

NEKATERE SPREMEMBE V RUBRIKAH

Some changes in the journal's contents



Obsežni številki, ki jo imate pred seboj, bi rad pristavil zgolj nekoliko suhoparen uvodnik. Po dolgih posvetih in pripravah sem se odločil izpolniti napoved s konca prejšnjega letnika: uvedbo nekaterih novih rubrik. Uvodnik je namenjen njihovi kratki predstavitvi.

Pregledni članki so pomembna skupina člankov, namenjenih povzemanju ključnih ugotovitev na določenem področju ornitologije. Mišljena so predvsem nova, neobdelana in hitro razvijajoča se področja. Citirane naj bi bile vse ključne reference. Članki lahko vsebujejo tudi dodatne izvirne podatke, obravnavali pa jih bomo enako kot druge znanstvene članke, kar vključuje dvojno recenzijo (poleg uredniške).

Stališče je poseben tip članka, ki je namenjen novim, predvsem zanimivim, provokativnim in včasih kontroverznim idejam. Avtorji naj se pred oddajo rokopisov zato posvetujejo z urednikom o primernosti teme. Takšni prispevki lahko vključujejo tudi vnovično predelavo starih podatkov, a na drugačen način. Ker gre za hipoteze, bodo stališča opremljena z eno neobvezno recenzijo, druga recenzija pa bo uredniška.

Kratki prispevki bodo sodili v najbolj obsežno novo rubriko. Gre za serije podatkov, favnistične popise, zanimive preliminarne podatke ter posamezne podatke velike vrednosti, pri katerih avtorji napišejo dodaten komentar in vsaj deloma svoje podatke primerjajo z objavljeno literaturo. V pričujoči številki vam predstavljam prvih osem kratkih prispevkov, nekatere smo predelali kar neposredno iz odlično napisanihotic. Uredniška obdelava bo vključevala eno recenzijo.

Znanstveni članki ne bodo več deljeni na dolge in kratke, saj je mnogokrat takšna delitev umetna. Vse rubrike pa bodo opsijske, glede na kakovost in količino prejetega materiala. Do naslednje številke bomo tudi ustrezno prenovili navodila za avtorje.

Vsekakor pa upam, da boste uživali pri branju raznolikih in zanimivih člankov.

PRIMOŽ KMECL

I would like to add just a short and laconic editorial to the issue you are now holding in your hands. After long consultations, I decided to fulfil my promise made at the end of the last volume: to introduce new sections in our journal. The aim of this editorial is their short presentation.

Review papers constitute an important group of articles that summarize some of the key findings in a certain field of ornithology, particularly in new, fast developing fields not presented as yet. All key references should be cited. These papers can include original data and will be treated as normal research papers which includes editorial and double peer review.

Point-of-view section contains new, interesting, provocative and sometimes controversial hypotheses. The authors should consult the editor prior to the manuscript submission, whether a certain topic is appropriate for publication. Such papers can also include new data manipulation, although in a different way. One non-binding peer review and an editorial revision will be provided for.

Short communications will be part of the most extensive new section of the journal. Series of data, faunistic studies, interesting preliminary data and high value single data will be included in it. Commentaries and references are required. This issue presents eight short communications, some of which have been rewritten from high quality short notes submitted to the journal. One peer review will be provided.

Research papers will no longer be divided into long and short papers, considering that this separation is sometimes rather artificial. All sections will be optional depending on the material. We will also amend the instructions to authors in the next issue.

In any case I do hope that you will enjoy yourselves while reading highly interesting and diverse papers.

PRIMOŽ KMECL

FIELD OBSERVATIONS OF THE SICHUAN WOOD OWL *Strix uralensis davidi* IN WESTERN CHINA

Terenska opazovanja sečuanske kozače *Strix uralensis davidi* v zahodni Kitajski

WOLFGANG SCHERZINGER¹ & YUN FANG²

¹ Bavarian Forest National Park, Guntherstraße 8, D-94568 St. Oswald, Germany, e-mail: drscherzinger@gmx.de

² Zoological Institute, Chinese Academy of Science, 19 Zhongguancun, Beijing 100080, PR of China, e-mail: fangyun@vip.sina.com

In 1995, 1997, and 1999 at least one pair of the rare Sichuan Wood Owl *Strix uralensis davidi* has been observed in the nature reserve “Lianhuashan”, Gansu Province (Kangle County / Central China). During 13 encounters, one photo, the territorial song, and a rising scale (“nest-site demonstration”) of the male and “begging” notes of the female were recorded. Supported by a conservation programme sponsored by British Petrol (BP), several nest boxes were mounted in suitable habitat in 2002 – 2003, which enabled close observation of breeding success of this rare species in 2005 for the very first time. In 2006 we obtained recordings of 3 territorial males, 2 females and 2 freshly hatched young ones. Description of the species is based on field observations and compared to characteristics of the European subspecies of Ural Owl (*Strix u. liturata* and *Strix u. macroura*). Due to the small remaining patches of mountain forests, the habitat of this owl is extremely threatened by fragmentation. With its 47 km² of natural woodland, the reserve forms a distributional relict of great importance, which will hopefully allow the survival of this nearly unknown owl.

Key words: Sichuan Wood Owl, *Strix uralensis davidi*, montane forest, fragmentation of habitat, preservation, central China, eastern Tibet

Cljučne besede: sečuanska kozača, *Strix uralensis davidi*, gorski gozd, fragmentacija habitata, varstvo narave, osrednja Kitajska, vzhodni Tibet

1. Introduction

The Sichuan Wood Owl (in Chinese language = “*Sichuan liu xiao*”, MacKINNON & PHILLIPPS 2000) was first described by SHARPE (1875) as *Syrnium davidi*, named after the French missionary Father Armand David (like a large number of plants, birds and mammals in China) who discovered this large owl during his first expedition to China in 1866. The majority of descriptions of the species in the literature are traceable to single observations and collections from the late 19th and early 20th centuries. Because of the obvious resemblance to the Ural Owl of Eurasia, initial taxonomic estimations classified the Sichuan Wood Owl as a subspecies of *Strix uralensis* (STRESEMANN 1923) or even a “local phase” (GROSSMAN & HAMLET 1964). Although since then only a few incidental

observations and a few specimens in museums have become known, nowadays lists emphasize the status of this rare owl as a separate species, mostly based on its absolute isolation for millions of years (KÖNIG *et al.* 1999, CLEMENTS 2003). As information about distribution, ecology, reproduction, voice, and behaviour of the Sichuan Wood Owl are completely lacking, a final decision requires new field observations and molecular analysis.

As a first approach, a comparison of the territorial songs of Sichuan Wood Owl (recorded in Lianhuashan nature reserve) and Ural Owl (tape recordings from Bavarian Forest National Park) showed a clear similarity. Since, in field experiments, the Sichuan Wood Owl fully recognized the play back of Ural Owl’s song, implying conspecificity, this was a crucial fact for my suggestion to rank the Sichuan Wood Owl

as a subspecies of Ural Owl (SCHERZINGER 2005).

Given the sparse records of the Sichuan Wood Owl, maps of its distribution give a rather rough picture – primeval forests in the high mountains of Sichuan, Sikiang and Qinghai. This owl species is not listed in the extensive catalogue of vertebrate fauna of Gansu (LIU 1995), as the owl's occurrence in this province was only detected on our first visit in 1995 (SUN *et al.* 2001, SCHERZINGER 2005). Clearly, the remote area of distribution is limited to coniferous forests at high elevations in the mountains of western China and eastern Tibet, therefore interpreted as a true relict of the last ice ages and the pre-glacial distribution of woodland (VOOUS 1962; Figure 1).

In this paper we not only present recent observations and the first record of successful breeding of this rare owl, but also point to the new opportunities for field work in the formerly closed areas of Chinese mountains.



Figure 1: Whereas the range of the Eurasian Ural Owl *Strix uralensis* extends over the entire palaeartic forest belt, the Sichuan Wood Owl *Strix uralensis davidi* occurs only in a strictly isolated area of montane forests in western China and eastern Tibet (map of distribution, from Voous 1962)

Slika 1: Areal kozače *Strix uralensis* se razteza čez celoten gozdni pas Palearktiki, sečuanska kozača *Strix uralensis davidi* pa se pojavlja le na popolnoma izoliranem območju gorskih gozdov v zahodni Kitajski in vzhodnem Tibetu (povzeto po Voous 1962)

2. Study area and methods

In the years 1995, 1997 and 1999 we succeeded in making field observations, photographic and tape recordings of at least one breeding pair of the Sichuan Wood Owl, during stays from April–May, May–June, and June–July in the “Lianhuashan Nature Reserve”. Though preliminary, these observations can help to improve the description and to document aspects of the behaviour of this rare forest-dwelling owl. Stimulated by the offer of nearly 40 large nest boxes, one successful brood was observed by Y. Fang in 2005.

This event was monitored by automatic video-camera in the nest box during the full nestling time. A 5-week stay in 2006, from the end of May to the beginning of July, resulted in records of 3 territorial males, 2 females, and two freshly fledged young ones. We have now obtained a long series of photos by high-speed digital camera.

2.1. Study Area

“Lianhuashan Nature Reserve” (coordinates 34°56′–58°N / 103°44′–48°E) was founded at the eastern edge of the mountainous Qinghai-Tibetan Plateau in Gansu Province (western China), south of the provincial capital city Lanzhou. Covering an area of approximately 120 km², the reserve includes coniferous forest (dominated by fir and spruce trees; mainly *Abies fargesii* and *Picea asperata*) on shaded slopes, with dry slopes on the southern exposition as well as treeless alpine meadows. The portion of non-fragmented woodland is approximately 47 km², the tree line being more than 3000 m a.s.l. (KLAUS *et al.* 1996). The reserve is named after a conspicuous rock summit, nearly 3500 m in height, which is visited by several thousand Buddhist pilgrims every year. Due to the sacredness of this precious landscape, large coniferous forests have persisted in natural stands. But due to heavy logging in the 1970's, stands of old growth forest only remain on extremely steep slopes, on exposed rocky ridges, and in inaccessible canyons (Figure 2; SUN *et al.* 2007, *in press*).



Figure 2: Natural forest near the tree line at 3000 m a.s.l. in the “Lianhuashan Nature Reserve”, Gansu Province, China; The island character of the forest relict in the reserve is intensified due to extensive clear cuts in surrounding landscapes and overgrazing of vegetation (photo: W. Scherzinger)

Slika 2: Naravni gozd blizu drevne meje na 3000 m n.v. v “Lianhuashan Nature Reserve”, provinca Gansu, Kitajski; Otoški značaj reliktnega gozda je poudarjen zaradi intenzivnih golosekov v okolici in intenzivne paše (foto: W. Scherzinger)

All the field records of Sichuan Wood Owl were collected in the main valley of “Lianhuashan Nature Reserve”, which stretches from a saddle at the base of the “Three Sisters Mountain” in the west (approximately 2900 m a.s.l., with dense coniferous old growth forest on a steep slope) to a swampy area along a small creek to the east, with dense coniferous stands.

2.2. Field observations

As the main purpose of the stay in the nature reserve was field research on endemic woodland grouse (Chinese Grouse *Bonasa sewerzowi*; see KLAUS *et al.* 1996), we detected the occurrence of Sichuan Wood Owl fortuitously. Whenever possible, we took the opportunity to collect at least rough information about habitat use and distribution, and about behaviour and vocalization of this very special bird. Oral imitation of territorial song and the nest-site-demonstration note (both well known notes from *Strix uralensis liturata* / *macroura*, the European subspecies) were used to stimulate vocalization of the free ranging owls.

Due to heavy timber harvesting in the 1970's, before Lianhuashan became a strict reserve, even natural forest stands lack the very old trees that could offer large raptor's nests or hollow trunks as suitable nesting sites for the big owls. Therefore the birds could only use rocky precipices for nesting. In view of previous experience of preservation management for the Ural Owl in the Bavarian Forest National Park



Figure 3: Due to the lack of natural tree cavities, simple nest boxes could stimulate Sichuan Wood Owls *Strix uralensis davidi* to breed in an artificial nesting site (photo: Y. Fang)

Slika 3: Zaradi pomanjkanja naravnih dupel, lahko gnezdilnice spodbudijo sečuanško kozačo *Strix uralensis davidi* h gnezdenju (foto: Y. Fang)

(SCHERZINGER 1996 & 2006), we decided to mount big nest boxes for the Sichuan Wood Owl. This should not only optimise opportunities for suitable breeding sites, but also increase the chance, for the first time, to observe these owls when breeding and rearing. With the helpful support of a conservation programme of British Petrol Company (BP), about 20 specific nest boxes were mounted in 2002 – 2003 (Figure 3).

3. Results

3.1. Description of the Sichuan Wood Owl

Successful field observations were made mostly in the evening twilight, but on 13 Apr 1995, we discovered a male owl during daylight. Under field conditions in the dim coniferous stand, the plumage looked pale greyish-brown, with distinct longitudinal streaks on the breast and under parts; nape, mantle and backside were darker than the front, the white dots on the scapular feathers were prominent; the roundly framed facial disc was distinct, with a dull-yellow beak and narrow almond-shaped eyes (colour appendix - Figure 1). These characteristics are clearly shown in the close-up photo of the female breeding in one of the nest boxes in 2005 (colour appendix - Figure 2). The unicoloured central tail feathers are also specific.

3.2. Field observations

On calm evenings the owl's hooting could be heard over the whole of the main valley of Lianhuashan reserve, stretching in an east-west direction for about 1,5 km. Based on the observation points, the home range of the pair of owls measures a minimum of 200 ha. During our field-stays in 1995, 1997 and 1999 we obtained a total of 6 visual records of male and 4 of female; photo documents of a male were obtained in 1995 and 2006 (colour appendix - Figure 1). 14 acoustical records of the male were registered (territorial song and initial strophes of this note, nest-site-demonstration, and aggressive calls; Figure 4), and 3 of the female (begging notes). We regularly heard duets from the couple, with territorial song and “nest-site-demonstration” by the male and begging notes by the female. Twice we observed the male delivering prey to its female (Table 3; see appendix). In addition, Jia Chen-xi, a colleague of the Chinese research team, took a close-up photo of a male in summer 2003, and Fang Yun attracted a male by playback of tape recordings in May 2004.

In 2005, one nest box was occupied by a pair of Sichuan Wood Owls. Egg laying started between April

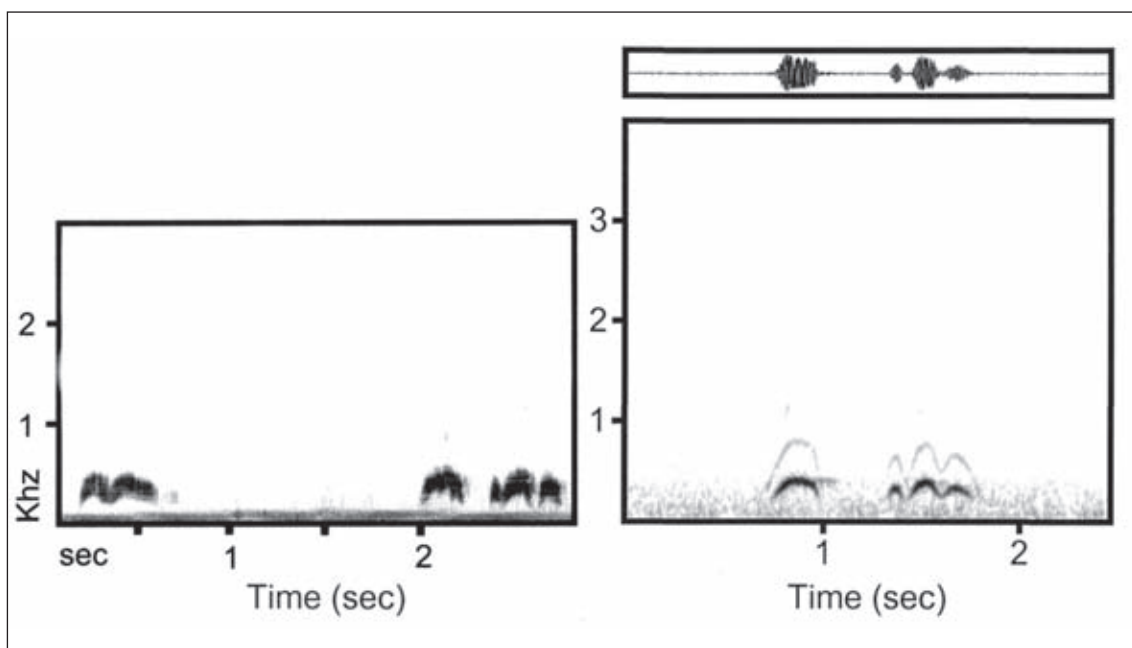


Figure 4: Sonographic comparison of territorial song of male Ural Owl *Strix uralensis* (left; record from captive birds in Bavarian Forest National Park) and Sichuan Wood Owl *Strix uralensis davidi* (right; record from Lianhuashan nature reserve)

Slika 4: Sonografska primerjava območnega petja samca kozače *Strix uralensis* (levo; posnetek osebkov v ujetništvu iz nacionalnega parka Bavarski gozd) in sečuanske kozače *Strix uralensis davidi* (desno; posnetek iz naravnega rezervata Lianhuashan)

25 – 27; the two fertile eggs measured 41.2 x 49.1 mm and 40.8 x 50.1 mm. Brooding started with the second egg at least, and the eggs hatched about 30 May. Nestlings remained in the nest box for 33 – 35 days. One sound fledgling left the nesting site between 3 and 5 Jul (colour appendix - Figure 1). This is the



Figure 5: Due to its size and diurnal activity the Gansu Pika *Ochotona cansus* is a favoured prey of the big wood dwelling owls (photo: W. Scherzinger)

Slika 5: Zaradi primerne velikosti in dnevne aktivnosti je žvižgač vrste *Ochotona cansus* priljubljen plen velikih v gozdu živečih sov (foto: W. Scherzinger)

first breeding record of this rare species under human observation. Favoured prey items include the Gansu Pika *Ochotona cansus* (Figure 5), but systematic records on hunting are lacking.

During an additional stay in 2006 we recorded 3 singing males and 2 females, and also detected 2 freshly fledged young ones in front of a nearly vertical rock-precipice, where they may have hatched in a cavity. Roosting at top of a spruce tree during daylight one of the fledglings got attacked by a Carrion Crow *Corvus corone corone*, while the adult male displayed conspicuously by singing and flying around (Figures 6 & 7).

Among the birds in the reserve we noted 3 further species of owls, the Little Owl *Athene noctua impasta* near the village, the Eagle Owl *Bubo bubo tibetanus*, and the Tengmalm's Owl in its local subspecies *Aegolius funereus beickianus*. With the support of suitable nest boxes, a minimum of 5 – 7 successfully breeding pairs of the latter species have been confirmed to date. Further play-back experiments with the songs of Collared Pygmy Owl *Glaucidium brodiei* and Tawny Owl *Strix aluco nivicola*, which could also live in this forest area, were not successful.



Figure 6: As soon as the Carrion Crow *Corvus corone corone* detected the helpless young at treetop, it approached in low-level attacks (photo: Y. Fang)

Slika 6: Takoj, ko je črna vrana *Corvus corone corone* zaznala nemočne mladiče sečuanske kozače *Strix uralensis davidi* v drevesnem vrhu, je začela s previdnimi napadi (foto: Y. Fang)



Figure 7: In striking contrast to the Ural Owl *Strix uralensis* the male Sichuan Wood Owl *Strix uralensis davidi* did not attack intruders, but showed a conspicuous distraction display, singing exposed and flying hyper-actively nearby (photo: Y. Fang)

Slika 7: Kot nasprotje kozači *Strix uralensis*, samec sečuanske kozače *Strix uralensis davidi* ne napade vsiljivcev ampak začne z odvračalnimi razkazovanjem, pri čemer poje popolnoma odkrit ter hiperaktivno leti v bližini (foto: Y. Fang)

4. Discussion

4.1. Comparison of Sichuan Wood Owl and Ural Owl

With respect to body size and specific characters, Sichuan Wood Owl strongly resembles the Eurasian Ural Owl, which also shows coarse longitudinal stripes on the breast and under parts, and almond-shaped, blackish-brown eyes in a distinct facial disc. However, the Chinese species / subspecies has a much

darker appearance, caused by the blackish-brown plumage on its scapulars. The central tail feathers are unicoloured dark brownish-black and without streaks (colour appendix - Figure 2; also photos of a mounted specimen, in SCHERZINGER 2005). Recorded sizes are: body length 540 – 580 mm, wing length 371 – 372 mm, and tail length 266 – 290 mm. ECK & BUSSE (1973) measured an index of tail to wing length 71.5 – 77.8 (compared to 70.1 in the smallest subspecies of Ural Owl *Strix u. hondoensis* from Japan, and 83.6 in the largest subspecies *Strix u. macroura* from the Carpathian Mountains; Table 1). There is no information about the body mass of Sichuan Wood Owl.

At first impressions the characteristics of the male's territorial song appear to be quite similar to those of the Ural Owl. However, the whole strophe is much shorter (0.42 – 1.41 s in Sichuan Wood Owl; 2.24 s in Ural Owl), and the frequency is significantly lower (basal amplitude maximal 356 – 420 Hz in Sichuan Wood Owl; 420 Hz in Ural Owl; SCHERZINGER 1980 & 2005). The difference is not so clear in the “nest-site-demonstration”. But clearly the owls themselves did not recognise this difference, when stimulated by imitations of Ural Owl's call notes, and displayed their full territorial performance. As species specific patterns of vocalization usually function as the strongest characteristics for reproductive isolation (KÖNIG 1994), this result strongly suggests that separation of these both types of owls has not yet reached species level. We therefore favour the original classification of Sichuan Wood Owl as a subspecies of Eurasian Ural Owl, until clarified by molecular analysis (STRESEMANN 1923, VOOUS 1962, BURTON 1973, WOLTERS 1975, GLUTZ & BAUER 1980, SCHERZINGER 2005; Table 2).

Although one successful brood was raised in one of the nest boxes in the reserve, our knowledge about reproductive biology is still only preliminary. Duration of brooding and nestling time corresponds with the breeding phenology of European subspecies of Ural Owl (GLUTZ & BAUER 1980). Nevertheless, further observations are necessary, so monitoring of vocalization, behaviour, ontogenetic development, breeding biology, and nutrition was carried out in 2006.

4.2. Survival of Sichuan Wood Owl – a function of forest management

The Sichuan Wood Owl has always been classified as extremely rare (WEIGOLD, in STRESEMANN 1923, HOLT *et al.* 1999). The isolated distribution, as well as the apparent rarity, of the Sichuan Wood Owl may suffice

Table 1: Weights and measurements of different subspecies of *Strix uralensis* (after MOMIYAMA 1928, MOŠANSKY 1958, ECK & BUSSE 1973, GLUTZ & BAUER 1980, MIKKOLA 1983, PIETIÄINEN 1988, KÖNIG *et al.* 1999); Sichuan Wood Owl *Strix uralensis davidi* belongs to the medium sized subspecies of east Asia**Tabela 1:** Teža in izmere podvrst *Strix uralensis* (po MOMIYAMA 1928, MOŠANSKY 1958, ECK & BUSSE 1973, GLUTZ & BAUER 1980, MIKKOLA 1983, PIETIÄINEN 1988, KÖNIG *et al.* 1999); Sečuanska kozača spada med srednje velike podvrste *Strix uralensis* vzhodne Azije

Subspecies	Weight [max]/ Teža [maks] (g)	Tot. length/ Dolžina (mm)	Wing/ Krilo (mm)	Tail/ Rep (mm)	Index of tail-to-wing length/ Indeks dolžine rep – krilo		
					Range	Mean	N
<i>Strix u. fuscescens</i>			310 – 332	232	70.1 – 74.4	72.88	4
<i>Strix u. hondoensis</i>			295 – 347	223 – 244			
<i>Strix u. japonica</i>			259 – 313	201 – 235			
<i>Strix u. nikolskii (daurica)</i>			310 – 355		71.4 – 78,8	75.43	4
<i>Strix u. yenissensis</i>			328 – 370				
<i>Strix u. davidi</i>	?	580 – 590	371 – 372	266 – 290	(71.5) – 77.8	74.65	2
<i>Strix u. uralensis</i>	657 – 950	500 – 620	340 – 380		77.1	77.10	1
<i>Strix u. liturata</i>	720 – 871 [1320]		338 – 396		77.4 – 78.2	77.87	3
<i>Strix u. macroura (carpathica)</i>	503 – 950 [1307]		354 – 415	270 – 315	80.6 – 83.6	82.10	3

to list this population in the category “vulnerable” (COLLAR *et al.* 1994), but more fieldwork is required to clarify this status. In China this owl is listed in category II of “nationally threatened” species (ZHENG & WANG 1998).

The availability of suitable habitats is strictly limited because of natural fragmentation of old growth coniferous forests, caused by the diverse morphology of the high mountains. In addition, human impact in the 1970's decreased the owl's chance of survival by extensive cutting and grazing in the natural mountain forests in large parts of the Gansu and Sichuan provinces, especially in the eastern Qinghai-Tibetan-Plateau (N. LIU, *pers. comm.*). Nowadays there is hope because, in the new politics in China, great effort is being made to maintain the woodland areas and encourage reforestation. Recently China's Ministry for land use and environment decreed a logging ban for nearly all the forests in mountainous areas, in some areas even for bamboo cutting. Furthermore, several reserves have been designated, some with a status comparable to that of national parks.

