia)	0.5 – 6.0	442 km ²	1997	ŠTUMBERGER (2000)
Pelješac (S Croatia)	1.0 – 1.5	93 km ²	1998	VREZEC (2001)
Oltrepò Pavese (NW Italy)	0.03 – 0.2	448 km ²	1992 – 1994	SACCHI <i>et al.</i> (1999)
Rosandra valley (NE Italy)	2.4 – 3.3	4.6 km ²	1991	BENUSSI <i>et al.</i> (1997)
Styria (S Austria)	0.05	204 km ²	1989	SAMWALD & SAMWALD (1992)

that provide suitable nest-sites. So far only two nests were found on Ljubljansko barje, one in a nestbox in Črna vas in 1988, which was previously used by Starling *Sturnus vulgaris*, and one in a hollow apple tree at Blatna Brezovica in 2000 (T. MIHELIC *pers. comm.*). No attempts at placing nestboxes on suitable locations for Scops Owls have been made so far. Old orchards are not very common on Ljubljansko barje and are not being rejuvenated. Instead of that, people prefer to plant plantation fruit trees that remain dwarfish and never develop tree cavities. There is also a problem of cutting down large old trees, such as Horse Chestnut and Lime that once dominated in the middle of farmyards. The intensification of agriculture also plays a role in determining the number of breeding Scops Owls by influencing both their breeding habitat and available food, as suggested by SACCHI *et al.* (1999) and BAVOUX *et al.* (1997). Compared to results from Styria (SAMWALD & SAMWALD 1992) and Oltrepò Pavese in NW Italy (SACCHI *et al.* 1999; Table 1) the densities of calling males on Ljubljansko barje are relatively high. Agricultural intensification in Austria in the past few decades has caused a decrease in the number of breeding pairs of Scops Owls (SAMWALD & SAMWALD 1992). The species reaches the northern border of its range in Austria which makes it especially vulnerable to deteriorating life conditions. In Oltrepò Pavese low breeding densities were attributed to intensive viticulture and excessive use of pesticides (SACCHI *et al.* 1999).

Territorial defence in Scops Owl normally involves both male and female hooting as a reaction to playback (GALEOTTI *et al.* 1997). It is therefore surprising that only a small percentage of calling males on Ljubljansko barje was heard duetting with females as a response to male playback. This might indicate a large number of unpaired males. As the first half of May is still a period of courtship and not egg-laying – the latter begins in the second half of May and in the beginning of June in Central Europe (GLUTZ VON BLOTZHEIM & BAUER 1980, SACCHI *et al.* 1999) – we can rule out the possibility of females incubating eggs as the reason for such low female numbers. Therefore, the actual number of breeding pairs and breeding success of Scops Owls on Ljubljansko barje remains to be determined in future studies.

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5. Povzetek

Med letoma 1998 in 2003 smo z metodo predvajanja posnetka samčevega klicanja popisovali velike skovike *Otus scops* na Ljubljanskem barju. Naš namen je bil ugotoviti velikost, razširjenost in stabilnost njegove populacije. Veliki skoviki so na Barju razporejeni gručasto v treh območjih: (1) Bevke in Blatna Brezovica, (2) osrednji del Barja vzdolž reke Ljubljanice (Robidnice, vasi Lipe in Črna vas) in (3) Grmez in Babna Gorica. Od leta 2001 dalje je potekala kolonizacija dveh novih območij: (4) Brest, Matena, Iška Loka in (5) Notranje in Vnanje Gorice. Nekatere lokacije klicočih samcev so si bile iz leta v leto zelo podobne ali celo enake. To morda pomeni, da so iste teritorije več let uporabljali isti samci, vendar bi bile za potrditev te hipoteze potrebne dodatne raziskave. Opazovano je bilo oblikovanje klicočih skupin, znotraj katerih se je številčnost samcev med leti lahko bistveno razlikovala. Na karti habitatnih tipov Barja se razširjenost velikih skovikov dobro prekriva z območji sadovnjakov, drevesnih mejic in grmovja ter z drugo drevesno vegetacijo z izjemo gozdne. Velikih skovikov ni bilo v gosteje naseljenih predelih, gozdovih, na območjih z intenzivnim kmetijstvom in na vznožju hribov. Velikost populacije je bila med letoma 1998 in 2003 41 – 59 klicočih samcev. Od leta 1998 do 2003 se je znižala za 23,7%, vendar se je v zadnjih treh letih (2001 – 2003) ustalila pri približno 45 klicočih samcih. Pri upadu med letoma 1998 in 2003 gre morda za normalna populacijska nihanja ali pa za odsev slabšanja ekoloških razmer za to vrsto na Barju. Gostota klicočih samcev na Barju je razmeroma nizka v primerjavi z nekaterimi drugimi območji (Goričko, Pelješac v južni Dalmaciji, dolina Glinščice v SV Italiji) in znaša 0,3 – 0,4 para/km². Možni razlogi za to so lahko podnebje s preveliko količino padavin, pomanjkanje gnezditvenih mest in intenzifikacija kmetijstva.

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