The first results of mapping the actual distribution of forest stands in the “Lianhuashan Nature Reserve”, based on satellite data, can be used to plan reforestation, and to create stepping stones and corridors between the remnant forest patches (KLAUS *et al.* 2001). In addition the new supply of suitable nest boxes will offer adequate nesting sites for the Sichuan Wood Owl, even in younger forest stands. We estimate a maximum density

of 4 territories of Sichuan Wood Owl in Lianhuashan reserve (woodland area about 47 km²; = 0.85 pairs / 10 km²). Further potential habitats exist at a distance of 30 km, and in the extensive forest alongside the mountain ridge at the border between the provinces of Gansu und Sichuan (Y.-H. SUN, *pers. comm.*). The owl was also observed several times in the famous Jiuzhaigou Reserve (HÖBCROFT, *pers. comm.*, C. JIA, *pers. comm.*). Unfortunately these data are not sufficient for even a rough estimate of total population size.

Acknowledgements: The field studies in “Lianhuashan Nature Reserve” were supported by the German Association for Research (DFG, project KL 962/3-3) and the National Natural Science Foundation of China. The support of the “British Petrol conservation programme”, which enabled a suitable supply of nesting sites, was a key factor in observing the first successful brood. We express our special gratitude for hospitality at the administrative station of “Lianhuashan” reserve, and especially to Prof. Dr. Sun Y.-H. from the Zoological Institute of the Chinese Academy of Sciences, Beijing. His helpfulness made fieldwork possible in forest habitats up to elevations of about 3,000 m. We are grateful to Dr. H.-W. Helb, from the University of Kaiserslautern, for drawing the sonograms. Last, but not least, we thank Dr. A. Vrezec and Prof. Dr. H. Pietiäinen for their helpful review.

Table 2: Suggestions in the literature about the taxonomic ranking of Sichuan Wood Owl as subspecies (*Strix uralensis davidi*) or distinct species (*Strix davidi*). Although there are no new findings, there has been a shift from “isolated race” to “valid species” in recent years, mainly in view of the very long isolation of the area of distribution.

Tabela 2: Pregled taksonomske razvrstitve sečuanske kozače kot podvrste (*Strix uralensis davidi*) ali vrste (*Strix davidi*). Kljub pomanjkanju novih podatkov je opazen premik od oznake “izolirana podvrsta” k “veljavni vrsti”, predvsem zaradi zelo dolge izoliranosti areala.

Reference	Insufficient knowledge/ Nezadostno poznana	<i>Strix uralensis davidi</i>		<i>Strix davidi</i>
		No splitting/ Ne ločuje	Subspecies/ Podvrsta	Distinct species/ Razložna vrsta
HOLT <i>et al.</i> (1999)	more study needed			
DICKINSON (2003)	more study needed			may be ?
GROSSMAN & HAMLET (1964)		dark phase		
ZHENG & WANG (1998)		isolated population		
STRESEMANN (1923)			heavily pigmented	
VOOUS (1962)			isolated	
BURTON (1973)			totally isolated	
ECK & BUSSE (1973)			isolated	
WOLTERS (1975)			W China	
CHENG (1987)			X	
VOOUS & CAMERON (1988)			X	
DUNCAN (2003)			well differentiated	
SIBLEY & MONROE (2003)			like <i>Strix u.</i> from Japan	
SHARPE (1875)				new species
PETERSON (1999)				X
KÖNIG <i>et al.</i> (1999)				absolutely isolated
MACKINNON & PHILLIPPS (2000)			sometimes as race	endemic
SUN, Y.-H. (2000; <i>pers. comm.</i>)				endemic species
HOWARD & MOORE (2003)			valid subspecies	probably
CLEMENTS (2003)				Nr. 2698
NICOLSON (2004; <i>pers. comm.</i>)				valid species
“Zoonomen” ¹	(uncertain)			X
“ITIS” ²				valid spec., Nr. 555434
“Avibase” ³				endemic species
“Animal Diversity Web” ⁴				X
“Global Owl Project” ⁵				X
DEL HOYO <i>et al.</i> (1999)				<i>Strix davidi</i> as superspecies of <i>Strix uralensis</i>

Remarks / opombe:

¹<http://www.zoonomen.net/>

²<http://www.itis.usda.gov/servlet/>

³<http://www.bsc-eoc.org/avibase/>

⁴<http://www.animaldiversity.ummz.umich.edu/site/accounts/classification.html>

⁵<http://www.globalowlproject.com>

5. Povzetek

V letih 1995, 1997 in 1999 je bil opazovan v naravnem rezervatu Lianhuashan, v provinci Gansu, osrednja Kitajska, najmanj en par redke sečuanske kozače *Strix uralensis davidi*. Med 13 srečanji sta avtorja posnela fotografije in teritorialno petje ter oglašanje. Namestila sta več gnezdilnic v primernem habitatu, v letih 2002 – 2003, ki so omogočile bližnje opazovanje gnezditve v letu 2005, prvič za to podvrsto. V letu 2006 sta posnela oglašanje 3 teritorialnih samcev, 2 samic in 2 pravkar speljanih mladičev. V diskusiji primerjata podvrsto z evropsko podvrsto kozače (*Strix u. liturata* in *Strix u. macroura*). Habitat te sove je izjemno ogrožen zaradi fragmentacije. V rezervatu je 47 km² ohranjenih gozdov, ki bodo morda omogočali preživetje te malo znane sove.

6. References

- BURTON, J. (1973): Owls of the world. – Eurobook, Peter Lowe publ., Hertford, England.
- CLEMENTS, J. (2003): Birds of the world: a checklist, 5th edition. – Ibis Publishing Comp., Vista, California.
- COLLAR, N., CROSBY, M. & STATTERSFIELD, A. (1994): Birds to watch 2: The world list of threatened birds. – BirdLife International, Cambridge.
- ECK, S. & BUSSE, H. (1973): Eulen. Die rezenten und fossilen Formen – *Aves, Strigidae*. – Neue Brehm Bücherei 469.
- GLUTZ V. BLOTZHEIM, U. & BAUER, K. (1980): *Strix uralensis* Pallas 1771 – Habichtskauz (Uralkauz). pp. 611–629 In: Handbuch der Vögel Mitteleuropas. – Aula, Wiesbaden.
- GROSSMAN, M.-L. & HAMLET, J. (1964): Birds of prey of the world. – Bonanza Books, New York.
- HOLT, D., BERKLEY, R., DEPPE, C., ENRIQUEZ ROCHA, P., OLSEN, P., PETERSEN, J., RANGEL SALAZAR, J., SEGARS, K. & WOOD, K., (1999): Species accounts of *Strigidae*. pp. 153–242 In: HOYO *et al.*: Handbook of the birds of the world. Vol. 5: Barn owls to Hummingbirds. – Lynx Edition, Barcelona.
- KLAUS, S., SCHERZINGER, W. & SUN, Y.-H. (1996): Ökologie und Verhalten des Chinahaselhuhns *Bonasa sewerzowi*. – Ornithol. Beob. 93: 343–365.
- KLAUS, S., SELSAM, P., SUN, Y.-H. & FANG, Y. (2001): Analyse von Satellitenbildern zum Schutz bedrohter Arten. Fallbeispiel Chinahaselhuhn (*Bonasa sewerzowi*). – Naturschutz u. Landschaftsplanung 33: 281–285.
- KÖNIG, C. (1994): Lautäußerungen als interspezifische Isolationsmechanismen bei Eulen der Gattung *Otus* (*Aves: Strigidae*) aus dem südlichen Südamerika. – Stuttgarter Beitr. Naturkunde/Ser. A 511: 35.
- KÖNIG, C., WEICK, F. & BECKING, J.-H. (1999): Owls – a guide to the owls of the world. – Pica Press, Sussex.
- LIU, N. (1995): Vertebrate fauna of Gansu. – Univ. Lanzhou, China.
- MACKINNON, J. & PHILLIPPS, K. (2000): A field guide to the birds of China. – Oxford Univ. Press., Oxford.
- MIKKOLA, H. (1983): Owls of Europe. – Poyser, Calton.
- MOŠANSKY, A. (1958): Beitrag zur Kenntnis der systematischen Stellung Karpatischer Habichtskäuze (*Strix uralensis*). – Sylvia 15: 55–66.
- MOMIYAMA, T. (1928): New and known forms of the Ural Owl (*Strix uralensis*) from south eastern Siberia, Manchuria, Korea, Sakhalin and Japan. – Auk 45: 177–185.
- PIETIÄINEN, H. (1988): Breeding season quality, age and the effect of experience on the reproductive success of the Ural owl (*Strix uralensis*). – Auk 105: 316–324.
- SCHERZINGER, W. (1980): Zur Ethologie der Fortpflanzung und Jugendentwicklung des Habichtskauzes (*Strix uralensis*) mit Vergleichen zum Waldkauz (*Strix aluco*). – Bonn. Zool. Monogr. 15.
- SCHERZINGER, W. (1996): Walddynamik und Biotopansprüche des Habichtskauzes (*Strix uralensis*). – Abh. Zool.-Bot. Ges. Österreich 29: 5–16.
- SCHERZINGER, W. (2005): Remarks on Sichuan Wood Owl *Strix uralensis davidi* from observations in south-west China. – Bull. B. O. C. 125: 275–286.
- SHARPE, R.B. (1875): Contributions to a history of the Accipitres. Notes on birds of prey in the museum at the Jardin des Plantes and the Collection of Mons. A. Bouvier. – Ibis Vol. 5 (3rd Ser.): *Syrnium davidi*: 256.
- STRESEMANN, E. (1923): Zoologische Ergebnisse der Walter Stötznerschen Expeditionen nach Szetschwan, Osttibet und Tschili. 2/12: *Striges bis Ralli*. – Abhandl. Ber. Mus. Tierk. Völkerkunde, Dresden 16: 58–70.
- SUN, Y.-H., SCHERZINGER, W., LIU, N.-F., KLAUS, S. & FANG, Y. (2001): New distribution areas of the Sichuan Wood Owl in Gansu. – Zoologica Sinica 47/4: 473–475.
- VOOUS, K.-H. (1962): Die Vogelwelt Europas und ihre Verbreitung. Ein tiergeographischer Atlas über die Lebensweise aller in Europa brütenden Vögel. – Parey, Hamburg, Berlin.
- WOLTERS, H. (1975): Die Vogelarten der Erde. Eine systematische Liste mit Verbreitungsangaben sowie deutschen und englischen Namen, vol. 1. – Parey, Hamburg, Berlin.
- ZHENG, G. & WANG, Q. (1998): *Aves*. In: WANG, S. (ed.): China red data book of endangered animals. – Science Press, Beijing, Hong Kong, New York.

Arrived / Prispelo: 31.1.2006

Accepted / Sprejeto: 5.10.2006

APPENDIX / PRILOGA

Table 3: Diary of field observations of Sichuan Wood Owl *Strix uralensis davidi***Tabela 3:** Dnevnik terenskih opazovanj sečuanske kozače *Strix uralensis davidi*

Date/ Datum	Time / Čas	Habitat	Weather / Vreme	Description of observation / Opis opazovanja
10 Apr 1995	19.45 – 21.00	coniferous forest, 2700 m a.s.l.	snow cover, calm wind, clear sky, waxing moon, +2°C	male owl hoots spontaneously; I try to stimulate the owl by imitating Ural Owl's territorial song: male intensifies its vocalization; dives above my head, and lands in a high spruce tree, singing variable strophes of territorial song; also a rising scale (similar to "nest-site-demonstration" of Ural Owl)
11 Apr 1995	16.40	coniferous forest	overcast, 0°C	male owl calls spontaneously
	19.30 – 20.25	mixed forest, slope		male owl utters territorial song, and long sequences of "nest-site-demonstration"; female owl answers from a rocky area in a steep canyon, with hoarse "begging calls", and approaches the male; hasty duet (territorial song by the male, "begging calls" by female; male breaks into full song and "nest-site-demonstration" with high intensity; female returns suddenly to rocky slope)
12 Apr 1995	19.19 – 20.04	creek in coniferous forest		male utters single songs, flies to an open area on a dry slope; utters "nest-site-demonstration"
13 Apr 1995	12.30 – 17.25	dense spruce tree stand	calm snowing, –3°C	male utters single strophes of territorial song; Chinese Nutcracker <i>Nucifraga caryocatactes macella</i> performs mobbing against the owl; the owl tries to escape with short flights; vocal activity in large intervals; I stimulate the owl by imitation of territorial song; male owl lands about 5 m directly above me, in a dense canopy of spruce
	19.30	shrubby conifer, at hillside		male handing over a piece of prey to the female, at top of an exposed coniferous tree
14 Apr 1995	19.45 – 20.05	conifers in valley	full moon, 0°C, calm wind	male starts activity with territorial song; female softly sails past me and lands in the crown of a spruce tree – well visible against the sky; male lands beside its partner, while singing; a long duet follows (territorial song by the male, "begging" by the female); both owls sitting close to each other, turn their face towards each other and lean forward, handing over some piece of prey with the beak; female presses the fetched mouse against the sitting branch with one leg, tears some pieces with its beak and swallows the entire remainder; after this it rubs its beak against the branch; male departs; female continues "begging", flies to a rocky slope

continuation of Table 3 / nadaljevanje tabele 3

Date/ Datum	Time / Čas	Habitat	Weather / Vreme	Description of observation / Opis opazovanja
2 May 1997	20.40	mixed forest, slope	free of snow, up to 18°C during daytime, +2°C in evening	I stimulate vocalization by imitating territorial song; male answers from long distance, but does not approach
4 May 1997	20.15 – 20.30	mixed forest, rocky slope	rain during night, 0°C	I stimulate vocalization by imitating territorial song; male answers immediately with territorial song, and flies near to me; At least long series of “nest-site-demonstration”
6 May 1997	07.35	mixed forest, slope	full sunshine	spontaneous territorial song of male
	19.20	mixed forest, slope		male starts vocal evening activity with “nest-site-demonstration”
7 May 1997	20.08 – 20.22	coniferous forest		male starts singing at an inaccessible steep slope; female answers and a duet follows; I stimulate vocalization by imitating territorial song; male approaches and lands on an exposed branch (about 40 m distance); female follows (both birds clearly visible against the sky); female departs into darkness
1 Jul 1999	20.45 – 21.15	rocky canyon, dry	mostly rain, thunderstorm, 13°C	I stimulate vocalization by imitating territorial song; male utters the first syllables of territorial song; later the female utters a strident “begging” call; parts of territorial song are heard in a duet (probably two males) – followed by fierce aggressive calls (similar to territorial demarcation of Ural Owl in autumn)

POPULATION DEVELOPMENT, NEST SITE SELECTION AND CONSERVATION MEASURES FOR WHITE STORK *Ciconia ciconia* ALONG THE LOWER TAMIŠ RIVER (VOJVODINA, N SERBIA)

Bela štokrlja *Ciconia ciconia* ob spodnjem toku reke Tamiš (Vojvodina, S Srbija) – populacijski trendi, izbira gnezdišč in varstveni ukrepi zanjo

MARKO TUČAKOV

Marka Oreškovića 9, 25275 Bački Breg, Serbia, e-mail: mtucakov@eunet.yu

Number of breeding pairs, their spatial distribution, selection of nest sites and the breeding success of White Stork *Ciconia ciconia* was studied in 2004 in 20 villages adjacent to the lower Tamiš valley. 322 pairs, which occupied their nests for at least four weeks (HPa) during the first half of the breeding season, were found, 307 of which were HPm: pairs with fledged young. The number of breeding pairs in the 1957 – 2004 period grew in the area, but population in the entire Vojvodina fluctuated. The study area is the most important breeding area for White Stork in the province (30.7% of all breeding pairs) and the country: 27.4% of national population breeds there. One of the most important reasons for the high population density are very suitable feeding conditions. Most of the pairs with fledged young (HPm) had 3 chicks per pair (40.1%), followed by pairs with two chicks (32.5%), four chicks (15.2%), one chick (11.4%) and five chicks (2.4%). The majority of nests were situated on buildings (53.7%) and electric pylons (41.9%). There is a marked change in the breeding habits compared with those in the 1980's: straw and hay bales have been almost completely abandoned as nest sites since then. Out of the entire number of HPa, 58 (18%) are situated in seven villages adjacent to the first river sector, 213 (66%) in nine villages along the second sector (where the river has wide floodplain) and 51 (16%) in four villages along the third river sector.

Key words: White Stork, *Ciconia ciconia*, population development, Tamiš, Serbia, Vojvodina

Ključne besede: bela štokrlja, *Ciconia ciconia*, razvoj populacije, Tamiš, Srbija, Vojvodina

1. Introduction

At the national level, White Stork *Ciconia ciconia* census in Serbia was carried out in 1996. A breeding population of 872 pairs was counted, 93% of them in Vojvodina, indicating the region as the most important for breeding of this species (PELLE 1996). Surveys of breeding pairs of White Stork in Vojvodina have long tradition. Censuses in the province were carried out in 1957 (SZLIVKA 1959), 1974 (GAROVNIKOV 1977), 1979 (GAROVNIKOV 1980-81) and 2000 (GERGELJ *et al.* 2000). The parameters which were subject of census

routine included only total number of active nests (breeding pairs) in particular villages and the nest site selection. Breeding success was surveyed only during the 2000 census (GERGELJ *et al.* 2000).

As the last census carried out in 2000 confirmed that one quarter of all pairs breed in villages situated on the edge of the lower Tamiš valley (GERGELJ *et al.* 2000), this region has been subject of survey in 2004. The aim was to determine the number of breeding pairs along the lower Tamiš, breeding success and nest site selection. The results of this census are presented and discussed in this paper.

2. Study area and methods

2.1. Study area

The study area was part of the Tamiš River valley, which is situated in Serbia (between 40°50' N 45°28' E and 20°23' N 20°58' E) in central and southwest Banat (LAZIĆ 1996). Out of 359 km of this transboundary river, 118 pass through Serbia, between the village of Jaša Tomić and the river mouth at Pančevo (Figure 1). Fluvial erosion and very pronounced fluctuations of



Figure 1: The study area of the lower Tamiš River

Slika 1: Raziskovano območje spodnjega toka reke Tamiš

the water level, as well as meandering, are the main river's characteristics. Extremely high water levels are usually recorded in April, extremely low in October (TOMIĆ 1989).

The river regulations started in 1728 and were completed in 1977, when part of the river stretch was included into the Danube-Tisa-Danube hydro system (TOMIĆ 1989). However, despite the fact that the greater part of the stretch is currently canalized (from the state border downstream to Botoš (the first sector in the text below) and from Opovo to the river mouth (the third sector in the text below), the river is free-flowing between Botoš and Opovo (the second sector in the text below) with intensive meandering, preserved river branches (near Farkaždin and Baranda), oxbows (near Čenta), floodplain meadows (near Tomaševac, Uzdin, Farkaždin, čenta and Botoš) and alluvial forests. Three sectors are different from the hydrological point of view. The first is 33 km long, the second 42 km, the third 43 km (LAZIĆ 1996). The widest river valley, regularly flooded, follows the boundaries of the second sector. Its widest parts are situated between Čenta and Baranda (10.6 km) and between Orlovat and Uzdin - 9.3 km. Five large fishponds are situated in the valley: Sutjeska (900 ha) near Sutjeska, Sveti Nikola (400 ha) at Neuzina, Uzdin (430 ha) near Uzdin, Baranda (1005 ha) between Baranda, Sakule and Opovo, and Čenta (120 ha) near Čenta (BUGARČIĆ 1999).

2.2. Methods

The census was carried out during the breeding season in 2004, from late May to mid August, in particular between 4 Jul and 18 Jul, in the phase of breeding cycle when chicks are visible from the ground, as recommended by the International White Stork Census methodology (SCHULZ 1999). This allowed simultaneous survey of nest site selection and breeding success. The following data were recorded: nest occupancy, nest site selection (with the following categories: building, electric pylon, tree, straw/hay bales, other) and number of fledged chicks. Only nests occupied by a pair for at least four weeks during the first half of the breeding season are considered to be occupied (SCHULZ & THOMSEN 1999). All nests situated on man-made buildings (houses, churches, observation towers and local power stations) were taken as single category, having in mind that further separation of this category was in many cases impossible. Besides settlements, all other potential breeding areas were surveyed.

While counting StDBiol, I took in account surface data for the river valley given by LAZIĆ (1996).

Table 1: Number of breeding pairs of White Stork *Ciconia ciconia* in villages along the lower Tamiš River in 2004**Tabela 1:** Število gnezdečih parov bele štorcklje *Ciconia ciconia* v vaseh vzdolž spodnjega toka reke Tamiš v letu 2004

Settlement / Naselje	HPa	HPm	Nesting sites / Gnezdišča				
			Building/ Zgradba	Electric pylon/ El. drog	Trees/ Drevesa	Hay bales/ Bale sena	Other niches/ Ostale niše
Sakule	31	29	24	6	0	0	1
Uzdin	30	28	23	4	1	0	2
Botoš	30	28	0	30	0	0	0
Čenta	28	28	18	9	1	0	0
Idvor	26	25	20	3	2	0	1
Baranda	26	25	24	2	0	0	0
Orlovat	21	17	1	19	0	0	1
Neuzina	21	19	1	20	0	0	0
Opovo	17	17	14	3	0	0	0
Jabuka	13	13	12	0	1	0	0
Boka	12	12	4	8	0	0	0
Tomaševac	11	11	1	9	0	0	1
Sefkerin	11	11	11	0	0	0	0
Glogonj	10	10	9	1	0	0	0
Farkaždin	10	9	6	2	0	2	0
Sutjeska	9	9	2	7	0	0	0
Sečanj	7	7	3	4	0	0	0
Ban. Despotovac	4	4	0	4	0	0	0
Jaša Tomić	3	3	0	2	0	1	0
Šurjan	2	2	0	2	0	0	0
Total	322	307	173	135	5	3	6

Abbreviations of the breeding parameters follow the methodology of International White Stork Census (SCHULZ & THOMSEN 1999; Table 5 in the appendix).

White Stork nests situated on wires of power pylons, as well as birds themselves, can cause a short-circuit, if they complete electric circuit between live and ground wire. Having results of nests site selection from 2004, in order to minimize the conflict and following the best practice in protection of nests situated on the wires (e. g. PERRENOU *et al.* 1996, MUŽINIĆ 1999), the most problematic nests in the study area placed on overhead wires on electric pylons in 2004 were supported by erection of platforms on top of the pylons before the start of the breeding season in 2005 (between 9 and 30 March). The metal platform was designed in order to create space (70 cm) between the nest and the wires. During the erection process, old nests were taken down from the wires, after which initial layer of branches was fixed at the bottom of the platform on the ground. Then platform was erected and fixed to

the pylon top. Nest acceptance was checked between 29 May and 10 Jul 2005.

3. Results

In the study area, 360 nests were counted, 322 of which were occupied. Occupied nests were found only in settlements: there were no nests outside them. Nests were found in each of 20 villages bordering the river floodplain (Table 1). Out of all 322 breeding pairs, 58 (18%) were situated in seven villages adjacent to the first river sector, 213 (66%) in nine villages along the second sector, and 51 (16%) in four villages along the third river sector.

Breeding success of all breeding pairs (JZa) was 2.58, and 2.60 of all breeding pairs that raised chicks (JZm). Most of the pairs with fledged young (HPm) had 3 chicks per pair (40.1%), followed by pairs with two chicks (32.5%), four chicks (15.2%), one chick (11.4%) and five chicks (2.4%; Table 2). There is no

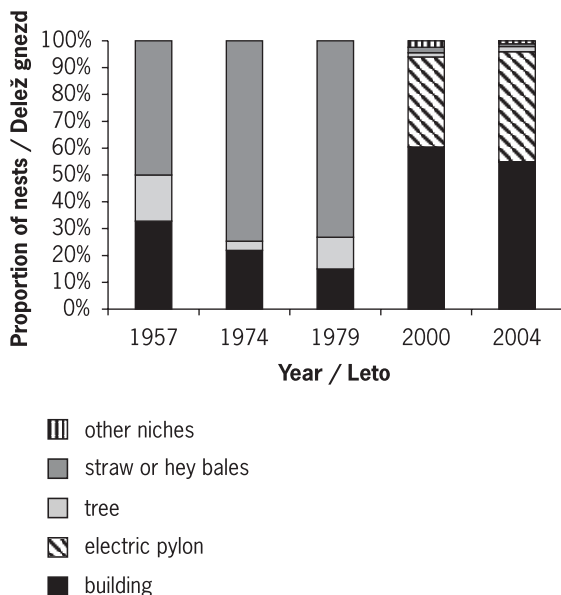


Figure 2: Changes in White Stork *Ciconia ciconia* nest site selection in the lower Tamiš valley

Slika 2: Spremembe v izbiri štorljinega gnezdišča bele štorke *Ciconia ciconia* v dolini spodnjega toka reke Tamiš

correlation between the pairs' breeding success within different villages (density groups; Figure 3). The vast majority of nests were situated on buildings (53.7%) and electric pylons (41.9%; Table 1). "Biological" potential density (StDBiol) was 26.9 pairs / 100 km².

The majority of nests on the pylons were situated on the non-isolated wires. Out of 135 these nests in the study area (Table 1), 37 nest-isolation platforms were erected before the beginning of the breeding season, in March 2005. 29 of them (78.3%) were accepted already in that year (Table 4).

4. Discussion

The number of breeding pairs in the 1957 – 2004 period grew (Table 3). Despite the fact that in some censuses the coverage of all villages was not complete in the entire valley, the trend is very indicative. However, population in the entire Vojvodina fluctuated in the same period (SZLIVKA 1959, GAROVNIKOV 1980-81, GAROVNIKOV 1977, PELLE 1996).

The breeding success (Table 2) was lower than in 2000, when JZm in the same area was 3.38, similar to the whole province where JZm was 3.14 (GERGELJ *et al.* 2000). A possible reason for this is the difference in the level of precipitation between the two years. The year 2000 was the driest in Serbia since the very beginning of weather surveys in Serbia (REPUBLIC

HYDROMETEOROLOGICAL SERVICE OF SERBIA 2001), while the territory of Vojvodina was extremely wet in 2004 (REPUBLIC HYDROMETEOROLOGICAL SERVICE OF SERBIA 2005). Similarly high reproductive success of the White Stork in 2000 was recorded in Switzerland (BOETTICHER-STREIM 1991). It has been proved that the breeding success is in negative correlation with the level of precipitation (BERT & LORENZI 1999).

Absence in correlation of breeding success with density of breeding pairs (Figure 3) opposes the one in the Sava River valley in Croatia, where White Storks breeding in high densities have had higher breeding success, indicating that food resources were evenly distributed and almost unlimited (SCHNEIDER-JACOBY 1993).

Table 2: Breeding success of White Stork *Ciconia ciconia* at villages in the lower Tamiš valley in 2004

Tabela 2: Gnezditveni uspeh bele štorke *Ciconia ciconia* v vashih vzdolž spodnjega toka reke Tamiš v letu 2004

Parameter	Value/ Vrednost
H	360
HPa	322
HPm	307
HB1	16
HB2	6
HPo	16
HPx	33
HPm1	28
HPm2	94
HPm3	116
HPm4	44
HPm5	7
JZG	798
JZa	2.48
JZm	2.60

It is estimated that recently 1000 – 1100 pairs bred in Vojvodina, and 1100 – 1250 in the entire Serbia (PUZOVIĆ *et al.* 2003), which makes the Tamiš River valley the most important breeding area for White Stork in the province (30.7% of breeding pairs breed there) and the country: 27.4% of the national population breed there. One of the most important reason for such a high population density are very suitable feeding conditions, which are considerably

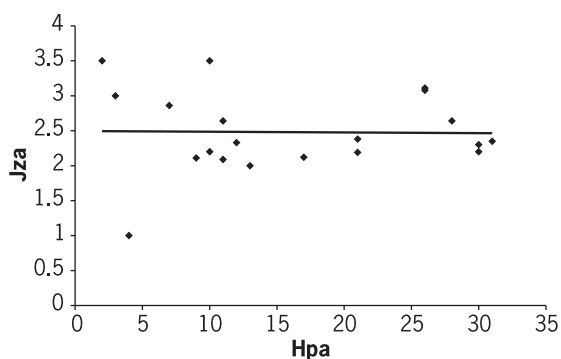


Figure 3: Correlation between the number of occupied nests of White Stork *Ciconia ciconia* per village and the breeding success in the lower Tamiš valley (Spearman $\rho = -0.049$, $df = 18$, NS, two-tailed test, H_0 is not rejected)

Slika 3: Korelacija med številom zasedenih gnezd na vas in gnezditveni uspeh bele štorcklje *Ciconia ciconia* v dolini spodnjega toka reke Tamiš (Spearman $\rho = -0.049$, $df = 18$, NS, dvorepi test, H_0 ni zavrnjena)

more favourable than in other areas in Serbia where regional censuses are conducted (e.g. RAŠAJSKI 1988, KULIĆ 2004).

The highest concentration of breeding pairs along the second Tamiš sector is due to the very favourable local feeding conditions in this wide inundation stretch, particularly in the preserved, extensive, temporarily flooded meadow and pastures that follow the river along both banks in this stretch. Findings of SCHNEIDER-JACOBY (1993), EICHELMANN (1999) and ŠTUMBERGER & VELEVSKI (2001) also prove that these are optimal foraging habitats for the White Storks and, when covering large areas, they support high breeding densities. These habitats are almost completely missing along the first and the third sectors (*own data*). It has already been proven that foraging areas during the breeding season in favourable areas

Table 3: Development of breeding population of White Stork *Ciconia ciconia* in the lower Tamiš valley between 1957 and 2004

Tabela 3: Razvoj gnezdeče populacije bele štorcklje *Ciconia ciconia* vzdolž spodnjega toka reke Tamiš med letoma 1957 in 2004

Census year/ Leto popisa	HPa	Source / Vir
1957	58	SZLIVKA 1959
1974	178	GAROVNIKOV 1977
1979	221	GAROVNIKOV 1980-81
2000	250	GERGELJ <i>et al.</i> 2000
2004	322	<i>this paper</i>

are situated in immediate vicinity of nests (OŽGO & BOGUČKI 1999).

All nest sites that White Storks use traditionally in Vojvodina are used in the Tamiš valley as well. However, there is a marked change in the breeding habits compared with those in the 1980s (starting from 1979, as RAŠAJSKI (1988) describes the situation for S Banat): straw and hay bales have been almost completely abandoned as nest sites since then (Figure 2). The most probable cause for this are changed practices of straw and hay conservation (in stables, under roofs), as well as evident absence of these nesting places in recent years (*own data*). The same trend was proven for Hungary, but sharp increase of electric pole usage for White Stork breeding started at least one decade earlier than in the Tamiš valley and the entire Vojvodina (LOVÁSZI 1999). Use of trees as nest sites in the study area decreased between 1957 and 2004 as well (Figure 4), although reasons for that are not clear. One of the suggested reasons can be absence of old trees suitable for breeding (A. ŽULJEVIĆ, *pers. comm.*), which happened, for example, in Slovenia (DENAC 2001). Numerous concentrated tree-breeding White Stork pairs are site-specific in Vojvodina (KANJO 2000).

Table 4: Results of the White Stork *Ciconia ciconia* nest-protection program in the lower Tamiš valley in 2005

Tabela 4: Rezultati programa za zaščito štorckljinih *Ciconia ciconia* gnezd v dolini spodnjega toka reke Tamiš v letu 2005

Village/ Vas	Erected/ Postavljeno	Accepted/ Sprejeto
Orlovat	10	6
Neuzina	10	9
Botos	8	7
Sutjeska	4	3
Tomasevac	3	2
Sakule	2	2

Acknowledgements: I dedicate this article to my friend David Reeder who is in love in Vojvodinian floodplains and their wildlife and who believes even more than I do that they can and will be sufficiently protected. This study was financed by the Rufford Small Grants for Nature Conservation of The Rufford Maurice Laing Foundation. Many thanks also to Elektrovojvodina Public Enterprise for their professional cooperation in White Stork conservation, to Robert MacCurrach who helped me during survey. Damijan Denac and Slobodan Puzović gave useful comments to the manuscript.

5. Povzetek

Leta 2004 je avtor prispevka v 20 vaseh, meječih na spodnji tok reke Tamiš v Vojvodini, ugotavljal število gnezdečih parov, izbiro gnezdišč in gnezditveni uspeh bele štokrlje *Ciconia ciconia*. Zabeleženih je bilo 322 parov, ki so v prvi polovici gnezditvenega obdobja zasedali gnezda najmanj štiri tedne (HPa), 307 izmed katerih so bili pari s speljanimi mladiči (HPm). V obdobju 1957 – 2004 je število gnezdečih parov v tem območju naraslo, medtem ko je populacija bele štokrlje v celotni Vojvodini nihala. Preučevano območje je najpomembnejše gnezditveno območje za belo štokrljo tako v Vojvodini (30,7% vseh parov) kot v celotni državi (27,4% srbske populacije). Eden izmed najpomembnejših razlogov za visoko populacijsko gostoto bele štokrlje v tem območju so nadvse ugodne prehranjevalne razmere. Večina parov s speljanimi mladiči (HPm) je imela po tri mladiče (40,1%), njim pa so sledili pari s po dvema (32,5%), štirimi (15,2%), enim (11,4%) in petimi mladiči (2,4%). Večina gnezd je bila spletenih na stavbah (53,7%) in električnih drogovih (41,9%). Sicer pa so se v precejšnji meri spremenile gnezditvene navade bele štokrlje v primerjavi s tistimi v osemdesetih letih prejšnjega stoletja: odtlej so bile kot gnezdišča skoraj povsem opuščene slamnate bale. Od celotnega števila parov s speljanimi mladiči jih 58 (18%) živi v sedmih vaseh, meječih na prvi rečni sektor, 213 (66%) v devetih vaseh vzdolž drugega sektorja (z veliko poplavno ravnico), 51 (16%) pa v štirih vaseh vzdolž tretjega rečnega sektorja.

6. References

- BERT, E. & LORENZI, M.C. (1999): The influence of weather conditions on the reproductive success of the White Stork (*Ciconia ciconia*) in Piedmont/Italy. pp. 437–442 In: SCHULZ, H. (ed.): Weisstorch im Aufwind? – White Storks on the up? Proceedings of International Symposium on the White Stork, Hamburg. – NABU, Bonn.
- BOETTCHER-STREIM, W. (1991): Der Weisstorch in der Schweiz. – Schweizerische Gesellschaft für den Weisstorch, Altdorf.
- BUGARČIĆ, P. (1999): Artificial lakes of Vojvodina – geographical aspects and problems. – PhD thesis, University of Novi Sad, Faculty of Sciences, Institute of Geography, Novi Sad.
- DENAC, D. (2001): Breeding biology, phenology and distribution of White Stork *Ciconia ciconia* in Slovenia. – *Acrocephalus* 22 (106–107): 89–103.
- GAROVNIKOV, B. (1977): White Stork census in Vojvodina in 1974. – *Arhiv bioloških nauka* 29 (1–2): 89–95.
- GAROVNIKOV, B. (1980–81): Brojnost belih roda (*Ciconia ciconia* L.) u Vojvodini na osnovu popisa gnezda u 1974. i 1979. godini. – *Priroda Vojvodine* 6–7: 47–57.
- GERGELJ, J., PUZOVIĆ, S., RAŠAJSKI, J., BALOG, I., LUKAČ, S., ŽULJEVIĆ, A., TUČAKOV, M., MATOVIĆ, Č., STOJNIC, N. & KOVAČEVIĆ, B. (2000): Bela roda (*Ciconia ciconia*) u Vojvodini 2000. godine – populacija i distribucija. – *Ciconia* 9: 32–44.
- KANJO, B. (2000): Gneždenje bele rode (*Ciconia ciconia*) u Svilojevu u periodu 1990 – 1999. – *Ciconia* 9: 187.
- KULIĆ, S. (2004): Promene brojnosti i rasporeda parova bele rode *Ciconia ciconia* u Leskovačkoj kotlini (jugoistočna Srbija). – *Ciconia* 13: 114–121.
- LAZIĆ, L. (1996): Tamiš river water economy problems of Potamisje in Yugoslavia. – PhD Thesis, University of Novi Sad, Faculty of Natural Sciences and Mathematics, Institute of Geography, Novi Sad.
- LOVÁSZI, P. (1999): Conservation of the White Stork in Hungary. pp. 203–211, In: SCHULZ, H. (ed.): Weisstorch im Aufwind? – White Storks on the up? Proceedings of International Symposium on the White Stork, Hamburg. – NABU, Bonn.
- MUŽINIĆ, J. (1999): A frame for White Stork nest. – *Israel Journal of Zoology* 45: 497–499.
- OŽGO, M. & BOGUČKI, Z. (1999): Home range and intersexual differences in the foraging habitat use of a White Stork (*Ciconia ciconia*) breeding pair. pp. 481–492 In: SCHULZ, H. (ed.): Weisstorch im Aufwind? – White Storks on the up? Proceedings of International Symposium on the White Stork, Hamburg. – NABU, Bonn.
- PELLE, Z. (1999): Status and biology of White Stork in Yugoslavia. pp. 219–221 In: SCHULZ, H. (ed.): Weisstorch im Aufwind? – White Storks on the up? Proceedings of International Symposium on the White Stork, Hamburg. – NABU, Bonn.
- PERENNOU, C., SADOUL, N., PINEAU, O., JOHNSON, A. & HAFNER, H. (1996): Management of nest sites for colonial waterbirds. *Tour de Valat, Le Sambuc*.
- PUZOVIĆ, S., SIMIĆ, D., SAVELJIĆ, D., GERGELJ, J., TUČAKOV, M., STOJNIC, N., HULO, I., VIZI, O., ŠĆIBAN, M., RUŽIĆ, M., VUČANOVIĆ, M. & JOVANOVIĆ, T. (2003): Birds of Serbia and Montenegro – breeding population estimates and trends: 1990 – 2002. – *Ciconia* 12: 35–120.
- RAŠAJSKI, J. (1988): Brojnost gnezdečih parova belih roda (*Ciconia ciconia*) sa pratećim pojavama gneždenja u južnom Banatu za period 1976 – 1985. – *Larus* 40: 111–123.
- REPUBLIC HYDROMETEOROLOGICAL SERVICE OF SERBIA (2005): Osnovne klimatske karakteristike na teritoriji Srbije u periodu januar-decembar 2004. godine. – Republic Hydrometeorological Service of Serbia. <www.hidmet.sr.gov.yu/podaci/meteorologija/latin/2004.pdf>, (Downloaded: 10 Sep 2006)
- REPUBLIC HYDROMETEOROLOGICAL SERVICE OF SERBIA (2001): Padavinski režim u Srbiji 1961 – 1990. – Republic Hydrometeorological Service of Serbia. <www.hidmet.sr.gov.yu/podaci/meteorologija/Padavinski_rezim_u_Srbiji_lat.pdf>, (Downloaded: 10 Sep 2006)
- SCHNEIDER-JACOBY, M. (1993): Vögel als Indikatoren für das ökologische Potential der Saveauen und Möglichkeiten für deren Erhaltung. – PhD Thesis, Biologischen Fakultät, Universität Konstanz.

- SCHULZ, H. & THOMSEN, K-M. (1999): Abbreviations, Glossary. pp. 25-26 In: SCHULZ, H. (ed.): Weisstorch im Aufwind? – White Storks on the up? Proceedings of International Symposium on the White Stork, Hamburg. – NABU, Bonn.
- SZLIVKA, L. (1959): Results of the White Stork census in the Vojvodina (Yugoslavia). – *Aquila* 66: 262-266.
- TOMIĆ, P. (1989): Reka Tamiš i njeni vodoprivredni problemi. – *Zbornik radova Instituta za geografiju* 16: 20-26.

Arrived / Prispelo: 6.6.2006

Accepted / Sprejeto: 5.10.2006

APPENDIX / DODATEK

Table 5: Abbreviations of White Stork *Ciconia ciconia* breeding parameters used in the text (after SCHULZ & THOMSEN 1999)

Tabela 5: Okrajšave za gnezdilne parametre bele štorke *Ciconia ciconia*, uporabljene v tekstu (po SCHULZ & THOMSEN 1999)

H	nest
HPa	pair which has occupied a nest for at least four weeks during the first half of the breeding season
HPm	pair with fledged young
HPmx	pair with x fledged young
HPo	pair without fledged young which has occupied a nest for at least four weeks during the first half of the breeding season
HPx	pair with unknown breeding success which has occupied a nest for at least four weeks during the first half of the breeding season
HB1	single bird visiting the nest, no binds to the nest
HB2	two birds (pair) visiting the nest, no binds to the nest
JZG	total number of fledged young in a defined area per year
JZa	breeding success, average number of fledged young per pair related to all HPa of a defined area
JZm	breeding success, average number of fledged young per pair related to all HPm of a defined area
StDBiol	“biological” population density, number of pairs (HPa) per 100 km ² of potential feeding habitat

HIDDEN LEKS IN THE YELLOW-BROWED WARBLER *Phylloscopus inornatus*? - INVESTIGATIONS FROM THE KHAN KHENTEY RESERVE (MONGOLIA)

Prikriti leki pri mušji listnici *Phylloscopus inornatus*? – raziskava iz rezervata Khan Khentey (Mongolija)

PETER HANS WILHELM BIEDERMANN

Department of Behavioural Ecology, Institute of Zoology, University of Bern, Wohlenstrasse 50A, CH-3032 Hinterkappelen, Switzerland, e-mail: peterbiederm@students.unibe.ch

The breeding biology of the Yellow-browed Warbler *Phylloscopus inornatus* is largely unknown. Recently the species was found to breed in clusters and some hypotheses on the function of aggregated breeding sites have been proposed. To obtain new insights, two clusters of Yellow-browed Warblers were observed from May to July 2003 in the Mongolian Khentey. Mist-netting, nest searching, behavioural observations and habitat analysis were conducted. In contrast to the large breeding clusters found in the main area of the species distribution in Siberia, pairs in the Khentey are breeding in single groups of a maximum of 3 nesting pairs. At this southern border of its breeding range the species has problems with immense predation pressure and unequal sex-ratios (approx. 5:1 males to females). As a consequence, four breeding pairs had at least ten nests, which were all predated before young were hatched. Nests are built solely by females and one of the females replaced its nest three times following predation of eggs. There was great fluctuation of territorial males in the clusters, which sometimes contained more than 20 males. Breeding pairs were formed after peaks in the numbers of territorial males. Due to its small breeding groups or clusters, the Khentey has great advantages for understanding and testing the process of cluster formation in this species. Locations of breeding territories were independent of habitat parameters, but centred in the middle of unsuccessfully established territories. Thus, this small dataset strongly supports the hidden lek hypothesis as the main explanation of clustering, saying that males with territories in the centre of a territory-congregation are sexually the most attractive for females. Yellow-browed Warblers could be one of the few and best examples for the correctness of this hypothesis. New data on biometry, breeding biology and behaviour in this species are discussed.

Key words: *Phylloscopus inornatus*, Yellow-browed Warbler, hidden lek, cluster breeding, sex ratio, predation

Ključne besede: *Phylloscopus inornatus*, mušja listnica, skriti lek, rastišče, gnezditve v skupkih, razmerje spolov, predacija

1. Introduction

In central Europe, the Yellow-browed Warbler *Phylloscopus inornatus* is widely known from accidental sightings. In the past there were three subspecies combined under the species *Phylloscopus inornatus*: The Yellow-browed Warbler (formerly known as *Phylloscopus inornatus inornatus*) and the two subspecies of the Hume's / Buff-browed Warbler (formerly known

as *Phylloscopus inornatus humei* and *P. i. mandelleii*). Because of morphological, ecological and behavioural criteria the Yellow-browed Warbler and the Hume's / Buff-browed Warbler are now seen as two species, and the second is now called Hume's Warbler *Phylloscopus humei* (GLUTZ v. BLOTZHEIM & BAUER 1991, SVENSSON 1992). Breeding sites are relatively rare in the European part of the Ural-mountains, but fairly common east of it. The species is, without large geographic differences,

distributed in the taiga-forests of Siberia between the Urals and the Ochotsk-sea (GLUTZ v. BLOTZHEIM & BAUER 1991).

Recently breeding attempts of Yellow-browed Warblers were reported from the Mongolian Khentey (A. BARKOW unpublished data, WICHMANN 2001, WICHMANN & POKROVSKAYA 2004), although this is outside the formerly accepted breeding range (CHABRY 1989). This area of forest-steppes in northern Mongolia constitutes the southern border of the species' breeding range.

The breeding biology of the Yellow-browed Warbler and the closely related Hume's Warbler is largely unknown (compare PRICE & JAMDAR 1991 for *P. (i.) humeii*). Despite its abundance in some areas, only some parameters of nesting sites and eggs are described in the literature (WITHERBY *et al.* 1943, WOROBJEW 1963, GLUTZ v. BLOTZHEIM & BAUER 1991).

“Cluster breeding” in birds is a quite unusual form of breeding, not found in many species. Breeding pairs are not randomly distributed over a suitable habitat, but clustered in groups. In contrast to colonial breeding, each pair still has its own defended territory. Most species that congregate in clusters for breeding do so for common defence against predators and/or follow an uneven distribution of food. Recent studies showed that the form of the mating system can also lead to cluster breeding (HERREMANS 1993, DANCHIN & WAGNER 1997, WAGNER 1997).

Breeding in clusters for *Phylloscopus inornatus* is briefly discussed in the literature (BOURSKI & FORSTMEIER 2000), but its function and frequency are largely unknown or speculative.

2. Study area

Bordering the Russian Federation in the north and the People's Republic of China in the east, south and west, Mongolia is a landlocked country which covers an area of 1.56 million km². It extends 1236 km from north to south and 2405 km from east to west, and is the seventh largest country in Asia.

The Khan Khentey Strictly Protected Area (KKSPA), situated in the northeast of Mongolia, was founded in 1992 (Figure 1). This huge uninhabited area, stretching from the Russian border to the northeast of Ulaanbaatar, lies between 48° and 49°N and from 107° to 110°E. It covers 1.2 million ha and is the fourth largest protected area in Mongolia (MYAGMARSUREN 2000). Compared with the protected boreal ecosystems in Europe, it is as large as the complete protected forests of Fennoscandia (VON VELSEN-ZERWECK 2002). Cooperation between Göttingen University and the National University of

Mongolia led, in 1998, to the research station “Khonin Nuga” being established by the side of the Eröö river in the western buffer zone of the KKSPA (Figure 1). The study area at Khonin Nuga (49°04'N, 107°24'E) lies at an altitude of 1000 m (+/-50 m) a.s.l. and covers 1.8 km².



Figure 1: The location of Khan Khentey Strictly Protected Area and the research station Khonin Nuga (after MNE & WWF 1994).

Slika 1: Lokacija rezervata Khan Khentey in raziskovalne postaje Khonin Nuga (povzeto po MNE & WWF 1994).

In Khonin Nuga, Yellow-browed Warblers inhabit *Betula fusca* shrubs, situated between riverine meadow pastures and Asian White Birch *Betula platyphylla* / Siberian Larch *Larix sibirica* forests on hillsides at the base of the northern mountainside. These shrub areas can be divided into a central region of vegetation of relatively homogenous height (approximately 3 metres) with only a few taller trees of Asian White Birch and small numbers of Siberian Larch, that contrasts with the hillside belt of shrubs that includes a lot of umbrella-trees (*Larix sibirica*) and young growth of larch, Siberian Spruce *Picea obovata* and willows (*Salix* sp.).

In 2003, I found two areas with a large number of clumped territories (clusters) of Yellow-browed Warblers (see Figure 2) in Khonin Nuga. One of these clusters (“Patch 1”) was also colonized the year before (A. BARKOW unpublished data), the other (“Patch 2”) was new. Patch 1 (-2.7 ha) lies in the south-western part of the area in the smooth transition zone between *Betula fusca* shrubs and the hillside forest (see Figure



Figure 2: The location of patch 1 (photo at the top), situated north of hillside forests, and patch 2 (photo at the bottom) in the centre of the valley (photo: P.H.W. Biedermann).

Slika 2: Lokacija območja 1 (zgoraj), severno od gozdov na pobočju in območja 2 (spodaj) na sredi doline (foto: P.H.W. Biedermann).

2). Patch 2 (-0.9 ha) lies in the centre of the *Betula fusca* shrub, bordered by rows of larch and birch aged about 30 years (see Figure 2). Nearly the whole study area was burnt down 30 years ago, which explains the high density of shrubs instead of forest.

In central Siberia, Yellow-browed Warblers prefer younger regrown vegetation in burnt habitats (GLUTZ v. BLOTZHEIM & BAUER 1991, FORSTMAYER *et al.* 2001).

3. Methods

In 2003 the whole study area (1.8 km²) was covered by two censuses a day, between 10 May and 15 May to look for Yellow-browed Warblers; then, until 3 Jul, the area was surveyed once a day.

When the first individuals arrived on 12 May, I started to catch birds full-time with mist nets until 21 May. After that mist netting was continued for only half a day until 7 Jun. Catching in the morning between 8.00 and 11.00 h was particularly efficient. More birds were caught when the weather was bad (around 80% of ringed birds when the cloud density was more than 50%). All birds were marked by colour rings, for recognition later in the field and released next to the net where they were caught.

Yellow-browed Warblers cannot be sexed by plumage. Most birds were thus sexed by wing-length (males: ≥ 66 mm; females: ≤ 64 mm) (for techniques and more information see SVENSON 1992), the remainder by their behaviour in the field. In addition to wing-length, the length of the 8th primary (1st primary next to 1st secondary) and body-weight were measured.

Additionally, I surveyed the area (in particular both patches mentioned above) for ringed and non-ringed individuals. Each Yellow-browed Warbler was documented, including its location and behaviour (particularly territorial, feeding, mating and nesting behaviour). Nesting territories were estimated by mapping singing posts and territorial behaviour. A male was considered to "own" a tree if it was observed singing in it. Two males were never recorded singing in the same tree, except at territory borders. From this observation it was possible to distinguish between two types of territories. The first was the centre of the territory where all the singing posts, territorial behaviour and nests were recorded – this area was defended against other males. The second territory was the whole area in which males were not observed every day (especially when there were a lot of territorial males around) and where they usually did not sing. Each time non-ringed birds were observed, I replaced the nets on the following day in an attempt to catch them.

When females started to build nests I tried to locate the nest sites. Each nest was checked every morning around 7.00 h for eggs. During the period of nest-building it is surprisingly easy to locate females. At this time of season shrubs are foliating and females often contact the male with calls after leaving the nest (for similar observations on *P. (i.) humeii* see PRICE & JAMDAR 1991).

Behaviour patterns, like territorial behaviour between males, nest-building behaviour of females, anti-predator and mating behaviour were observed (see Results).

At the end of the breeding season all nest sites were analysed for material used, direction of nest entrance and habitat.

At the end of June, when only two pairs were left in the area, an attempt was made to obtain footprints of terrestrial nest predators with a sand-filled hole on a path near one nest. Around another nest, six small-mammal traps were placed at a distance of 5 metres. Habitat parameters of "long-time territories" were compared with those of the area bordering the patch. At randomly chosen points (3 x 3 m) the mean height and diameter of *Betula fusca* shrubs and the number of wood-trunks were measured. "Long-time territories" are defined as areas where birds stayed more than two days (N = 8). The numbers of small / large Asian White Birches, Siberian Larches and other trees in plots of 50 x 50 m within and outside territories with nests were recorded.

4. Results

4.1. Catching phenology

During 18 catching days I ringed 29 individuals (24 males, 5 females), with one to nine mist nets (9143.75 net-hours x m² or 0.00317 caught birds / net-hour x m²). The first territorial males arrived in the study area on 15 May. The first female was caught on 18 May. Ringing was most successful during the first three days of the study when more than one third of the total catch were ringed (10 males, 1 female). After that only three birds could be caught until the 1 Jun, when again ten males and one female were ringed (Figure 3).

The sex ratio of those caught by mist-netting was 24 males to 3 females. The two other females were caught in front of their nests. Most individually ringed specimens were not seen again after the first capture (17 males, 2 females). All mated individuals remained in the study area for more than ten days (Figure 4).

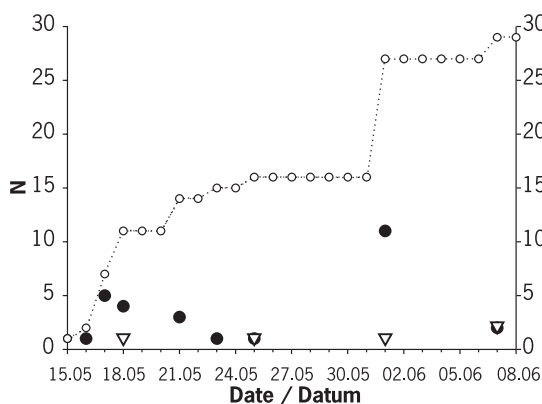


Figure 3: Numbers of Yellow-browed Warblers *Phylloscopus inornatus* caught during the survey. Open circles and dotted line denotes cumulative total ringed, filled circles number ringed each day and triangles females ringed each day.

Slika 3: Število muških listnic *Phylloscopus inornatus* ujetih med raziskavo. Odprti krožci in pikčasta črta pomenijo skupno število obročkanih ptic, polni krožci število obročkanih ptic po dnevih, trikotniki pa število obročkanih samic po dnevih.

4.2. Biometrics

The biometry of captured birds was very similar to the sparse data already published. Five females, with wing length 52 – 55 mm (mean 53.4 mm, SD 1.0) and weight 5.5 – 6.5 g (5.9 g, SD 0.4), and 24 males, with wing length 55 – 60 mm (mean 57.5 mm, SD 1.2); weight 5.5 – 7.0 g (mean 6.4 g, SD 0.4). GLUTZ v. BLOTZHEIM & BAUER (1991) give a mean wing length of 54.0 mm and a mean weight of 6.0 g for females (N = 47), and a mean wing length of 57.0 mm and a mean weight of 6.0 g for males (N = 75) (data from Hopei / NE China for April / May and August / October).

Males that remained in the study area for more than one day (N = 7) were slightly smaller (mean wing length = 57.1 mm, SD 1.77) in contrast to those that were not sighted again (57.6 mm, SD 1.0, N = 17). No significant correlation was observed between wing length and body weight of the two groups (t-test: wing length (t) = 0.92, P > 0.05; Mann-Whitney Rank Sum test: T(weight) = 92; P > 0.05) (Figure 5). The three mated males had the largest wing length (mean = 58.3 mm) but the smallest body mass (mean = 6.2 g compared to 6.4 g); the sample size was too small to test for statistical significance. It appeared that larger and heavier males arrived earlier in the year (see Figure 5), but the correlation was weak (Spearman rank order correlation: P (wing length) = 0.10; P (weight) = 0.58).

The sample size of measured females was too small to do statistical tests.

4.3. Bird counts

The first two singing males were recorded on 15 May (patch 1). This date is about one week later than the year before (A. BARKOW unpublished data), probably due to bad weather with snow at higher altitudes. Patch 2 was first settled on 22 May. After that four to five flocks (with 8 to 22 males) were observed that migrated through the area (see Figure 6), as well as many territorial males which established short-term territories for one to ten days in the two small patches (2.7 + 0.9 ha). The number of singing males fluctuated greatly. The greatest numbers recorded were 7.4 (patch 1) and 13.3 (patch 2) territorial males per hectare (Figure 6). Most of the males were observed in patch 1 (max. 20 males; in contrast to max. 12 males in patch 2).

The high density of territorial males did not result in high breeding densities, because of the almost complete absence of females. Although a lot of the

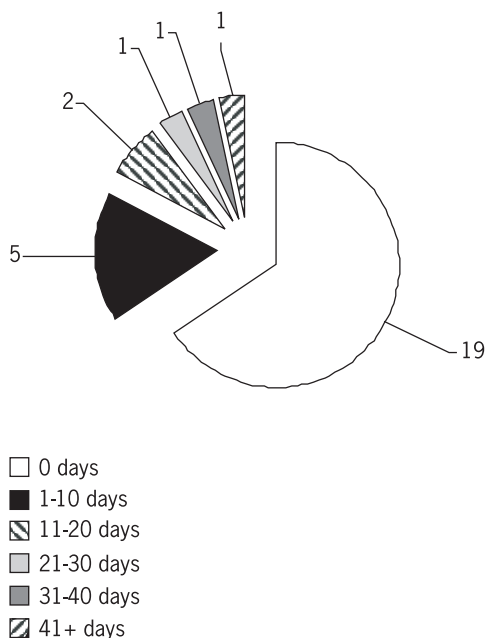


Figure 4: Number (proportion) of birds and how long they stayed in the study area. Most birds left the area soon after ringing.

Slika 4: Število (delež) ptic glede na dolžino postanka na območju raziskave. Večina ptic je območje zapustila kmalu po obročkanju.

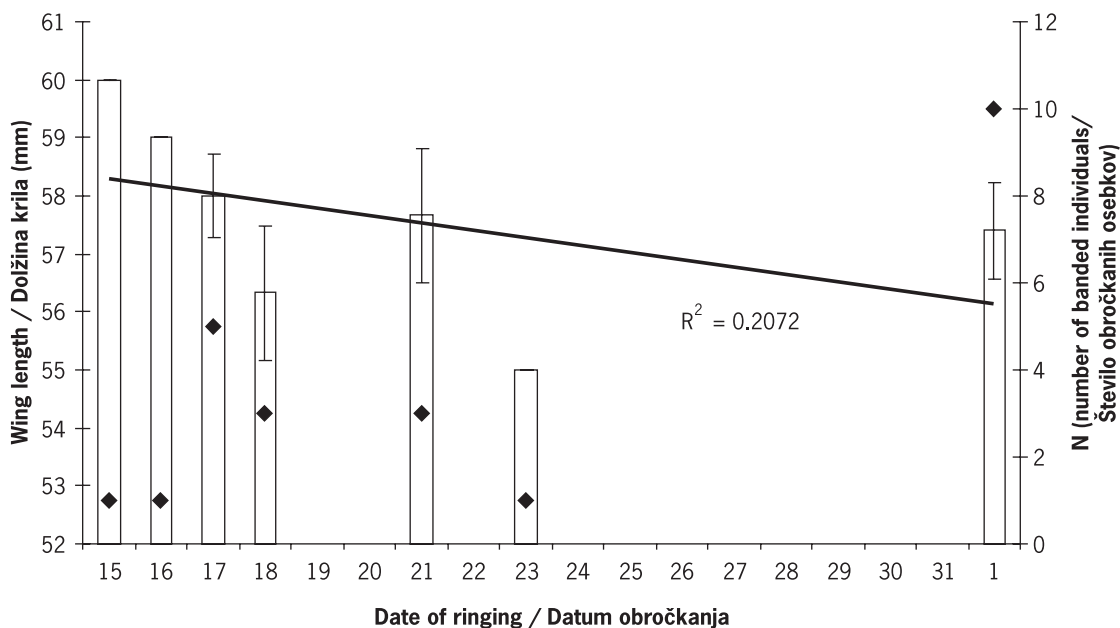


Figure 5: The dependence of wing length of ringed males on ringing date (15 May 2003 to 1 Jun 2003). R^2 is the variance of the regression line (= square of residuals). Diamonds (◆) represent N for the particular day. Individuals at the beginning of the season were not significantly larger than individuals at the end of the season.

Slika 5: Odvisnost dolžine kril od datuma obročkanja (15.5.2003 – 1.6.2003). R^2 pomeni varianco regresijske premice. Diamanti (◆) predstavljajo število osebkov. Osebkovi na začetku sezone niso bili signifikantno večji od osebkov ob koncu sezone gnezdenja.

males were ringed (see above) there were never more than three ringed males in the study area. On days with large numbers of singing males I usually caught new females. The last flock of males left the area on 20 Jun. The last bird was observed on 4 Jul.

4.4. Breeding biology

By recording colour-ringed males it was possible to see which individuals established “real” (long-time) territories. 7 males (5 in Patch 1 and 2 in Patch 2 – 29.2% of all males) stayed for longer than one day in the area. Other males, which obviously did not mate, left the area within 10 days of being first sighted. 3 males mated (2 in patch 1, 1 in patch 2).

Only one of the three ringed females was seen again after ringing. It was mated with one of the males in Patch 1. Two additional females were ringed in front of their nests, by non standard mist-netting.

In total there were 4 breeding pairs (3 in Patch 1, 1 in Patch 2) in the area – one of the males was bigyn with 2 females. The 4 pairs observed during the study built at least 9 or 10 nests, which were all predated during the egg laying period.

The first nest-building female was seen on 23 May (Figure 7). The last nest was left, probably after predation of eggs, on 4 Jul (by the same female). During that time four females laid a total of 15 – 16 eggs in at least 10 different nests (1st female: 4 nests, 2nd: 1, 3rd: 3, 4th: 2). Most nests were predated after the first egg was laid (N = 6), one nest with two, one with three and one with four eggs. After predation, nests were abandoned and the females started to built new nests one to ten days later (only once did a female lay an egg in an already predated nest).

Nest building took females a minimum of 3 – 7 days, before laying the first egg. Eggs were laid on consecutive days. During the day, laying females were never seen at the nest or in its vicinity.

One of the females probably never laid eggs – it was the second female of a male – and abandoned the completed nest (and the area) after five days of building.

4.5. Nest analysis

Nine nests were collected after the birds left the area and analyzed for dimensions, nesting materials,

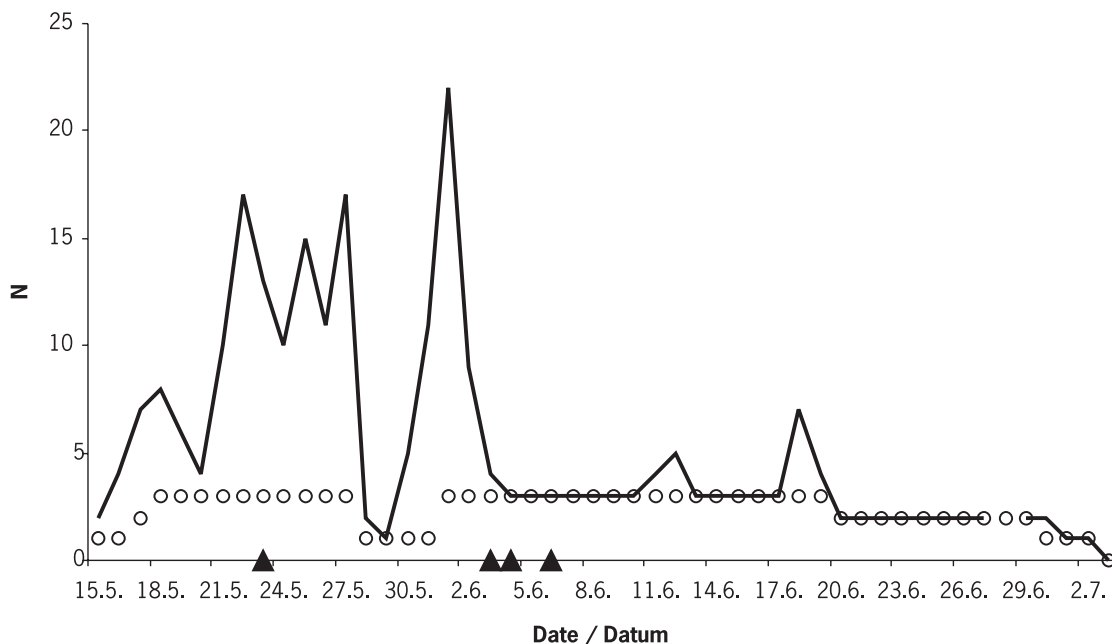


Figure 6: Total number of singing males on both patches over the breeding season in 2003. Open circles (O) represent total number of known (ringed) singing males. Full triangles (▲) mark the appearance of new matings.

Slika 6: Skupno število pojočih samcev na obeh raziskovalnih območjih v gnezdilni sezoni v letu 2003. Prazni krožci (O) predstavljajo skupno število znanih (obročkanih) pojočih samcev. Polni trikotniki (▲) označujejo novo parjenje.

location and habitat. The nests were built by four different females, four of them by one female.

All nests were built in small holes in the ground. They were globular shaped with the entrance on one side. Like in other *Phylloscopus* species only the female builds.

The nests comprised an outer and an inner nest, differing in the nesting materials used. In Khonin Nuga, Yellow-browed Warblers built the outer nest with 7 different materials (see Figure 8), which were collected mainly in the immediate vicinity of the nest. Field surveys showed that all nest materials could be found within 20 metres of the nest sites (90% up to 10 m). The following were found in descending order: long dry grass (>15 cm), moss, short dry grass (< 5 cm), old leaves, dry horsetail *Equisetum* sp., bark (*Salix* sp.) and rotten wood (*Betula platyphylla*).

The inner nests contained only three components: needles (*Larix sibirica*), animal hairs (horse, wild pig, deer etc.) and short dry grass (<15 cm). With the exception of animal hairs all materials of inner nests were found up to 10 m from nests.

Nests were solely built by females. There was a tendency to mate with males that owned territories in the centre of a patch, i.e. in the centre of the other

males' territories. Mating and nest building always followed days with peak numbers of territorial males (see also Figure 6).

During nest building the female called frequently – in 8 out of 14 approaches to the nest site with new nest material (mean of 3.9 calls). In 2 out of 15 departures (13.3%) she called again (mean of 1.5 calls). Thus, to locate new nests one should look out for calling birds, usually females, in occupied territories.

All nine nests were found among *Betula fusca* shrubs (1.8 – 2 m height) in the transition zone between dense and more open shrubs, with an average distance of one to three metres between bushes. Half the nests were built in holes at the roots or under old branches directly at the base of *Betula fusca* bushes (one at the base of a Sibirian Larch) or not more than half a metre away. The other half were built in tussocks. In both cases only the entrance could be seen, the rest being covered by branches and mainly old grass (Figure 9). This camouflage was not constructed by the bird; the nest was simply built under it. Normally nests were directly on the ground. Two were 10 cm and 20 cm above the ground (in these cases the nesting site was very wet). Nests were always covered by overhanging branches. In most cases there was a landmark, like

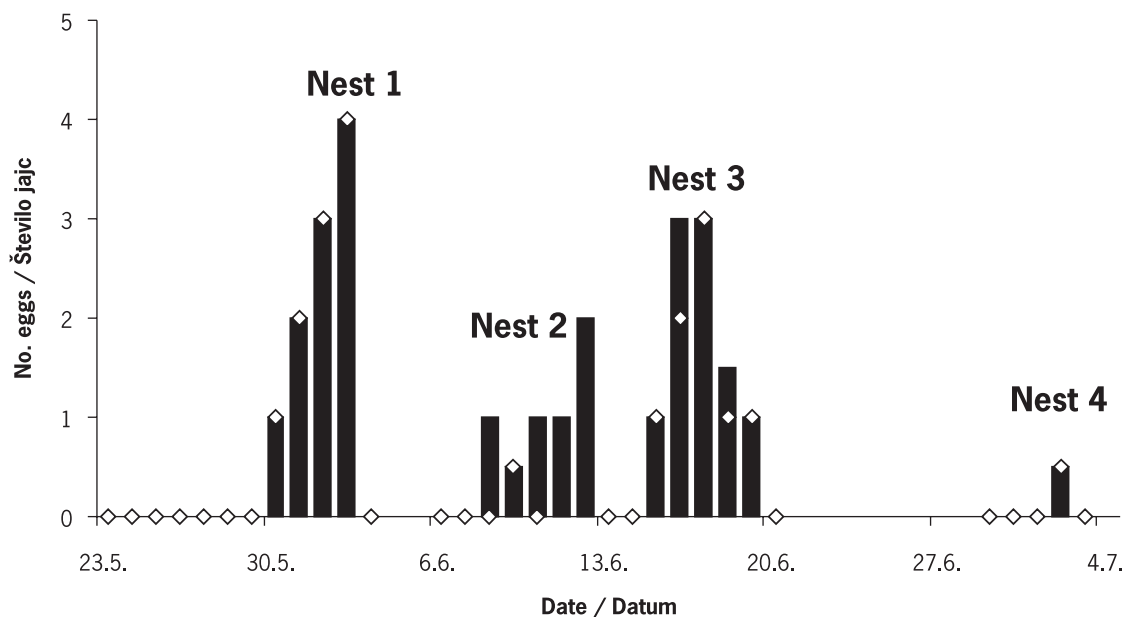


Figure 7: The black columns indicate the number of eggs in the whole study area (patches 1 and 2) over the breeding season in 2003. The open diamonds indicate the number of eggs of pair 1. Nests 2 and 4, that were abandoned before the first egg was laid, were assumed to contain 0.5 eggs (probability of 50% that one egg was laid).

Slika 7: Črni stolpci označujejo število jajc na celotnem območju raziskovanja (1 in 2) prek sezone v letu 2003. Prazni diamanti označujejo število jajc para 1. Pri gnezdih 2 in 4 je privzeta vrednost 0,5 (verjetnost izleženega jajca 50%).

a tree or a higher bush, very close to the nest, that was used by males as singing post. Most nests (70%) were found close to the border of males' territories, and replacements were surprisingly close to former, predated nests, with a minimum distance of 13 m. This corresponds to the relatively small size of male territories. The nesting sites of two females which were mated with the same male (bigyn), were 50 m apart. There was a slight preference for directing nest entrances to the north (Figure 10), although this appears to be more location than climate dependent.

4.6. Territory size, habitat and territorial behaviour:

Figure 2 shows the dimensions of the two patches that were settled by territorial males. Four of all the males recorded stayed in the area for more than ten days and only in these cases was it possible to identify territory size. During periods when there were no other (i.e. "short-term") territorial males in the area (see Figure 6), territories measured, on average, 4700 m² (SD 641.2 m²; max. 5650 m²; min. 4250 m²; N = 4). On days with many other males present, resident males concentrated their defended areas to an average size of

1687.5 m² (SD 566.2 m²; max. 2500 m²; min. 1200 m²; N = 4). In this case the territory of an unmated male appeared nearly twice as big as the territories of the three mated males. Due to the facts of rough terrain and unclear territory-borders at some places it was difficult to measure the sizes exactly. Thus, an error of +/- 100 m² is possible.

No differences in vegetation characteristics could be observed between patches and their surrounding habitat in the study area (Table 1). Comparisons were characterized by t-tests for the height of shrubs (P = 0.92; N = 20), diameter of shrubs (P = 0.6; N = 20), number of small birches or larches (P = 0.11, P = 0.79; N = 8), number of tall birches or larches (P = 0.52, P = 0.27; N = 8), total number of trees (P = 0.47; N = 8) and Mann - Whitney Rank Sum test for number of wood-trunks (P = 0.96; N = 20).

Males appeared to defend territories only in the morning until noon. Singing was unusual in the afternoon, especially at the beginning of the season, during this time the birds probably deserted the area, probably to the surrounding forests. This could be confirmed by observations of non-ringed individuals in the nearby forests during the afternoon.

4.7. Some behavioural observations

New birds arrived in the area during the night. In the morning males occupied territories for short periods (see Figure 4 & 6). Only males that stayed longer than 2 days used singing posts on tops of trees or in high shrubs; the others usually sang while moving, but with decreased intensity. These males, which were obviously migrating through the area, appeared to be attracted by other singing males and stimulated to sing themselves. The fact that they were moving all the time made it very hard to localize and observe them.

During the mating period, the singing activity of mated males decreased. Singing fluctuated during the day – if one male started to sing many others were stimulated to do the same. There were thus times apparently without any territorial birds, and 5 minutes later the opposite.

Wing flicking was a common behaviour of males, and wing drooping in concert with the song was seen mainly against other males at territory borders (in a different sense, sometimes also to the mate). There the two (sometimes three) rivals sat face to face at distances of 2 – 3 m, singing and threatening each other. They then became very excited, frequently flew a few metres, and started again with the same behaviour. Real fights

were never observed, but long chases and conflicts at territory-borders were common.

An often heard call was a high “tsuiist”, used as a contact call between sexes and, as a slightly different function, as a warning call. In the latter case calls were repeated at intervals of 1 s for sometimes more than 30 min. Males warned especially persistently against cuckoos (*Cuculus canorus*, *C. horsfieldii*) and sometimes also attacked them. In this case the birds called additionally with a “schääh-schääh-schääh-schääh” that sounded very similar to the “mobbing-calls” of tits. They continued mobbing until the cuckoo left the area.

Although cuckoos were very common in the area and warning behaviour could be observed nearly every day, I never observed other Yellow-browed Warblers from the same patch joining the attacking pair.

Immediately after the arrival of females, pairs were formed and females started to build nests. During nest building, females were commonly seen visiting bare patches on the ground, investigating suitable hollows, and picking up items of potential nesting materials. Males often joined their females and sometimes might engage in chasing males. Copulation was very secretive and could never be recorded with certainty.

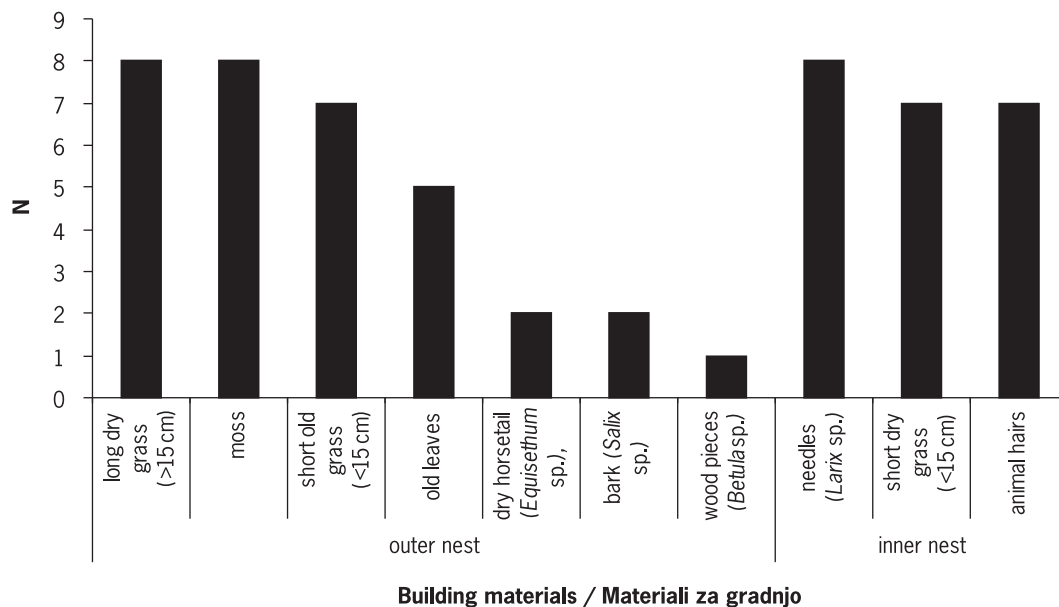


Figure 8: Building materials found in 9 nests of Yellow-browed Warbler *Phylloscopus inornatus*. The height of the bars represents the number of nests in which the specific material was found.

Slika 8: Gradbeni materiali pri devetih gnezdih mušje listnice *Phylloscopus inornatus*. Višina stolpca pomeni število gnezd v katerih je bil najden določen material.

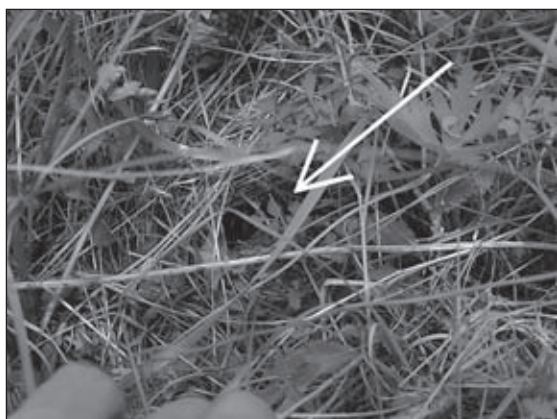


Figure 9: Example of a nest of Yellow-browed Warbler *Phylloscopus inornatus*. The white arrow marks the entrance. This nest was predated with four eggs. All the nests looked like “mouse-holes” in the ground. They were left undamaged after predation (photo: P.H.W. Biedermann).

Slika 9: Gnezdo mušje listnice *Phylloscopus inornatus*. Bela puščica označuje vhod. Gnezdo je imelo štiri jajca in je bilo izropano. Vsa gnezda so videti kot “mišje luknje” v tleh. Po predaciji niso bila poškodovana (foto: P.H.W. Biedermann).

4.8. Predation

At least eight of the nests found were predated during the study period (see also “breeding biology”). Predation of eggs always occurred at night (between 21.00 and 7.00 h).

I was not able to catch any potential predator with small-mammal traps or to find any footprints with sand-filled holes. Predators never left signs in or around the nests. Eggs were removed complete; shells were never found. Nests were completely undamaged, and even the entrance hole size was unchanged.

The most probable predators in the area were a stray dog from the research camp and Siberian Chipmunks *Tamias sibiricus*. The former would be likely to damage or destroy nests totally.

Siberian Chipmunks were sometimes seen in the forests on the slopes of the valley. Although I never observed them in the study area, they are the most likely animals to steal eggs without leaving any damage.

Cuckoos (*Cuculus canorus*, *C. horsifieldii*) are very common in the area, but Yellow-browed Warblers evolved a persistent mobbing behaviour (see also 4.7. Some behavioural observations). Cuckoos are unlikely nest predators in this case, because I never found any cuckoo-eggs in the nests and predation occurred only during the night.

The importance of predators like crows, weasels, foxes and especially snakes is probably underestimated, because they have never been observed. Small mammals like voles, mice or shrews were completely absent from the area, because of very cold winters without snow-cover (SHEFTEL *pers. comm.*).

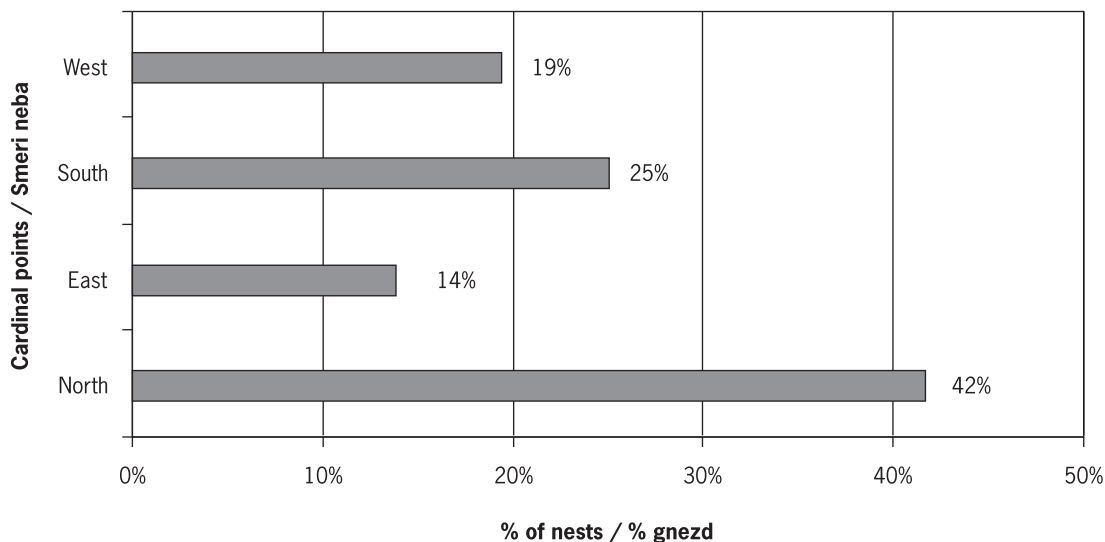


Figure 10: Proportion of nests whose entrances were directed to the four cardinal points

Slika 10: Delež gnezd glede na smer vhodov

Table 1: Habitat comparison between randomly chosen points (plots) within and outside the patches: *Betula fusca* shrubs are compared for shrub height and diameter and tree structure is compared for different species (*Betula fusca* and *Larix sibirica*) and their height. No significant differences were found.

Table 1: Primerjava habitata med naključno izbranimi točkami na in izven popisnega območja: grmovje *Betula fusca* glede na višino in premer ter struktura dreves (*Betula fusca* in *Larix sibirica*) glede na višino in število. Razlike niso statistično značilne.

		N							
		Height/ Višina* (cm)	Diameter/ Premer* (cm)	Wood- trunks/ Debel*	Birch/ Breza <10 m**	Birch/ Breza >10 m**	Larch/ Macesen <10 m**	Larch/ Macesen >10 m**	All trees/ Vseh dreves**
Outside patches/ Zunaj površin	Mean	200.0	84.0	1.3	3.0	10.6	25.2	5.8	44.6
	SD	44.9	46.0	0.5	2.2	5.6	27.1	3.3	30.5
	N	10	10	10	5	5	5	5	5
Inside patches/ Znotraj površin	Mean	202.5	97.5	1.7	6.0	13.7	30.0	9.3	59.0
	SD	57.0	62.0	1.2	2.0	7.0	11.3	5.1	8.9
	N	8	8	8	3	3	3	3	3
P (t-test)		0.92	0.60	0.96***	0.11	0.52	0.79	0.27	0.47

* at randomly chosen points with a size of / naključne točke 3 x 3 m (9 m²)

** at randomly chosen plots with a size of / naključne točke 50 x 50 m (2500 m²)

*** Mann-Whitney test

5. Discussion

Compared with the main breeding grounds in Siberia, *P. inornatus* breeds near Khonin Nuga in very low densities (BOURSKI & FORSTMEIER 2000, SHEFTEL *pers. comm.*). Reasons for this may be the immense predation pressure (also A. BARKOW *unpublished data*), unequal sex ratios (approx. 5:1 for males) and probably not ideal habitat. The sex ratio could be partly overestimated, because females are more inconspicuous and move less, making them harder to catch with mist-nets (but see WAGNER 1997 and HERREMANS 1993 with similar sex ratios for *P. sibilatrix*). Although males tried to attract females, most of them were unsuccessful and left the area after one or two days.

It is obvious that most birds migrated further north, because the number of nesting pairs per cluster is quite small compared with those in Siberia (FORSTMEIER *pers. comm.*). Birds that remain appear to be smaller, their size decreasing with later arrival dates (both non-significant).

Another hypothesis is that most migrating birds have difficulty in getting to Khonin Nuga, because of the huge Mongolian steppes and deserts to the south. Small passerines are probably not able to fly across this barrier (MÜHLENBERG & WICHMANN *pers. comm.*). This would be supported by the late arrival of the birds in the area, compared with their main breeding grounds, although further north, they arrive in central

Siberia only some days later – 17 to 26 May for males, 24 May to 2 Jun for females (SHEFTEL *pers. comm.*, BOURSKI & FORSTMEIER 2000).

The pressure of egg predators appears to be immense, destroying all clutches of Yellow-browed Warblers in the study area in 2003. In similar habitats in Siberia, Siberian Chipmunks are important predators of bird nests and *Phylloscopus fuscatu*s shows an adaptive plasticity in nest-site selection in response to changing predation risk (FORSTMEIER *et al.* 2004). In years with high chipmunk abundance, nests are built significantly higher above the ground and nest bushes are more isolated from other bushes than in years with low densities. Yellow-browed Warblers show no obvious plasticity in nest-sites in response to egg predation, but usually replace predated nests immediately. It is remarkable that nests are replaced up to four times and built within a few (>3) days. Most *Phylloscopus* species appear to replace their nests once after predation, but building time is usually longer (5 – 16 days depending on the species) (GLUTZ v. BLOTZHEIM & BAUER 1991). In the most closely related *P. humeii*, predation does not usually appear to lead to the laying of second clutches (PRICE & JAMDAR 1991) and nest-building takes 4 – 8 days (GLUTZ v. BLOTZHEIM & BAUER 1991), or 5 – 16 days (PRICE & JAMDAR 1991). More than one replacement is known only for *Phylloscopus sibilatrix*, which builds its nests within 2 – 4 days (GLUTZ v. BLOTZHEIM & BAUER 1991).

Yellow-browed Warblers lay slightly smaller eggs (mean 13.7 mm x 10.8 mm, N = 26) (WITHERBY *et al.* 1943, WOROBJEW 1963, GLUTZ v. BLOTZHEIM & BAUER 1991) than *Phylloscopus proregulus* (mean 14.5 x 10.9 mm, N = 60) and *P. humeii* (mean 14.3 x 11.3 mm, N = 60), although their body size is slightly larger. Thus, Yellow-browed Warblers invest more in the quantity of eggs, probably adapted to the need for a higher replacement rate. An additional adaptation to predators is probably the egg-laying in the early morning and absence from the nest during the daytime, as also observed in *P. humeii* (PRICE & JAMDAR 1991).

Dates of first arriving birds, first nest-building and egg-laying in the study area are similar to those recorded for other *Phylloscopus* species (GLUTZ v. BLOTZHEIM & BAUER 1991) at comparable latitudes.

Nest measurements (see Table 2) were very similar to those for the closely related *P. (i.) humeii* (PRICE & JAMDAR 1991) and its subspecies *P. (i.) mandelleii* (GLUTZ v. BLOTZHEIM & BAUER 1991). Total weights of nests were, with an average of 7.89 g, very different from the 9.6 to 27.8 g for *Ph. (i.) humeii*. This might be explained by the common replacement of nests and

/ or the different nesting materials used in different habitats.

Indeed PRICE & JAMDAR (1991) found some different materials for *P. (i.) humeii*. As in the present results, he found mainly grass. 72% of his nests contained birch-bark, and 79% some moss (N = 33). In some nests he found pine needles and animal-hairs. Koshvar (in GLUTZ v. BLOTZHEIM & BAUER 1991) additionally found feathers in inner nests, which I and PRICE & JAMDAR (1991) could not find.

It is still not clear whether the species is able to raise successful broods in the study area. Individuals are possibly capable of estimating rodent densities (these are likely to be the main predators) from their scent-marks (VITALA *et al.* 1995) and therefore avoid the area. However, SHEFTEL (*unpublished data*) observed very low densities of mice, shrews and voles in the study area in 2003.

The relatively small number of territorial males per cluster and relatively low breeding densities in the present study area compared to Siberia (around 30 breeding pairs in BOURSKEI & FORSTMEIER 2000) make for big advantages for studying the social system of Yellow-

Table 2: Nest parameters of Yellow-browed Warbler *Phylloscopus inornatus* compared with those for closely related species. Due to the globular shape of the outer nest there are 2 diameters.

Tabela 2: Parametri gnezda mušje listnice *Phylloscopus inornatus* v primerjavi s sorodnimi vrstami. Zaradi ovalne oblike ima zunanje gnezdo dva premera.

	Outer nest / Zunanje gnezdo				Inner nest / Notranje gnezdo				Total weight/ Skupna teža(g)
	Diam. 1 (mm)	Diam. 2 (mm)	Width of cup/ Širina skodelice (mm)	Entrances/ Vhod (mm)	Height/ Višina (mm)	Diam. (mm)	Height (mm)	Weight/ Teža (g)	
Mean	105	123.75	61.25	26	55	62.5	30	1	7.89
SD	7.82	11.11	2.17	2.12	6.55	2.5	5	0	3.86
Min.	95	110	60	23	45	60	25	1	4
Max.	120	150	65	28	65	65	35	1	16
N	9	8	4	4	7	4	2	1	9
Min.*	83	95	43	25	85	43			9.6
Max.*	140	217	70	50	155	70			27.9
N*	18	18	18	18	17	18			15
Mean**		115			101				17.1
SD**		13			11				4.0
Min.**									12
Max.**									25.5
N**		33			33				38
Mean***	100	105		30		55-60			

*KOVSHAR *et al.* 1974

**PRICE *et al.* 1991 for *P. (i.) humeii*,

***BEICK 1937 for *P. (i.) mandelleii*

browed Warblers. The process of cluster formation is slower and its mechanisms are easier to observe.

Territories are aggregated, similarly to other *Phylloscopus* species (PRICE & JAMDAR 1991, GLUTZ V. BLOTZHEIM & BAUER 1991). The size of the defended territory is smaller than that recorded for *P. trochilus* (2000 – 7000 m² in LAWN 1982, TIAINEN 1983) and *P. bonelli* (2000 – 6000 m² in PRENN 1932), but appears to be larger than for *P. trochiloides* (200 – 800 m² BLAGOSKLONOW 1991). Fluctuations of territory size in Yellow-browed Warblers appear to be similar to those recorded for *P. sibilatrix*: MILDENBERGER (1940) talks of "...varies in size during the breeding period...", and FOURAGE (1968) adds "... with a nesting-territory that has a size of 1200 – 1900 m²...".

In Khonin Nuga, the large number of short-term territorial males with very small (if any "real") territories attracts females, with the result that the central male(s) gets mated. These central males appear to be the first in the area and to establish their territories before the arrival of other males. The number of singing males strongly attracts more males and females. New matings were observed after peaks of territorial male numbers. This appears to be like a lek-system, where a number of males try to attract females (DANCHIN & WAGNER 1997) and compete for them. However, to the observer, it is a somewhat different phenomenon – territorial males are aggregated but distributed over some hectares – the lek is not obvious but hidden ("hidden lek").

BOURSKI & FORSTMEIER (2000) set up four hypotheses for clustering in *P. inornatus* and tested the first two in their Siberian study: (1) Birds react to locally superabundant insects. They found no increase in prey abundance inside the cluster and rejected this hypothesis. (2) Birds are attracted by another species' vigilance or nest defence behaviour, as shown by SLAGSVOLD (1980) for *Turdus pilaris* colonies. They also rejected this one. (3) Clustering enhances communal defence against predators through increased vigilance (ROGACHEVA 1992). (4) Clustering males profit by attracting females more effectively, as supposed for the Wood Warbler by HERREMANS (1993).

Regarding the third hypothesis, I could never observe communal mobbing behaviour. Defence against potential predators always involved the breeding pair alone. Birds from neighbouring territories were only interested when predators entered their territory. Although birds with central territories (this should be males with the highest status, because females mated only with them) could have the advantage of being warned in advance when predators are invading the area.

The most likely explanation for clustering in this species is the fourth hypothesis, which can be viewed as the hidden lek hypothesis (WAGNER 1997). A large number of males attracts females to a certain spot (lek), where they compete for them. Males that are able to get central positions in the lek are of high quality and most likely to reproduce with visiting females.

My analysis shows that habitat quality and choice of nesting habitat are not related to the quality of the male. In view of the scarcity of females and patchy (but sufficient) distribution of preferred habitat, aggregation of territories might be of direct advantage to the males, by improving their chances of mating. The formation of units with a "supersexy" function might constitute an important part of the reproduction strategy, in which the attraction of relatively rare females is the major task. In my study I found that one of these central males attracted two females to his territory (bigyn). Attracting two females to one territory is also known for *P. (i.) humeii* (PRICE & JAMDAR 1991), *P. trochilus* (LAWN 1982, TIAINEN 1982) and *P. collybita* (SCHÖNFELD 1978). Furthermore, promiscuity (extra pair copulations) is being discovered in more and more passerine bird species that were formerly assumed to be monogamous (HERREMANS 1993, FOERSTER *et al.* 2003, WESTNEAT & SHERMAN 1997). One fact that supports this idea is that females tended to build their nest close to territory borders, in the vicinity of extra pair males.

Males that claim territories far away from other, high quality males, may be less able to attract a mate, forcing them to readjust their territorial claims and breed near other males, and might copulate with their mates. Additionally, even males that risk losing paternity (unmated males) might cluster to attempt extra pair copulations with receptive females (see hidden lek hypothesis by WAGNER 1997).

However, this explanation requires reasons why pairs do not leave the lek after mating. It might be the very productive habitat (which provide sufficient food for all birds), but only for a short time of the year (which leads to a form of time pressure on the birds). It is also important to discuss why birds leave the area in the afternoon, especially early in the breeding season. This might be caused by limited food resources at this time of the year (see similar diurnal altitudinal migrations for *P. (i.) humeii* in PRICE & JAMDAR 1991).

Additionally, males might be expected to retaliate against unfaithful mates by withholding parental care or by evicting the female from the territory. WAGNER (1997) considers that the male biased sex ratio, which I also observed in Yellow-browed Warblers, may give females leverage over their mates. It would force solitary

males to nest near more preferred males to find mates, resulting in the observed pattern of clumping.

I have no obvious explanation for the rather variable location of territory clusters in different years (A. BARKOW unpublished data, FORSTMAYER pers. comm., WICHMANN 2001), but the hidden lek hypothesis predicts variable clumped distributions in a habitat that is below saturation (for more information see WAGNER 1997).

Leks are established more randomly, simply by meetings of males in a fitting habitat, which start to sing and attract more males. Other possible explanations are different predation pressure or avoidance of other *Phylloscopus* species (as in BOURSKEI & FORSTMAYER (2000) and FORSTMAYER *et al.* (2001). The only other *Phylloscopus* species in my study area – *P. borealis* and *P. fuscatus* occurred in very low densities and I would reject this explanation in this case.

Some bird species form genetically related groups of individuals that cooperate to their mutual evolutionary advantage (SHERMAN 1999). This cannot be excluded in Yellow-browed Warblers without genetic analysis.

Future studies should focus more on the genetic relationship, age and paternity of the individuals that form the clusters. Yellow-browed Warblers could be one of the best examples of the hidden lek hypothesis (WAGNER 1997).

6. Povzetek

Gnezditvena biologija mušje listnice *Phylloscopus inornatus* je v glavnem slabo poznana. V zadnjem času so raziskovalci prišli do spoznanja, da gnezdi v skupkih (rastiščih, lekkih) in pojavilo se je kar nekaj hipotez, ki skušajo pojasniti takšen način gnezditve. Dva takšna skupka je opazoval avtor od maja do julija leta 2003 v rezervatu Khan Khentey, v severni Mongoliji, z namenom dodatno raziskati takšen način gnezditve.

Pri delu je uporabljal lovljenje z mrežami, iskanje gnezd, opazovanje obnašanja in habitatno analizo. V tem rezervatu so gnezditveni skupki relativno majhni glede na gnezdišča v Sibiriji in obsegajo le največ 3 pare. Tukaj, na jugu gnezditvenega areala, je vrsta izpostavljena velikim pritiskom predacije, obenem pa je razmerje med spoloma neenako (ca. 5:1 samci proti samicam). štirje gnezdeči pari so tako imeli najmanj deset gnezd, ki so bila vsa opljenjena, še preden so se zvalili mladički. Gnezda gradijo samo samice in ena od samic je kar trikrat znova zgradila gnezdo po predaciji. V skupkih pojočih samecev se bila velika številčna nihanja, včasih so vsebovali več kot dvajset osebkov. Gnezdeči pari so se formirali po številčnih višjih pojočih samcev. Ker so skupki na tem področju majhni, nudijo veliko možnosti za raziskavo mehanizmov formacije skupkov. Lokacije gnezditvenih območij

so bile neodvisne od habitanih parametrov, bila pa so na sredi med neuspešno vzpostavljenimi teritoriji. Ta primer je močen dokaz za hipotezo skritih lekov, kot glavno razlago za tvorbo skupkov; ta hipoteza pa predvideva, da so samci na sredi skupkov spolno najbolj privlačni za samice. Mušja listnica bi lahko bila eden od redkih primerov za točnost te hipoteze. Predstavljeni so tudi podatki o biometriji, gnezditveni biologiji in obnašanju te vrste.

Acknowledgements: I am grateful to Frank Wichmann and Michael Mühlenberg for inviting me to Mongolia, for giving me the chance to carry out this project and for supporting me throughout this study. I also thank the local ranger D. Myagmarsuren, his family and all other students for physical support and hospitality. For mental support via letters I especially thank my family and friends at home. Andy Barkow, Boris Sheftel and Wolfgang Forstmeier provided helpful comments. I am grateful to Peter Sackl who helped me a lot with this manuscript. I am thankful to Andy Barkow that he gave me the data he collected on *P. inornatus* in 2002. This project was partly funded by the German Academic Exchange Service (DAAD).

7. References

- BLAGOSKLONOW, K.N. (1991): Zur Brutbiologie von *Phylloscopus trochiloides* bei Moskau. Citation in: GLUTZ VON BLITZHEIM, N. & BAUER, K. (eds.): Handbuch der Vögel Mitteleuropas, 12 II. – Aula Verlag, Wiesbaden.
- BOURSKEI, O.V. & FORSTMAYER, W. (2000): Does interspecific competition affect territorial distribution of birds? A long term study on Siberian *Phylloscopus* Warblers. – *Oikos* 88: 341–350.
- CHABRY, W.M., LOSKOT, W.M. & VON VIETINGHOFF-SCHEEL, E. (1989): *Phylloscopus inornatus* (Blyth.). pp. 553–564 In: STRESEMANN, E., PORTENKO, L.A. *et al.* (eds.): Atlas der Verbreitung paläarktischer Vögel. – Akademie Verlag, Berlin.
- DANCHIN, E. & WAGNER, R.H. (1997): The evolution of coloniality: the emergence of new perspectives. – *TREE* 12: 342–347.
- FOERSTER, K., DELHEY, K., JOHNSEN, A., LIFJELD, J.T. & KEMPENAERS, B. (2003): Females increase offspring heterozygosity and fitness through extra-pair matings. – *Nature* 425: 714–717.
- FORSTMAYER, W., BOURSKEI, O.V. & LEISLER, B. (2001): Habitat choice in *Phylloscopus* Warblers: the role of morphology, phylogeny and competition. – *Oecologia* 128: 566–576.
- FORSTMAYER, W. & WEISS, I. (2004): Adaptive plasticity in nest-site selection in response to changing predation risk. – *Oikos* 104: 487–499.
- FOURAGE, J.G. (1968): Le Pouillot siffleur. – *Gerfaut* 58: 179–368.

- GLUTZ VON BLOTZHEIM, N. & BAUER, K. (1991): Handbuch der Vögel Mitteleuropas, 12 II. – Aula Verlag, Wiesbaden.
- HERREMANS, M. (1993): Clustering of territories in the Wood Warbler *Phylloscopus sibilatrix*. – Bird Study 40: 12–23.
- LAWN, M.R. (1982): Pairing systems and site tenacity of the Willow Warbler *Phylloscopus trochilus* in southern England. – Ornithology, 13: 193–199.
- MARCHETTI, K. (1998): The evolution of multiple male traits in the Yellow-browed leaf Warbler. – Anim. Behav. 55: 361–376.
- MILDENBERGER, H. (1940): Beobachtungen über Fitis, Weiden- und Waldlaubsänger im Rheinland. – J. Orn. 88: 537–549.
- MNE & WWF (1994): Naturerbe der Mongolei: Nationalpark Chan Chentie. – Ministry for Nature and the Environment of Mongolia, Ulaanbaatar.
- MYAGAMASUREN, D. (2000): Special Protected Areas of Mongolia. – Ulaanbaatar.
- POLIWANOW, W.M. & POLIWANOWA, N.N. (1986): Ökologie der Waldvögel am Nordabfall des NW-Kaukasus. – Trudy Teberdinskogo gos.sapow. 10: 9–164 (in Russian).
- PRENN, F. (1932): Beobachtungen am Neste des Berglaubsängers. – Orn. Mber. 40: 7–12.
- PRICE, T. & JAMDAR, N. (1991): Breeding biology of the Yellow-browed leaf Warbler *Phylloscopus inornatus* in Kashmir. – Journal of the Bombay natural history society 88(1): 1–16.
- ROGACHEVA, H. (1992): The birds of Central Siberia. – Husum Druck- und Verlagsgesellschaft, Husum.
- SCHÖNFELD, M. (1978): Der Weidenlaubsänger. Neue Brehm-Bücherei 511. – Ziemsen, Wittenberg.
- SHERMAN, P. (1999): Birds of a feather lek together. – Nature 401: 119–120.
- SLAGSVOLD, T. (1980): Habitat selection in birds: on the presence of other bird species with special regard to *Turdus pilaris*. – J. Anim. Ecol. 49: 523–536.
- SVENSON, L. (1992): Identification Guide to European Passerines. – L. Svensson, Stockholm.
- TIAINEN, J. (1983): Dynamics of local populations of the Willow Warbler *Phylloscopus trochilus* in Southern Finland. – Ornithology, 14: 1–15.
- VIIITALA, J., KORPIMAKI, E., PALOKANGAS, P. & KOIVULA, M. (1995): Attraction of kestrels to vole scent marks visible in ultraviolet light. – Nature 373 (6513): 425–427.
- VON VELSEN-ZERWECK, M. (2002): Socio-Economic Causes of Forest Loss in Mongolia. – Wissenschaftsverlag Vauk Kiel KG, Kiel.
- WAGNER, R.H. (1997): Hidden leks: sexual selection and the clustering of avian territories. pp. 123–145 In: PARKER, P.G. & BURLEY, N., (eds.): Avian Reproductive Tactics: Female and Male Perspectives (Vol.49). – Ornithological Monographs, American Ornithologists' Union.
- WITHERBY, H.F., JOURDAIN, F.C.R., TICEHURST, N.F. & TUCKER, B.W. (1943): The handbook of British birds. – Witherby, London.
- WESTNEAT, D.F. & SHERMAN, P.W. (1997): Density and extra-pair fertilizations in birds: a comparative analysis. – Behav Ecol Sociobiol 41: 205–215.
- WICHMANN, F. (2001): Analyse der Vogelgemeinschaften im Habitatmosaik einer Naturlandschaft im Norden der Mongolei, Westchentie. – Diplomarbeit an der Georg-August-Universität Göttingen, Göttingen.
- WICHMANN, F. & POKROVSKAYA, I. (2004): Birds – Ornithology, species list of Khonin Nuga. pp. 48–53 In: MÜHLENBERG, M. & WICHMANN, F. (eds.): Inventory of Species of Khonin Nuga, West Khentii. – Zentrum für Naturschutz, Universität Göttingen, Göttingen.
- WOROBJEW, K.A. (1963): Ptizy Jakutij. – Akad. Nauk SSSR, Moskau.

Arrived / Prispelo: 8.9.2005

Accepted / Sprejeto: 5.10.2006

THE FERRUGINOUS DUCK *Aythya nyroca* AS A POTENTIAL INDICATOR SPECIES FOR TRACKING ECOLOGICAL CHANGES AT THE SREBARNA LAKE MANAGED RESERVE (NE BULGARIA)

Kostanjevka *Aythya nyroca* kot potencialna indikatorska vrsta za spremljanje ekoloških sprememb v upravljanem rezervatu jezera Srebarna (SV Bolgarija)

NIKOLAI PETKOV

Bulgarian Society for the Protection of Birds/BirdLife Bulgaria, PO Box 50, BG-1111 Sofia, Bulgaria,
e-mail: nicky.petkov@bspb.org

As the Ferruginous Duck *Aythya nyroca* has always been numerous at Srebarna Lake, it is an obvious choice as a biomonitor. Long-term data on the number of Ferruginous Ducks at Srebarna Lake has been collected since 1987. Despite much speculation on the relationship between Ferruginous Duck numbers and ecological change at Srebarna, this is the first attempt to quantify this statistically. In this paper I have tested, for correlation, the species numbers with a number of limnological parameters – water level, chlorophyll a, dissolved oxygen, zoobenthic biomass, zooplankton biomass and water transparency. Significant positive correlations were found with water level, and water transparency, and a significant negative correlation with the concentration of chlorophyll a. The significance of these correlations increased when ecological parameters were tested with the numbers of Ferruginous Ducks present in the next year. These significant correlations with changes in the ecological parameters suggest that the Ferruginous Duck could be an important indicator species for the condition of wetlands and the Srebarna Lake managed reserve in the specific case.

Key words: Ferruginous Duck, *Aythya nyroca*, Srebarna Lake, indicator species, wetland change, limnology

Ključne besede: kostanjevka, *Aythya nyroca*, jezero Srebarna, indikatorska vrsta, spremembe v mokriščih, limnologija

1. Introduction

Ferruginous Duck *Aythya nyroca* is a species of global conservation concern that was in the middle of the last century classified as Vulnerable (COLLAR *et al.* 1994). Following some high number counts during migration in various countries across Asia, the species was lowered to the Near Threatened category (BIRDLIFE INTERNATIONAL 2000). However, the population decline in Europe continues (ROBINSON & HUGHES 2003) and most of the studies on the species are focused largely on numbers and distribution, while the habitat requirements and characteristics are often neglected (ROBINSON 2003). All information on the habitat characteristics so far has been descriptive and no quantitative and qualitative study has been performed.

Generally it is accepted that the Ferruginous Duck inhabits shallower, well-vegetated wetlands of various kind (CRAMP & SIMMONS 1977). The knowledge of the habitat requirements of the species is key data for motivated habitat management of breeding sites and conservation activities on the species.

Srebarna Lake is situated in northeastern Bulgaria, on the Bulgarian bank of the Danube, beside the village of Srebarna. It is the only Danube riverside lake in Bulgaria that has survived the drainage campaigns of the 20th century. It was declared as a protected area 55 years ago due to its unique bird diversity. There has been much speculation on the relationship between Ferruginous Duck numbers and ecological change at Srebarna (STOYNEVA & MICHEV 1997), but so far no statistical relation to wetland parameters has been

established. Since 1990, various ecological parameters of the wetland ecosystem have been monitored (VASSILEV 2002). The Ferruginous Duck is known to inhabit luxurious wetlands with rich biodiversity and a diversity of microhabitats (PETKOV 1997). Long-term data on Ferruginous Duck numbers has been collected in a standardised fashion at Srebarna Lake for many years. Here we discuss the use of Ferruginous Duck numbers as a biomonitor for tracking ecological change in the wetland ecosystem.

2. Materials and Methods

2.1. Data collection and analysis

Ferruginous Ducks were counted on a single day between the period 15 – 20 May, i.e. once the breeding season had already started. All birds were recorded whilst walking along the southern and western banks of the wetland. Data is stored in the BSPB/BirdLife Bulgaria National Data Bank for Ornithological Information. The Laboratory of General Ecology has collected data on lake limnology since the 1990's within the project concerning the ecological monitoring of restoration of Srebarna Lake water regime. Data on nitrate, phosphate, and ammonium ions were collected from 1998 – 2001. Data on zooplankton were collected from 1998 – 2000. Water level data were collected from 1991 – 2001 using the Baltic measuring system. The data analysis and correlations between Ferruginous Duck numbers and transparency and chlorophyll a covers a period of 8 years (1988 – 1991 and 1998 – 2001).

The raw data was log transformed for normalisation before Pearson Correlation analysis was applied. Though transparency, water level and chlorophyll a are interrelated, their relationship with Ferruginous Duck numbers were tested separately for different years using the Jundel Scientific Statistical package Sigma Stat ver. 1.0.

The various ecological parameters were tested for correlation with Ferruginous Duck numbers, firstly using duck numbers from the same year when the ecological parameters were measured and at the second test using duck numbers from the following year (as this may better reflect the effect of any limnological change). We presumed that the effect of poor limnological conditions resulting in poorer breeding result would reflect on the next year numbers through fewer yearlings for recruitment in the breeding population and some unsuccessful breeders looking for alternative sites elsewhere.

2.2. Study area

Srebarna Lake (UTM NJ08; IBA BG033; 44°07' N, 27°04' E) is situated on the south bank of the Danube River between kilometres 393 and 391 of the river, in northeastern Bulgaria, 18 km to the west of Silistra town near the village of Srebarna. The lake is situated 12 m a.s.l., has a surface area of about 350 ha, and a depth of 0.7 – 3 m. The wetland has extensive floating reedbeds consisting of Common Reed *Phragmites australis*, some Marsh Fern *Thalypoteris palustris* and Grey Willow *Salix cinerea*. It is listed as a wetland of international importance under the Ramsar Convention, World Heritage Site, Important Bird Area and Biosphere Reserve. Under the national legislation, it is classified as a managed reserve. Map and location in the country is available from KAMBUROVA (2005).

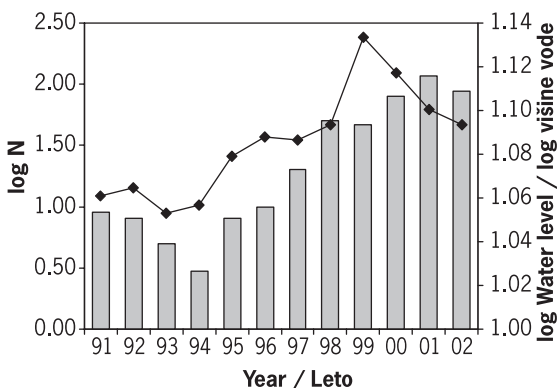


Figure 1: Trends in the Ferruginous Duck *Aythya nyroca* numbers and the water level at the Srebarna Lake managed reserve in the years 1991 – 2002 (values are log transformed)

Slika 1: Trend gibanja števila kostanjevk *Aythya nyroca* in višine vode v upravljanem rezervatu jezera Srebarna v letih 1991 – 2002 (vrednosti so logaritmsko transformirane)

The lake used to be annually flooded by the Danube, which purified the lake of detritus and mud sediments, but in 1949 it was disconnected from the river by a dike constructed to reclaim the marsh for arable land. In addition, since 1975 reed-cutting has stopped resulting in a large amount of organic material entering the ecosystem annually. In 1979, the dike was partially removed but only to the extent that very high waters of the Danube could enter the wetlands. As a result of human interference, the wetland ecosystem at Srebarna was disrupted, and the natural purification system stopped operating (MICHEV *et al.* 1998). A large silt layer then formed on the bottom of the lake,

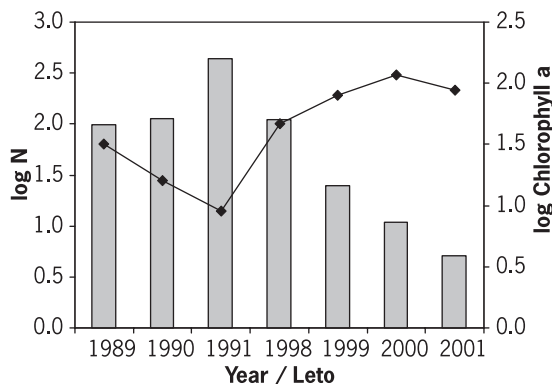


Figure 2: Trends in the Ferruginous Duck *Aythya nyroca* numbers and the chlorophyll a concentration at the Srebarna Lake managed reserve in the years 1989 – 2001 (values are log transformed)

Slika 2: Trend gibanja števila kostanjevk *Aythya nyroca* in koncentracije klorofila a v upravljanem rezervatu jezera Srebarna v letih 1989 – 2001 (vrednosti so logaritmsko transformirane)

which reduced water flow into the lake from karstic springs. These factors, combined with abstraction of water for irrigation and drainage of other parts of the Srebarna watershed, resulted in the lake gradually drying up. The last inflow of water from the Danube was in 1988, and by 1993 – 1994 the lake was only some tens of centimetres deep. The lake turned into a hypereutrophic wetland with algal blooms, this process exacerbated by input of fertilisers from surrounding agricultural land. In 1994, an artificial canal was built to reconnect the wetland with the Danube and the lake has subsequently reformed.

3. Results

Ferruginous Duck numbers were positively correlated with water level (Figure 1 & 4; $r = 0.81$, $p = 0.001$, d.f. = 12) and water transparency (Figure 3 & 6; $r = 0.83$, $p < 0.01$, d.f. = 8), and negatively correlated with chlorophyll a (Figure 2 & 5; $r = -0.79$, $p = 0.019$). Using duck numbers from the following season in the analysis, an increase of the significance of these relationships was obtained (water level – $r = 0.87$, $p < 0.001$, d.f. = 11; water transparency – $r = 0.91$, $p < 0.005$, d.f. = 7; chlorophyll a – $r = 0.89$, $p < 0.001$, d.f. = 7; Fig. 2). All other tested parameters – nitrate, phosphate, ammonium ions, dissolved oxygen, zooplankton and zoobenthos – did not show any significant correlation.

4. Discussion

In the 19th and early 20th century, the Ferruginous Duck used to be one of the most common breeding species in Bulgarian wetlands (PETKOV 1997) and has always had historically a significant breeding population in Srebarna Lake. Even when the national population began to decrease, the species in Srebarna Lake was still a common breeder (PATEV 1950). The data from the National Ornithological Database with the BSPB/ BirdLife Bulgaria show that since the mid-1980s the species population started to decrease dramatically. The last inflow of Danube waters was in 1989 and the Ferruginous Duck population experienced some slight increase and then around the mid-1990s, when the Lake was at its worst stage. With water depth of a few tens of centimetres, the species almost became extinct as a breeder with just single individuals still being present there. Since the restoration of the Danube River – Srebarna Lake connection through a canal, the Ferruginous Duck started a notable gradual recover (PETKOV 2000). The only previous

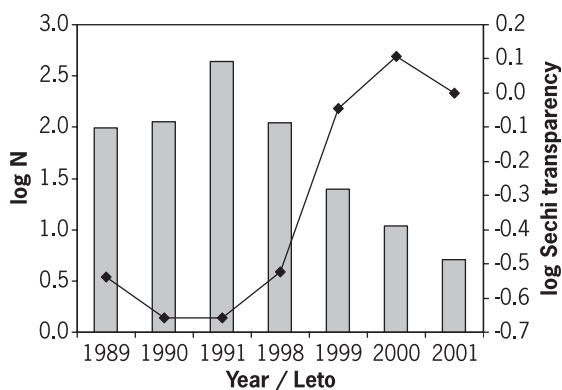


Figure 3: Trends in the Ferruginous Duck *Aythya nyroca* numbers and the Sechi water transparency at the Srebarna Lake managed reserve in the years 1991 – 2002 (values are log transformed)

Slika 3: Trend gibanja števila kostanjevk *Aythya nyroca* in prozornosti vode (Sechi) v upravljanem rezervatu jezera Srebarna v letih 1989 – 2001 (vrednosti so logaritmsko transformirane)

study of waterbird numbers and wetland change at Srebarna Lake (STOYNEVA & MICHEV 1997) did not find any significant statistical relationships. The authors suggested the Glossy Ibis *Plegadis falcinellus* as a good indicator of wetland change. This, however, was based on expert opinion rather than on solid data and statistical correlation. The results of the present

data analysis prove statistically that the changes in the Ferruginous Duck breeding population numbers reflect the ecological changes at Srebarna Lake since the 1980s. The species is totally dependent on wetlands and well-expected result for a diving duck is the fact that the water level changes influence the wetland suitability for the Ferruginous Duck. The studies of REITAN and SANDVIK (1992) and KOSINSKI (1999) show the importance and influence of the water level on the number of *Anas* and *Aythya* species breeding pairs. The Ferruginous Duck has been recorded to abandon wetlands, which experience fluctuations in water level (PETKOV 2000), especially when their preferred shallow bankside habitats disappear (PETKOV 2004). Water level reduction during the breeding season also leaves many nests accessible to terrestrial predators. At Srebarna Lake, the Ferruginous Duck nests mainly on floating reedbeds or on smaller pools within the reedbeds. Ducklings may be trapped in these pools when water level falls, as happened in 2002 (PETKOV

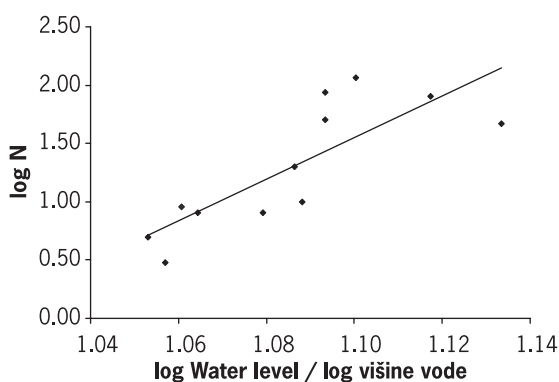


Figure 4: Correlation between water level and Ferruginous Duck *Aythya nyroca* numbers at the Srebarna Lake managed reserve in the years 1991 – 2002 (values are log transformed; $r = 0.87$, $p < 0.001$, d.f. = 11; Pearson)

Slika 4: Korelacija med nivojem vode in številom kostanjevk *Aythya nyroca* v upravljani rezervatu jezera Srebarna v letih 1991 – 2002 (vrednosti so logaritamsko transformirane; $r = 0.87$, $p < 0.001$, d.f. = 11; Pearson)

2004). In 1999 there was a slight drop in Ferruginous Duck numbers, which might be related to the fact of too high waters that flooded the lake too late during the breeding season and might have drowned some nests. Fluctuation in numbers was obvious in the last 3 – 4 years since 2001, when subsequently with reduction in water level the numbers of the Ferruginous Duck have been decreasing, but went up again with the improvement of the water level. The influence of the water level should not be simplified just to the water

depth. The influence is more complicated and related as well to the disappearance of some microhabitats in the wetland, which are important for the species as foraging or resting sites – mainly the shallow vegetated areas or mudflats on the western and south western bank of the lake (PETKOV 2004). The waterbirds are influenced by water level variation both directly and indirectly. Some studies have shown that species and groups of species like grebes, diving and dabbling ducks can indicate water level changes (FREDERICKSON & TAYLOR 1982, FREDERICKSON & REID 1988, SHORT 1989).

The correlation between the Ferruginous Duck numbers and chlorophyll a and water transparency (turbidity) is an indication of the influence of the trophic condition of the wetland on the species breeding population in the wetland. These influence the benthic community and submerged vegetation, both of which are a food resource for the species. Before the river connection was restored in 1994, the benthic community was totally suppressed by the hypereutrophic conditions of the wetland. The macrophyte community was in poor condition as well. The hypereutrophication has often been suggested as a reason for the disappearance of the Ferruginous Duck from various wetlands (CALLAGHAN 2001). This is related to the benthic community that prior to the restoration of the water level and connection with the Danube River was suppressed by the hypereutrophic conditions in the wetland. Despite the fact that some researchers have suggested that Ferruginous Ducks prefer oligotrophic conditions (e.g. ZHMUD 2003), most breeding habitats are found to be eutrophic wetlands (ROBINSON 2003). Perhaps, however, there is a eutrophic tolerance threshold of the species, related to its foraging requirements and which, if breached, the breeding population is suppressed or starts to decrease.

The increased significance of correlations using a one year time delay in Ferruginous Duck numbers suggest that though ecological parameters might have some immediate effect on the species population, there is a greater effect in the next breeding season. This may be the result of reduced breeding success in the previous year, through the effect of homing of the breeders and the recruitment of new breeders (JOHNSON *et al.* 1992) or improved success respectively when numbers increase. Thus when breeding success is poor there are fewer birds joining the breeding population next year (reduced recruitment) and some of the unsuccessful breeders from previous year may be looking for more suitable breeding sites in other wetlands in the region – influencing the homing of the unsuccessful breeders.

5. Conclusions

According to KANTRUD & STEWART (1984), the most sensitive to changes in the wetland ecosystem are those bird species that: a) nest in the periphery of the wetlands or close to water; b) forage in mudflats; c) require structured vegetation of the wetland and certain water regime. All these are typical characteristics of the Ferruginous Duck (CRAMP & SIMMONS 1977, BAUER & GLUTZ 1969, ROBINSON 2003). Our recent studies on the species revealed that it shows preferences for foraging areas like mudflats and requires well structured and mosaic vegetation (PETKOV 2004).

The Ferruginous Duck numbers are closely related to water and limnology parameters at Srebarna Lake and reflect the ecological changes in the wetland. Long-

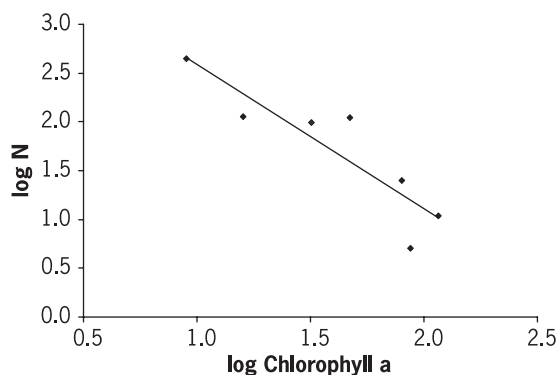


Figure 5: Correlation between chlorophyll a concentration and Ferruginous Duck *Aythya nyroca* numbers at the Srebarna Lake managed reserve in the years 1991 – 2002 (values are log transformed; $r = 0.89$, $p < 0.001$, d.f. = 7; Pearson)

Slika 5: Korelacija med koncentracijo klorofila a in številom kostanjevk *Aythya nyroca* v upravljanem rezervatu jezera Srebarna v letih 1991 – 2002 (vrednosti so logaritmsko transformirane; $r = 0.89$, $p < 0.001$, d.f. = 7; Pearson)

term data sets exist for the species and an effective monitoring scheme has already been established. The numbers of the Ferruginous Duck at Srebarna Lake mirror the development of the lake ecosystem from the second half of 20th century. The high correlation with important limnology parameters suggests that the Ferruginous Duck is sensitive to wetland conditions. Thus we recommend it be used as a biomonitor for the long-term monitoring programme at Srebarna Lake. Data on the species numbers should be collected using the same route, methods and time period (15 – 25 May) as this study. The sensitivity of the species to limnological change may be a reason for its decline throughout Europe. The importance

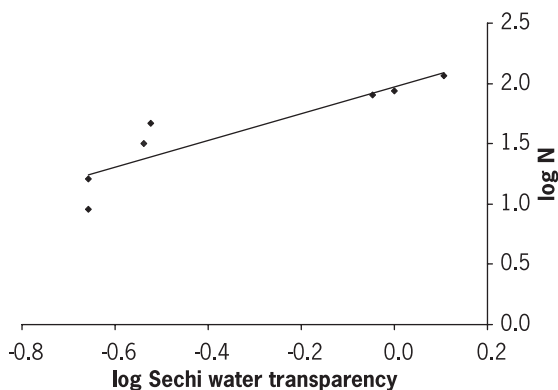


Figure 6: Correlation between Sechi water transparency and Ferruginous Duck *Aythya nyroca* numbers at the Srebarna Lake managed reserve in the years 1991 – 2002 (values are log transformed; $r = 0.91$, $p < 0.005$, d.f. = 7; Pearson)

Slika 6: Korelacija med prozornostjo vode (Sechi) in številom kostanjevk *Aythya nyroca* v upravljanem rezervatu jezera Srebarna v letih 1991 – 2002 (vrednosti so logaritmsko transformirane; $r = 0.91$, $p < 0.005$, d.f. = 7; Pearson)

of the Ferruginous Duck as an indicator of biological change should be explored further through an analysis of bird numbers and limnological parameters at other sites where sizable breeding populations of the species exist.

So far there has been no proof that a single bird species can indicate the integrity of a wetland ecosystem, but species with specific ecological requirements regarding their habitats can be used for bioindication purposes (ADAMUS 1996). It is very well possible that the specific habitat conditions in the wetland that favour the breeding requirements of the Ferruginous Duck – fairly large expanses of reedbeds, mosaic vegetation etc. to be favorable for other breeding species as well and thus the changes in the Ferruginous Duck population may indicate problems for other breeding species, which are more difficult to record and assess or have smaller populations.

6. Povzetek

Glede na dejstvo, da je bila kostanjevka vselej številna ptičja vrsta na jezeru Srebarna, se je zdela nadvse primerna za izbor kot indikatorska vrsta. Podatki o številu kostanjevk *Aythya nyroca* na jezeru Srebarna se v Bolgariji zbirajo že od leta 1987. Kljub precejšnjim špekulacijam o razmerju med številom kostanjevk in ekološkimi spremembami na Srebarni je to vendarle prvi poskus, da se to razmerje izmeri statistično. V pričujočem članku avtor ugotavlja korelacijo med

številom kostanjevk in več limnološkimi parametri, in sicer višino vode, klorofilom a, raztopljenim kisikom, zoobentoško biomaso, zooplanktonsko biomaso in transparentnostjo vode. Precejšnja pozitivna korelacija je ugotovil z višino vode in njeno transparentnostjo, precejšnja negativna korelacija pa s klorofilom a. Pomen korelacij se je povečal, ko so bili ekološki parametri primerjani s številom kostanjevk v naslednjem letu. Te precejšnje korelacije s spremembami v ekoloških parametrih namigujejo, da bi kostanjevka lahko bila pomemben kazalec razmer v mokriščih in, konkretno, v upravljanem rezervatu jezera Srebarna.

7. References

- ADAMUS, P.R. (1996): Bioindicators for assessing ecological integrity of prairie wetlands. – Environmental Protection Agency, Environmental Research Laboratory EPA/600/r-96/082.report, Corvallis, OR, USA.
- BAUER, K.M. & GLUTZ VON BLOTZHEIM, U.N. (1969): Handbuch der vogel Mitteleuropas, Band 3/2. – Academische Verlagsgesellschaft, Frankfurt am Main.
- BIRDLIFE INTERNATIONAL (2000): Threatened birds of the world. Lynx Edicions and BirdLife International. – Barcelona and Cambridge, UK.
- BULGARIAN SOCIETY FOR THE PROTECTION OF BIRDS (2006): National Data Bank for Ornithological Information with the BSPB/BirdLife Bulgaria. – BSPB, Sofia.
- CALLAGHAN, D. (2001): Ferruginous Duck (*Aythya nyroca*). pp. 57 – 103 In: SCHAEFFER, N. & GALLO-ORSI, U. (eds.): European Union action plans for eight priority bird species. – European Commission, Belgium.
- COLLAR, N.J., CROSBY, M.J. & STATTERSFIELD, A.J. (1994): Birds to Watch II. The World List of Threatened Birds. BirdLife Conservation Series No. 4. – BirdLife International, Cambridge, UK.
- CRAMP, S. & SIMMONS, K.E.L. (1977): Handbook of the birds of Europe, Middle East and North Africa, Vol. 1. – Oxford University Press, Oxford, UK.
- FREDERICKSON, L.H. & TAYLOR, T.S. (1982): Management of seasonally flooded impoundments for wildlife. Resource Publication No148. – US Fish and Wildlife Service, Washington DC.
- FREDERICKSON, L.H. & REID, F.A. (1988): Waterfowl use of wetland complexes, pp. 15– 20 In: Frederickson, L.H. & Reid, F.A. (eds.): Waterfowl Management Handbook. Fish and Wildlife Service Leaflet 13.2.1. – USFWG, Washington, DC.
- JOHNSON, D.H., NICHOLS, J.D. & SCHWARTZ, D. (1992): Population dynamics of breeding waterfowl. pp. 446 – 485 In: BATT, B.D.J., AFTON, A.D., ANDERSON, M. G., JOHNSON, D.H., KADLEC, J.A. & KRAPU, G.L. (eds.): Ecology and management of Breeding Waterfowl. – University of Minnesota Press, Minneapolis.
- KAMBUROVA, N.T. (2005): The recent status of breeding bird communities of the Srebarna Reserve (NE Bulgaria). *Acrocephalus* 26 (125): 81–97.
- KANTRUD, H.A., & STEWART, R.E. (1984): Ecological distribution and crude density of breeding birds on prairie wetlands. – *Journal of Wildlife Management* 48: 426–437.
- KOSINSKI, Z. (1999): Effect of lake morphometry, emergent vegetation and shore habitat on breeding bird communities. – *Acta ornithologica* 34: 27–35.
- MICHEV, T., GEORGIEV, B., PETROVA, A. & STOYNEVA, M. (1998): Biodiversity of the Srebarna Biosphere Reserve. Checklist and Bibliography. – Contex & Pensoft Ltd., Sofia.
- PETKOV, N. (1997): Current Status of the Ferruginous Duck *Aythya nyroca* in Bulgaria. – MSc Thesis, Sofia University Department of Biology, Sofia.
- PETKOV, N. (2000): Population trends of breeding Ferruginous Duck in Bulgaria. – *TWWSG News* 12: 44–48.
- PETKOV, N. (2003): Status and Distribution of Breeding Ferruginous Duck in Bulgaria. pp. 22–27 In: PETKOV, N., HUGHES, B. & GALLO-ORSI, U. (eds.): Ferruginous Duck: From Research to Conservation. BSPB Conservation Series No. 6. – BirdLife International – BSPB – TWWSG, Sofia.
- PETKOV, N. (2004): Comparative ecological studies on the Ferruginous Duck (*Aythya nyroca*) and Common Pochard (*Aythya ferina*) during breeding season in Bulgaria. – PhD Thesis, Central Laboratory of General Ecology, Bulgarian Academy of Sciences.
- REITAN, O. & SANDVIK, J. (1992): Responses of wetland birds to additional damming of part of a reservoir. pp. 417–2424 In: HAGEMAIER, E.J. & VERSTRAEL, T.J. (eds.): Bird Numbers 1992. Distribution, monitoring and ecological aspects. Proceedings of the 12th International Conference of IBCC and EOAC, Noordwijkerhout, The Netherlands. – Statistics Netherlands, Voorburg/Heerlen & SOVON, Beek-Ubbergen.
- ROBINSON, J. A. (2003): A global overview of the ecology of the Ferruginous Duck. pp. 114–121 In: PETKOV, N., HUGHES, B. & GALLO-ORSI, U. (eds.): Ferruginous Duck: From Research to Conservation. BSPB Conservation Series No. 6. – BirdLife International – BSPB – TWWSG, Sofia.
- ROBINSON, J.A. & HUGHES, B. (2003): The Global Status and Distribution of the Ferruginous Duck. pp. 8–17 In: PETKOV, N., HUGHES, B. & GALLO-ORSI, U. (eds.): Ferruginous Duck: From Research to Conservation. BSPB Conservation Series No. 6. – BirdLife International – BSPB – TWWSG, Sofia.
- SHORT, H.L. (1989): A wildlife habitat model for predicting effects of human activities on nesting birds. pp. 957–973 In: SHARITZ, R.R. & GIBBONS, J.W. (eds) Freshwater wetlands and wildlife. CONF-8603101, Symposium Series No 61. – US Department of Energy, TN.
- STOYNEVA, M. & MICHEV, T. (1997): Srebarna Case: Study Habitat Changes as Reflected by Waterfowl. – *Hungarian Waterfowl Publications* 3: 131–142.
- VASSILEV, V. (2002): Report on the Monitoring Activities by the CLGE in Srebarna Biosphere Reserve under a Contract with MOEW. – Central Laboratory of General Ecology, Sofia.

ZHMUD, M.Y. (2003): Status of the Ferruginous Duck in the Ukrainian Danube Delta and Adjacent Areas. pp. 72-75
In: PETKOV, N., HUGHES, B. & GALLO-ORSI, U. (eds.):
Ferruginous Duck: From Research to Conservation.
BSPB Conservation Series No. 6. – BirdLife International
– BSPB – TWSG, Sofia.

Arrived / Prispelo: 4.4.2006

Accepted / Sprejeto: 5.10.2006

A PRELIMINARY ASSESSMENT OF THE ORNITHOLOGICAL IMPORTANCE OF LIVANJSKO POLJE (CETINA RIVER BASIN, BOSNIA AND HERZEGOVINA)

Preliminarna ocena ornitološkega pomena Livanjskega polja (dolina reke Cetine, Bosna in Hercegovina)

MARTIN SCHNEIDER-JACOBY¹, BORUT RUBINIĆ², PETER SACKL³ & BORUT ŠTUMBERGER⁴

¹ European Nature Heritage Fund (Euronatur), Konstanzer Str. 22, D-78315 Radolfzell, Germany, e-mail: Martin.Schneider-Jacoby@euronatur.org

² Borut Rubinić, DOPPS-BirdLife Slovenia, pp 2990, SI-1001 Ljubljana, Slovenia e-mail: borut.rubinic@dopps-drustvo.si

³ Steiermärkisches Landesmuseum Joanneum, Forschungsstätte Furtnersteich, Raubergase 10, A-8010 Graz, Austria, e-mail: peter.sackl@stmk.gv.at

⁴ SI-2282 Cirkulane 41, Slovenia, e-mail: stumberger@siol.net

Twelve short visits to Livanjsko Polje, from spring 2002 to spring 2005, have indicated that its cultural and natural landscape has changed little over the years. Several of the indicator species present almost 100 years ago (REISER 1939) are still found in good numbers. Besides the Corncrake *Crex crex*, the occurrence in good numbers of Great Bittern *Botaurus stellaris*, Snipe *Gallinago gallinago*, Redshank *Tringa totanus*, Marsh Harrier *Circus aeruginosus* and Montagu's Harrier *Circus pygargus* is of particular interest for conservation management. Several other species, including Spoonbill *Platalea leucorodia*, Pintail *Anas acuta*, Lesser-spotted Eagle *Aquila pomarina*, Crane *Grus grus* and Curlew *Numenius arquata* are probably still breeding and the potential breeding habitats for these species in the area are still considerable. Human impact and possible solutions for conserving the natural features of Livanjsko Polje are briefly described.

Key words: karstic polje, peat bog, temperate grassland, flooding, cultural landscape

Ključne besede: kraško polje, visoko barje, travišče, poplava, kulturna krajina

1. Introduction

Livanjsko Polje is situated in Herceg-bosanska County (Livno district / Canton) at the border between Bosnia & Herzegovina and Croatia, in the hinterland of Split. The massif of the Dinara Mountain (1913 m a.s.l.) separates the region from the Adriatic Sea, which is only 30 km away. Herceg-bosanska County is a mosaic of huge karstic poljes (about 30% of the surface: Kupreško Polje, Duvanjsko Polje, Glamočko Polje, Livanjsko Polje) and high mountains. karstic poljes are large closed depressions, draining underground, with a flat floor across which there may be an intermittent or permanent stream. They may be liable to flooding and become lakes, and their floors make a sharp break with parts of the surrounding slopes

(JENNINGS 1985). The area of the Herceg-bosanska County district is 5020 km² and until 1991, 155,000 people lived there, i.e. only 23 people per km². Karst is the typical landscape feature in the region (BOŽICEVIĆ 1992) and its protection is a global task, as it is linked to very specific habitats and a high biodiversity (e.g. VERMEULEN & WHITTEN 1999).

While the mountains in the NW of the county are a part of the Sava River Basin – here is the source of Unac, the small beginning of the Una River – the rest of the county lies within the Cetina River Basin. The Mediterranean Cetina river has two thirds of its basin in Bosnia and Herzegovina, but these parts of its catchment area are connected with the main river only by subterranean water courses (UNEP/MAP/PAP 2000).

Livanjsko Polje is surrounded by high mountains, which are characterised by very hard winters. The karstic polje runs in a NW to SE direction with Buško blato (today an artificial reservoir not included in this study) in the SE and Ždralovac on the NW edge. Ždralovac is some kind of bottleneck between the last Dinara Mountains and Šator where Livanjsko Polje is followed by Grahovo Polje. The length of the karstic polje is 65 km with an average width of 6 km. Its surface is 410 km², situated between 700 and 720 m a.s.l.

The best, and possibly the only, description of the ornithological and natural features is found in the great



Figure 1: Livanjsko Polje, without Buško blato in the SE. The observation points (1 – 32) used in the present survey are marked. The landscape features near the points are as follows: 1, 2 and 32: SE part, mainly consists of meadows and pastures, some arable land, old peat excavations sites and a small part is impacted by coal mining; 3, 4, 30 and 31: Central part with large pastures and some meadows; 5, 6, 28 and 29: Northern central part with main forest complexes; 7 – 27: NE Livanjsko Polje (“Ždralovac Veliki” = “Crane Swamp”) with elder forests (25, 26), reed beds (17 – 22) and meadows (7 – 16), the central part is impacted by peat excavation and needs restoration; 33 – 36: road through the north of Livanjsko Polje with flooded meadows and some birch and oak forests left and right. Source: Generalkarte von Mitteleuropa, Kartenstand 1894, Wien.

Slika 1: Livanjsko polje, brez Buškega blata na JV. Označene so opazovalne točke (1 – 32), uporabljene v tej študiji. Pokrajinske značilnosti v bližini točk so: 1, 2 in 32: JV del, v glavnem travniki in pašniki, nekaj obdelovalne zemlje, nekaj izkopov šote, in manjši izkop premoga; 3, 4, 30 in 31: osrednji del z velikimi pašniki in travniki; 5, 6, 28 in 29: severni osrednji del z glavnimi kompleksi gozdov; 7 – 27: SV Livanjsko polje (“Ždralovac veliki”) s starejšimi gozdovi (25, 26), trstišči (17 – 22) in travniki (7 – 16), na osrednjem delu je precej izkopa šote in potrebuje renaturacijo; 33 – 36: cesta skozi severno Livanjsko polje s poplavljenimi travniki in nekaj bukovimi in hrastovimi gozdovi ob cesti. Vir zemljevida: Generalkarte von Mitteleuropa, Kartenstand 1894, Wien.

materials for an *Ornis Balcanica* by REISER (1939). Apart from Hutovo Blato, which is currently the only Ramsar Site in Bosnia and Herzegovina, one of the three Important Bird Areas (IBA) and a nature park (HEATH & EVANS 2000), Livanjsko Polje constitutes the most important wetland in Bosnia and Herzegovina and the neighbouring countries, according to Reiser. It was described as hosting a unique community of water birds (Table 1). Most striking is the fact that the north western marsh and bog habitats are named after the Crane *Grus grus*, which was breeding here 100 years ago (ždral = Crane, “Ždralovac Blato” or “Ždralovac Veliki” = “Crane Swamp” or “Large Crane Area”). Nobody knows when this breeding tradition ended or, indeed, whether it still exists. It is clearly important to determine whether this indicator species is still present in the area and if its habitats have been preserved over the last 100 years.

The study is based on ongoing inventories and projects dedicated to preserve key sites of the European EECONET in SE Europe by Euronatur. The justification for these studies and projects is the basic lack of ornithological data from at least the last thirty years for many sites, and for some areas even longer. From old published data it is obvious that the Balkan Peninsula hosted many more species, and more sites important for the conservation of endangered species, than we know today (compare HEATH & EVANS 2000, IUCN 2004). The question is, do we just not have enough information to determine how much, if anything, has been lost?

2. Methods

The war did not allow the area to be visited during recent years, because it was one of the major battlefields. There are still mine fields inside the area and its surroundings, partly marked by signs or traces of mine excavation.

The first visits by the authors were undertaken in 2002, using the main road through the area twice in March 2002 (B. Štumberger, B. Rubinić and M. Schneider-Jacoby). These were followed by three more systematic counts from the small road around the site (numbers 6 to 32 on Figure 1), once in June 2002 (B. Rubinić), twice in July 2002 (M. Schneider-Jacoby) and once in May 2003 (N. Aleš, A. Vrezec and B. Rubinić) during travels to or from southern Dalmatia. Subsequent counts were made from selected points by P. Sackl, B. Štumberger, B. Mozetič, A. Vrezec and B. Rubinić in September 2002, January 2003, April 2003, April 2004 and January 2005. All counts were made as point counts, scanning the area by different stops

Table 1: Water and marsh birds previously reported in Livanjsko Polje by REISER (1939)**Tabela 1:** Vodne in močvirske ptice na Livanjskem polju po REISERJU (1939)

Species / Vrsta	Year / Leto	Abundance / Številčnost	Site and remarks / Območje in opombe
<i>Circus aeruginosus</i>	1888	several	Ždralovac blato
<i>Circus aeruginosus</i>	1896	3 nests	Ždralovac blato
<i>Circus pygargus</i>	1896	>6 nests	common breeding bird in Ždralovac blato near Bataši
<i>Haliaeetus albicilla</i>	1904	1	middle aged bird over Ždralovac blato
<i>Egretta garzetta</i>	1888	colony	Ždralovac blato
<i>Egretta garzetta</i>	1896	20 – 25 nests	Ždralovac blato
<i>Ardeola ralloides</i>	1904	30 – 35 pairs	Ždralovac blato
<i>Ardeola ralloides</i>	1896	40 pairs	Ždralovac blato
<i>Nycticorax nycticorax</i>	1888	30 – 35 pairs	Ždralovac blato
<i>Ixobrychus minutus</i>	1888	1 specimen	Ždralovac blato
<i>Botaurus stellaris</i>	1888	several	Bataši – very likely a breeding bird
<i>Platalea leucorodia</i>	1888	>9 nests	Ždralovac blato
<i>Platalea leucorodia</i>	1904	30 nests	Ždralovac blato
<i>Plegadis falcinellus</i>	1888	only 1	Ždralovac blato
<i>Porzana parva</i>	1894	1	Ždralovac blato, very likely breeding
<i>Grus grus</i>	1894	2 eggs	Ždralovac blato
<i>Grus grus</i>	1904	3 pairs	Ždralovac blato
<i>Gallinago gallinago</i>	1904	good number	breeding in Ždralovac blato, Prisap and Bataši
<i>Tringa totanus</i>	1888	>2 pairs	eggs near Livno, Bataši and Crni Lug
<i>Tringa totanus</i>	1904	several pairs	Ždralovac blato near Crni lug with fledged young
<i>Vanellus vanellus</i>	1888	many pairs	Ždralovac blato
<i>Anas acuta</i>	1888	eggs	Livno, few breeding pairs
<i>Chlidonias niger</i>	1896	>>200 pairs	Ždralovac blato and near Nuglašica, two colonies

along the road (Figure 1). P. Sackl visited Livanjsko Polje again in May 2005.

On 9 Jun 2002 and 16 May 2003 road transect counts were performed on the western part of the Polje in order to identify common breeding bird species (passerines). Birds were counted within a belt of approximately 200 m on both sides of the road from a car at a speed between 10 to 15 km/h.

Time is given as Central European Time (CET).

3. Results

3.1. Early spring observations in March 2002

Livanjsko Polje was visited briefly for the first time in March 2002. On 6 Mar 2002, point counts were made from the main road at the north-western end of the polje from 16.00 until 17.10 h. On 9 Mar 2002, observations started at 16.00 and lasted until dawn

(approx. 18.00 h).

In March most of the northern polje was covered by water. This large wetland (>7000 hectare) is used by many species in large numbers. On 6 Mar 1200 birds, including Grey-legged Goose *Anser anser* (120), Wigeon *Anas penelope* (200), Gadwal *A. strepera* (20), Teal *A. crecca* (300), Garganey *A. querquedula* (6), Pintail *A. acuta* (50), Mallard *A. platyrhynchos* (500), Crane (5) and Hen Harrier *Circus cyaneus* (7), were counted from only one point where the Polje is approximately 6 km wide (point 26, Figure 1). The real number of birds present was impossible to estimate, but most probably was much higher. According to information from local people, hunting and other human disturbances are present and are probably lowering the capacity of the site.

On 9 Mar, it was obvious that, for species like Crane (14 observed), Marsh Harrier *Circus aeruginosus* (19) and Hen Harrier (8), the whole polje is an

important feeding site (points 1 to 6). Large flocks of Corn Buntings *Miliaria calandra* with up to 200 and 300 birds were seen in central parts of the polje (ŠTUMBERGER 2002). Concentrations of this number of passerine birds provide a good food basis for wintering birds of prey. Cranes were seen at different sites wandering about in groups of 2, 2 and 4, and two families with 1 young each, between Livno and the northern part of the polje. On 6 Mar Cranes – a group of 5 was seen – arrived so late in the northern floodplains, that due to darkness it was not possible to count them. Here probably is the roost of the birds for the whole 40,000 hectares large polje. However, groups of cranes were also seen by the team in other adjoining karstic poljes (RUBINIĆ 2002A).

3.2. Breeding bird community in summer 2002

In summer 2002 the breeding bird community was checked during whole day visits on 9 Jun 2002, and subsequently during two morning excursions on 5 Jul and 9 Jul 2002. Birds were registered at 36 points with good visibility across the polje, and a first quick overview of the breeding birds community was gained. For points that were counted twice, the better figure was taken into the analysis to give a first, rough picture on the distribution of selected bird species. On Jun 9 all the points (1 to 36) were visited between 10.00 and 17.30 CET, starting from the SW end, through the W edge of the Polje (points 32 to 24), ending on

the SE edge in Livno (point 1). The day was cloudy with excellent observation conditions. On 5 Jul 2002, from 4.20 until 11.00 h, points 1 to 32 were visited and, on 9 Jul 2002, from 3.45 to 10.00 h points 7 to 27 and 33 to 36. Table 2 shows the numbers of typical species seen during the June and July 2002 counts. The numbers often refer to territorial birds (calling Snipe *Gallinago gallinago*, Bittern *Botaurus stellaris*, displaying males of harriers).

Although the mixed heron colony described by REISER (1939) was not found – only a small colony of Grey Herons *Ardea cinerea* with 14 pairs was seen in the alluvial forest – species composition, numbers and distribution of birds show that Livanjsko Polje has maintained its main character throughout the last 100 years. The core area is still Ždralovac Blato, where five male Great Bitterns were heard calling in July and an adult Purple Heron *Ardea purpurea* was observed flying from a potential breeding habitat of extensive reedbed in June. Redshanks *Tringa totanus* and Lapwings *Vanellus vanellus* are still abundant, and successful broods of Great Crested Grebes *Podiceps cristatus* (4 pairs in June and 3 families in July) and Garganeys (one family with 7 half grown ducklings in July) were seen. Even a Curlew *Numenius arquata* moved slowly through the vegetation in July about 2 km from the road in the central part of the large Crane Swamp, where the bog area is already impacted by drainage canals.

In June and July large areas of the northern part of

Table 2: Spring, summer and autumn observations of birds of prey in Livanjsko Polje

Tabela 2: Opazovanja ujed na Livanjskemu polju spomladi, poleti in jeseni

Species – Date/ Vrsta – Datum	9 Jun 2002	5 Jul 2002	9 Jul 2002	13 Sep 2002	2 Apr 2003	8 May 2005
<i>Pandion haliaetus</i>	0	0	0	0	0	1
<i>Circus pygargus</i>	37	14	13	1	0	24
<i>Circus cyaneus</i>	0	0	0	0	0	1
<i>Circus aeruginosus</i>	29	12	10	0	0	14
<i>Falco subbuteo</i>	2 pairs	4	0	0	0	6
<i>Falco tinuculus</i>	4 pairs	1	1	10	1	3
<i>Falco columbarius</i>	0	0	0	0	0	1
<i>Buteo buteo</i>	9 pairs	1	2	37	2	4
<i>Pernis apivorus</i>	0	0	2	0	0	0
<i>Aquila pomarina</i>	1	1	0	0	0	0
<i>Circaetus gallicus</i>	1	1	0	1	0	1
<i>Accipiter gentilis</i>	0	0	0	1	0	0
<i>Accipiter nisus</i>	0	0	0	0	0	1
<i>Milvus migrans</i>	0	0	0	0	1	0

Table 3: Spring road transect counts of passerine birds on a 37.3 km long road transect between Mali Guber and Donji Kazanci (W part of Livanjsko Polje). Numbers indicate singing males.**Tabela 3:** Spomladanska opazovanja ptic pevk s transekta, dolgega 37,3 km, med vasema Mali Guber in Donji Kazanci (Z del Livanjskega polja). Število pomeni pojoče samce.

Species / Date	9 Jun 2002	16 May 2002
<i>Alauda arvensis</i>	100	12
<i>Galerida cristata</i>	outside transect	/
<i>Lullula arborea</i>	outside transect	/
<i>Hirundo rustica</i>	2	13
<i>Motacilla alba</i>	2	5
<i>Motacilla flava cinereocapilla</i>	18	4
<i>Luscinia megarhynchos</i>	16	3
<i>Oenanthe oenanthe*</i>	1	/
<i>Oenanthe hispanica</i>	1	/
<i>Saxicola rubetra</i>	6	2
<i>Saxicola torquata</i>	/	3
<i>Turdus merula</i>	4	5
<i>Sylvia atricapilla</i>	3	1
<i>Sylvia communis</i>	1	2
<i>Sylvia nisoria</i>	outside transect	1
<i>Sylvia hortensis</i>	/	2
<i>Acrocephalus scirpaceus</i>	1	/
<i>Acrocephalus arundinaceus</i>	2	1
<i>Parus major</i>	4	5
<i>Parus caeruleus</i>	1	/
<i>Lanius collurio</i>	26	43
<i>Lanius minor</i>	9	1
<i>Pica pica</i>	2	/
<i>Corvus monedula</i>	1	/
<i>Corvus corone cornix</i>	7	1
<i>Sturnus vulgaris</i>	6	4
<i>Sturnus roseus</i>	1♂, 2♀	/
<i>Oriolus oriolus</i>	1	2
<i>Passer domesticus</i>	25	15
<i>Passer hispaniolensis</i>	45	5
<i>Passer montanus</i>	1	/
<i>Fringilla coelebs</i>	1	/
<i>Carduelis cannabina</i>	8	/
<i>Carduelis carduelis</i>	2	/
<i>Carduelis chloris</i>	1	4
<i>Coccothraustes coccothraustes</i>	1	/
<i>Emberiza citrinella</i>	2	/
<i>Emberiza cirrus</i>	1	2
<i>Emberiza melanocephala</i>	outside transect	/
<i>Miliaria calandra</i>	126	not counted

*Rubinić (2002b)



Figure 2: View from point 21 (compare Figure 1) over the flooded NE part of Livanjsko Polje with large reed beds at the foot of the Dinara Mountain bordering Croatia (Photo: M. Schneider-Jacoby / Euronatur)

Slika 2: Pogled s točke 21 (primerjaj sliko 1), prek poplavljenega SV dela Livanjskega polja, z velikimi trstičišči ob vznožju Dinare, na meji s Hrvaško (foto: M. Schneider-Jacoby / Euronatur)

the Polje were still under water (dark grey in Table 6), offering excellent habitats for a great variety of breeding water birds. Obviously the area is still one of the most important and unique wetlands in the Balkans. Even in July most of the meadows were still wet. The distribution of Corncrake *Crex crex* and Snipe – calling birds, display was not observed – indicates areas of wet meadows (light grey in Table 6). Both species are good indicators for these rare and valuable marshland habitats. Orchids (e.g. *Orchis palustris*) and Gladiole *Gladiolus illyricus* were abundant in this habitat type. The main road through the polje from Bojmunte to Pržine – points 33 – 36 offers a great view into the centre of the marshes which is intersected with birch *Betula* sp. and broad leaved alluvial forests. Because only point counts were made, population numbers of Corncrakes for 2002 (on the basis of July counts that were conducted in the early morning) are estimated at a minimum of 200 callers, but it was late for counting. This part of Livanjsko Polje is about 12 x 6 km. The middle part of the Polje and the areas near Livno were already too dry for Corncrakes in summer 2002. Other species like Quail *Coturnix coturnix*, Lesser Grey Shrike *Lanius minor* and Hoopoe *Upupa epops* are typical for the drier parts and edges of the polje.

Montagu's Harrier *Circus pygargus* is still widespread in the area, as it was 100 years ago. The population is estimated at 30 – 50 breeding pairs. Up to six males in June and five males in July were seen together, when

they started to fly in the morning near Crni Lug, where six nests were found 100 years ago. Although the area was visited only very briefly and during morning hours, or on a cloudy day, an interesting variety of birds of prey was seen, including both in June and July endangered species like the Lesser Spotted Eagle *Aquila pomarina*. In June a single bird observed near Lištani (point 30, Figure 1) was conducting a display flight, clearly suggesting breeding in this area. Two Long-legged Buzzards *Buteo rufinus* were seen in neighbouring Duvanjsko Polje, 10 km from Livno. Furthermore Short-toed Eagles *Circaetus gallicus* were observed on three occasions – a single bird again near Lištani on Jun 9, one close to Čaprazlije (point 29, Figure 1) on 13 Sep 2002, and a pair seen, together with Mato Gotovac, on 7 Apr 2004 in the north-western part of the polje (point 15 – 17; Figure 1).

3.3. Road transect counts of spring passerine birds in June 2002 and May 2003

Road transect counts of passerines were performed during two visits in spring: on 9 Jun 2002 (between 10.00 and 14.30 h) and on 16 May 2003 (between 12.00 and 14.00 h). Birds were counted at the western part of the polje between Mali Guber and Donji Kazanci (Points 32 and 27, Table 3) on a 37.3 km long road transect. These data provide an indication only, since the time of the day was not optimal for breeding

Table 4: Spring observations (number of individuals) on 17 Apr 2004 from the main road and in the northwestern part of Livanjsko Polje (points as in Figure 1); abbreviations: bp – breeding pair, s – calling, ex – individual**Tabela 4:** Spomladanska opazovanja (število osebkov) dne 17.4.2004 z glavne ceste na sveverozahodnem delu Livanjskega polja (točke kot na Sliki 1); okrajšave: bp – gnezdeči par, s – kliče, ex – osebek

Point in map/ Točka na zemljevidu	1	2	3	4	5	6	35	27	24	23	20	Total
Species / Time	15.45	16.00	16.15	16.30	16.40	17.10	17.15	17.25	17.40	17.50	18.10	
<i>Podiceps cristatus</i>								3	2 bp (1 nest)	1 bp		3 bp (1 nest) + 3 ex
<i>Phalacrocorax carbo</i>								1				1
<i>Ardea cinerea</i>	2	10		1								13
<i>Platalea leucorodia</i>	7		2	2								11
<i>Botaurus stellaris</i>								1 s	1 s	5 s		7 booming
<i>Anas penelope</i>								2				2
<i>Anas acuta</i>								38				38
<i>Anas clypeata</i>								18				18
<i>Anas platyrhynchos</i>								7		3		10
<i>Anas querquedula</i>						10		15	2	15		42
<i>Anas crecca</i>								32				32
<i>Aythya ferina</i>								16				16
<i>Fulica atra</i>									1	12 (1 nest)		14 ex (1 nest)
<i>Grus grus</i>							1 bp					1 bp
<i>Hematopus ostralegus</i>			3	3								6
<i>Vanellus vanellus</i>			4 bp			3 bp						7 bp
<i>Larus cabinnans</i>	45	14	3	638								691
<i>Larus fuscus</i>				18								18
<i>Circus pygargus</i>	6 (5♂, 1♀)			1								7 (5♂, 2♀)
<i>Circus aeruginosus</i>	1										1	2 (1♂, 1♀)
<i>Falco tinnunculus</i>	1				1							2♀
<i>Buteo buteo</i>					1		1					2

passerines census. Furthermore the methodology provides only the approximate abundance of passerine communities (Table 4) and not breeding density.

The road transect between Mali Guber and Donji Kazanci passes mainly through open landscape. On the southern part of the transect, the habitat is open marshy or substeppe (depending on water level) flatland with sparse shrubs and solitary trees, mostly along the road. The area is the main breeding place for Skylark *Alauda arvensis*. Due to the fact that most of the transect passes open landscape, Skylark is also one of the most abundant species along the whole transect. On several trees close to the villages there are a number of small colonies of Spanish Sparrows *Passer hispaniolensis*, with one to five nests. The road

passes through or near 10 settlements, 4 of which were destroyed and abandoned between the war, in the years 1992 and 1995. Most of the settlements are surrounded with pastures and very little cultivated land. There are some orchards, the main breeding place of Lesser Grey Shrikes. The northern part of the transect has a submediterranean substeppe character with abandoned fields that are becoming overgrown by tall grass and surrounded by shrubs. This is the main breeding area for Red-backed Shrikes *Lanius collurio* and Corn Buntings. Both species are extremely numerous, showing great breeding preference for the succession phases between abandoned pastures and grasslands and the thick shrubs that are plentiful around the northern part of the transect. The sighting

of Rose-coloured Starling *Sturnus roseus* in this part of the polje is also very interesting. Here most of the villages have been destroyed, so that once cultivated land is gradually becoming overgrown by bushes. At a few places the road comes very close to the surrounding submediterranean forest of Downy Oak *Quercus pubescens* and Manna Ash *Fraxinus ornus* that spreads above the west side of the Polje. Here is where most of the typical forest species have been recorded.

3.4. Spring observations in April 2004

On 17 Apr 2004 about 50% of Livanjsko Polje was flooded. In the northwest part, due to the high water level, mainly water birds were observed (points 20 – 35, Table 5). Of particular interest is the great diversity of dabbling ducks (Anatini), which were feeding or resting in groups of obviously paired birds, like a flock of 19 pairs of Pintails, a species which was a common breeder 100 years ago. Very interesting is also the late observation of a pair of Cranes, which may indicate breeding in the area. The large reed beds in the northern part of the polje are core breeding habitats for Bitterns, with a total of 7 booming males heard in April 2004. Furthermore, the observation of at least 11 Spoonbills *Platalea leucorodia* is of special interest, because this species is also a potential breeder in the area. Montagu's Harriers were only present in the drier central and eastern parts of the polje.

The presence of large numbers of Lesser Black-backed Gulls *Larus fuscus* of the subspecies *graellsii* (16 ad.) and *fuscus* (2 ad.) indicates the importance of Livanjsko Polje for birds using the central European flyway to reach their breeding areas in northern Europe. This may also be true for the Oystercatchers *Haematopus ostralegus* present in April 2004.

3.5. Winter observations on Livanjsko Polje

Livanjsko polje was visited briefly on 29 Jan 2003. The team of Borut Rubinić and Sašo Weltdt counted 286 Common Buzzards *Buteo buteo*, 82 Hen Harriers, 1 Sparrowhawk *Accipiter nisus*, 20 Kestrels *Falco tinnunculus* and 8 Great Grey Shrikes *Lanius excubitor* on the 56 km long main road transect between Crni Lug and Veli Guber (points 24 and 32, Figure 1). The number of Hen Harriers shows the importance of Livanjsko polje as a wintering area for the species. The estimated 100 to 150 wintering birds constitutes more than one percent of the European Hen Harrier wintering population.

3.6. Spring observations in May 2005

The late beginning of the breeding season is obvious from the count in May 2005. Corncrake, Redshank and Snipe are still missing. Also Quail, Hoopoe and Lesser Grey Shrike are still rare. The observations of the Squacco Herons *Ardeola ralloides* and the pairs of Pintails, both formerly recorded bird species in Livanjsko Polje, are interesting, in that they would still find ideal breeding habitats (Table 6).

4. Discussion

Livanjsko Polje is one of the most specific natural phenomena in Bosnia and Herzegovina, representing the typical karstic landscape features. Furthermore, by Livanjsko Polje is the largest periodically flooded karstic polje in the world (RITTER-STUDNIĆKA & GRGIĆ 1971), offering a unique opportunity for sustainable development for the district of Livno, capital of the county "Herceg-bosanska County / Canton". Almost 100 years ago Livanjsko Polje was described by REISER (1939) as the most specific and important natural site of the country besides Hutovo Blato. Although the area is impacted by peat extraction and water use for electricity production, the cultural landscape and the key habitats are still in a very natural or semi-natural state. Apart from this, Livanjsko Polje is the largest wetland in Bosnia and Herzegovina with more than two thirds of its area regularly flooded, as we saw in April 2004.

The vegetation of Livanjsko Polje is a very special mix of northern European grasslands and forest elements, as well as plants characteristic of the Mediterranean coast, e.g. plants which are typical for brackish water lagoons near Pag (RITTER-STUDNIĆKA 1974). Visitors to the area are impressed by the vegetation of the karstic polje, which may remind them of bog and fen landscapes typical in northern Europe, and the mountains with a high diversity of grassland associations (*Centaureetum pannonicae* Horvatic 1963, *Molinio-Lathyretum pannonicum* Horvatic 1963, *Deschampsietum mediae* Horvatic 1963, *Plantaginetum altissimae* s. lat., *Nardetum strictae* s. lat., *Festuco illyricae-Linetum flavi* Ritter-Studnicka 1972; see RITTER-STUDNIĆKA 1972, 1974). While these grassland associations could still be found in some other karstic poljes, the natural and semi-natural forests are unique to Livanjsko Polje. Huge areas – about 20% of the whole surface – are covered by old forests of three associations, which are of great importance for nature conservation: pure Alder *Alnus glutinosa* forests, large wet or seasonally flooded Pedunculate Oak *Quercus*

robur forests and a very interesting type of Ash *Fraxinus angustifolia* forest, which is partly used for hay-cutting (RITTER-STUDNIČKA & GRGIĆ 1971). The threatened Lesser Spotted Eagle is an indicator of the ornithological importance of these forests which, as a result of land-mines from the last war, are still only partially accessible. The uniqueness of Livanjsko Polje and its global ecological value according to the criteria of the Ramsar Convention (size, vegetation, indicator species such as the Corncrake, karstic phenomena), together with the ecological importance of other karstic poljes in the upper parts of the Cetina River Basin, have to be integrated into the UNEP/MAP/PAP study (2000) and the spatial development model based on existing sectoral plans (UNEP/MAP/PAP 2000); furthermore, the first plans to enhance the national system of protected areas in Bosnia and Herzegovina have to give more attention to the unique karstic poljes (CHAPE *et al.* 2003) because, until now, their protection has not been proposed (VILUŠIĆ 2000), although their ecological significance is outstanding (see RITTER-STUDNIČKA 1972, 1974).

Published data on the globally threatened Corncrake (EU Species Action Plan, <<http://www.corncrake.net/Download/crex-ap.rtf>>) point to the fact that the conservation of Livanjsko Polje is of great international concern. The plan encourages Bosnia and Herzegovina to designate Livanjsko Polje as a protected site under the nature conservation law, undertake a national Corncrake census to identify key sites, and to protect Livanjsko Polje from any further melioration programmes or peat extraction. In a paper on the Corncrake population in Croatia, the Institute for Ornithology in Zagreb has published an important statement concerning the current situation of the species in Livanjsko Polje: “*Paško Polje* is the only breeding site in the whole Mediterranean Croatia. The small population (10 – 20 singing males) probably survived in the vicinity of the large population of Corncrakes in the neighbouring *Livanjsko Polje*... There were at least 1000 males in Livanjsko Polje before the recent war...” (RAĐOVIĆ & DUMBOVIĆ 1995). During the first International Corncrake Symposium in Munich (Germany) the karstic poljes of former Yugoslavia, and in particular Livanjsko Polje, were identified as important breeding sites of the species (SCHNEIDER-JACOBY 1991). It is surprising that REISER (1939) does not mention the occurrence of Corncrake in Livanjsko Polje.

The dozen short visits between 2002 and 2005 indicate that the cultural and natural landscape of Livanjsko Polje is not greatly changed, beside the ongoing peat excavation and impacts in the south-eastern part by the water regulation, and that several

of the indicator species described by Reiser (Table 1) could be still found in good numbers (Table 2 – 8). Because the present assessment is rapid and preliminary, it defines the lower limits of populations present. The occurrence of Bittern (7 booming), Snipe (>8 territories), Redshank (at least 10 – 20 pairs), Montagu’s and Marsh Harrier (each 30 – 50 pairs) in good numbers is significant. More research is needed to define the size of the populations, especially of Snipe and Redshank, but also of other marsh birds including ducks and crakes. The number of pairs for several passerine species is difficult to estimate for the whole Polje. The fact that Red-backed Shrike (estimate over 100 pairs), Lesser Grey Shrike (over 20) and Corn Bunting (over 300) are still common indicates the persistence of a rich cultural landscape. In addition the polje is an important breeding site for Hoopoe (over 50) and Quail (over 100).

With potential breeding habitats still abundant in Livanjsko Polje for several other species including Spoonbill, Pintail, Crane and Curlew, breeding is still possible. Local people reported that they have seen small flocks of Cranes over the whole summer of 2004. Observations of Lesser Spotted Eagle (twice in summer 2002, probably one territory) and Short-toed Eagle (two territories) prove the importance of the Polje as a breeding habitat for very rare birds of prey. The wintering population of Hen Harriers is of great importance, as the area hosts more than one percent of the European wintering population. Birds of prey should be monitored more precisely to provide more reliable data on breeding and wintering species and population numbers. The use of the polje and adjoining Buško jezero by migrating birds is indicated by the observation of Cranes and other waterfowl, but its continuing importance is threatened by widespread hunting activities.

The recorded impacts endangering the ecological and hydrological characteristics of Livanjsko Polje are (1) the use of the water for energy production, including the canal system for Buško Lake hydro-power plant near Livno (BOŽICEVIĆ 1992); (2) the excavation of peat and associated canals built by FINVEST on a large area (about 30%) in the northwestern part of the Ždralovac Polje and (3) planned meliorations cited in the UNEP/MAP/PAP study (2000). An additional impact on grassland ecosystems is the reduction of traditional grassland management due to the depopulation of many settlements following the recent war.

To maintain the unique site and to use it for sustainable development in the region, Euronatur proposes the following urgently needed measures:

(1) A supplement to the UNEP/MAP/PAP study

- (2000) defining the ecological and hydrological importance of the karstic poljes in Bosnia and Herzegovina;
- (2) Immediate examination of the peat excavation by FINVEST and preparation of rehabilitation measures. These large-scale works require a transboundary environmental impact study and a programme for restoring the bog area;
 - (3) Inclusion of ecologically significant karstic poljes – in particular Livanjsko Polje – into a new national system of protected areas;
 - (4) Nomination of Livanjsko Polje as a RAMSAR site and IBA;
 - (5) Preparation of a pilot project “Livanjsko Polje” or “Sustainable use of karstic poljes” to implement the UNESCO Biosphere Reserve concept in Bosnia and Herzegovina. It would be an important step, for example, to include sustainable use of the grassland areas, with the production of cheese (“Livanjski sir”), into the development and return programmes, especially in the northwestern and wettest parts of the polje;
 - (6) Preparation of a GEF project based on the global importance of Livanjsko Polje and neighbouring sites. In addition to the Sava wetlands and the Neretva-Hutovo Blato ecosystem, the karstic poljes of the Livno district need urgent international support.

Note: Livanjsko Polje, together with the Dinara massif, is already included as a priority site for transboundary cooperation in nature conservation in the new IUCN Strategy for southeast Europe (IUCN 2004).

5. Povzetek

Dvanajst kratkih obiskov Livanjskega polja od pomladi 2002 do pomladi 2005, je pokazalo, da sta tako naravna kot kulturna krajina dobro ohranjeni. Veliko indikatorskih vrst prisotnih že pred 100 leti (REISER 1939) je še vedno tu, z močnimi populacijami. Poleg kosca *Crex crex* so varstveno pomembne vrste še bobnarica *Botaurus stellaris*, kozica *Gallinago gallinago*, rdečenogi martinec *Tringa totanus*, rjavi lunj *Circus aeruginosus* in močvirski lunj *Circus pygargus*.

Nekaj drugih vrst še vedno najverjetneje gnezdi, npr. žličarka *Platalea leucorodia*, dolgorepa raca *Anas acuta*, mali klinkač *Aquila pomarina*, žerjav *Grus grus* in škurh *Numenius arquata*, in imajo na voljo precej primerne habitata. Vpliv ljudi in možne varstvene strategije so na kratko predstavljene v zaključku.

6. References

- BOŽICEVIĆ, S. (1992): Fenomen Krš. – Školska Knjiga, Zagreb.
- CHAPE, S., BLYTH, S., FISH, L., FOX, P. & SPALDING, M. (eds.) (2003): 2003 United Nations List of Protected Areas. – IUCN, Gland, Switzerland and Cambridge, UK and UNEP-WCMC, Cambridge, UK.
- HBZUP (2006): Zemljovid. <<http://www.hbzup.com/livno/zemljopis/>>, (Downloaded: 4 Sep 2006).
- HEATH, M.F. & EVANS, M.I. (2000): Important Bird Areas – Priority sites for conservation, Vol 2(8). – BirdLife International, Cambridge.
- IUCN (2004): Conservation without Frontiers – Towards a new Image for the Balkans. A Strategic Plan for the IUCN South-Eastern European Programme, May 2004. Compiled by EURONATUR for the IUCN Regional Office for Europe (ROE) in cooperation with IUCN/WCPA, 26 pages.
- JENNINGS, J.N. (1985): Cave and Karst Terminology, In: MATTHEWS P.G. (ed.): Australian Karst Index 1985, ASF Broadway, <<http://home.mira.net/~gnb/caving/papers/jj-cakt.html>>.
- RADOVIĆ, D. & DUMBOVIĆ, V. (1995): The Corncrake (*Crex crex*) in Croatia. Proceedings of the Workshops in Hilpoltstein, <http://www.corncrake.net/proceedings_e.htm>, page 49–53.
- REISER, O. (1939): Materialien zu einer Ornithologie der Balkanhalbinsel. Band I, Bosnien und Herzegowina. – Annalen des naturhistorischen Museums, Wien.
- RITTER-STUDNIČKA, H. & GRGIĆ, P. (1971): Die Reste der Stieleichenwälder in Livanjsko Polje (Bosnien). – Bot. Jb. 91(2/3): 330–347.
- RITTER-STUDNIČKA, H. (1972): Neue Pflanzengesellschaften aus den Karstfeldern Bosniens und der Herzegowina. – Bot. Jahrb. Syst. 92(1): 108–154.
- RITTER-STUDNIČKA, H. (1974): Die Karstpolje Bosniens und der Hercegovina als Reliktstandorte und die Eigentümlichkeiten ihrer Vegetation. – Bot. Jahrb. Syst. 94(2): 139–189.
- RUBINIĆ, B. (2002A): Common Crane *Grus grus*. *Acrocephalus* 23(112): 106–107.
- RUBINIĆ, B. (2002B): Northern Wheatear *Oenanthe oenanthe* & Black-eared Wheatear *O. hispanica*. *Acrocephalus* 23(112): 108.

- SCHNEIDER-JACOBY, M. (1991): [Distribution and size of the Corncrake population in Yugoslavia]. – Vogelwelt 112: 48–57. (in German)
- ŠTUMBERGER, B. (2002): Corn Bunting *Miliaria calandra*. Acrocephalus 23(112): 109.
- UNEP/MAP/PAP (2000): River Cetina Watershed and the Adjacent Coastal Area – Environmental and Socio-economic Profile. Mediterranean Action Plan PAP/RAC, Split, Priority Action Programme (ISBN 953-6429-34-9).
- VERMEULEN, J. & WHITTEN, T. (1999): Biodiversity and cultural property in the management of limestone resources. III. Series: Direction in Development. – IBRD/ The World Bank, Washington, D.C.
- VILUŠIĆ, G.J. (2000): Bosnia and Herzegovina. – IUCN Newsletter Central and Eastern Europe, December 2000/24(37): 13–15.

Arrived / Prispelo: 30.6.2005

Accepted / Sprejeto: 5.10.2006

APPENDIX / DODATEK

Table 5: Spring observations (number of birds) on 8 May 2005 at selected points, not covering the whole Livanjsko Polje.

Tabela 5: Spomladanska opazovanja (število ptic) 8.5. 2005 v izbranih točkah (ne na celi površini polja)

Point in map/ Točka na zemljevidu	1	2	3	4	5	6	7	8	9	12	14	15	16	17	18	20	23	24	25	26	27	33	34	35	36	Total	
Water/ Voda (%)	20	70	80	5	0	5	10	20	5	10	20	10	15	90	80	0	0	0	0	0	0	0	0	0	0	50	
<i>Tachybaptus ruficollis</i>																								I		I	
<i>Podiceps cristatus</i>															4	4											8
<i>Ardea cinerea</i>	I									2			2	I													6
<i>Ardeola ralloides</i>												4															4
<i>Botaurus stellaris</i>														I	I												2
<i>Anas platyrhynchos</i>	18									3						I								3			25
<i>Anas querquedula</i>	2								2	3						2	3										12
<i>Anas acuta</i>																									2	2	
<i>Falco subbuteo</i>													I	I											I	3	6
<i>Falco tinnuculus</i>					I	I			I																		3
<i>Buteo buteo</i>											I													I	I	I	4
<i>Circus aeruginosus</i>	I	I	I						3	4		3								I							14
<i>Circus pygargus</i>	I					I						4	7	I		I					4			I		4	24
<i>Vanellus vanellus</i>							I	I				4					2	I							II	20	
<i>Fulica atra</i>												2			3	4											9
<i>Coturnix coturnix</i>														I													I
<i>Upupa epops</i>	I																										I
<i>Lanius minor</i>	I				I																						2
Total	25	I	I	0	2	2	I	0	7	12	I	18	II	3	II	12	2	I	0	I	4	I	6	2	20	144	

APPENDIX / DODATEK

Table 6: Observations (number of birds) of characteristic bird species from points 1 – 32 (see Figure 1) along roads in Livanjsko Polje on 9 Jun and 5 and 9 Jul 2002. For each point the largest of three counts was taken. Observations of Bitterns *Botaurus stellaris*, Corncrakes *Crex crex* and Snipes *Gallinago gallinago* include mainly calling males. The visible water surface and flooded areas in July were estimated at each point to document the wet character of the northwestern part of the area (dark grey) and the transition zone (grey).

Tabela 6: Opazovanja (število ptic) značilnih vrst ptic s točk 1 – 32 (glej sliko 1) vzdolž cest na Livanjskem polju, dne 9.6., 5.7. in 9.7.2002. Upoštevan je maksimum treh štetij v vsaki točki. Opazovanja bobnaric *Botaurus stellaris*, koscev *Crex crex* in kozic *Gallinago gallinago* vključuje pretežno kličeče samce. Vidna vodna površina in poplavljeni površine v juliju smo ocenili v vsaki točki zaradi ocene vlažnosti sevrozahodnega dela polja. Vodna površina je označena s temno sivo barvo, prehodno podrčje pa s svetlo sivo.

Point in map / Točka na zemljevidu	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	Total															
Water / Voda (ha)	1	1	1	10	20	30	20	1	1	1				10	10	10	1				116															
<i>Tachybaptus ruficollis</i>					4																4															
<i>Podiceps cristatus</i>					8	1															9															
<i>Ardea cinerea</i>			14		1	2	1	5													25															
<i>Ardea purpurea</i>					1			1													1															
<i>Botaurus stellaris</i>					1	1	3	1													6															
<i>Anas platyrhynchos</i>				4	1	2															7															
<i>Anas querquedula</i>				1	9			1													11															
<i>Anas crecca</i>				1																	1															
<i>Falco subbuteo</i>								1				2			1	1					6															
<i>Falco tinnunculus</i>											1				1	1					4															
<i>Buteo buteo</i>								1	3	3					2						9															
<i>Circus aeruginosus</i>	1			3	3	4	5	2	2					14	4	5					43															
<i>Circus pygargus</i>	5	1	1	3	5	2	2	2	7	2		1		6	4	4		2	2		43															
<i>Gallinago gallinago</i>					1	1	4										1	1			8															
<i>Numenius arquata</i>																					1															
<i>Vanellus vanellus</i>	20	2		4	1	12		3							8	1					55															
<i>Tringa totanus</i>	2			4	1	6									1						14															
<i>Fulica atra</i>				4	1	1	1	1													8															
<i>Crex crex</i>			1	1	2	1	1	1	3	1	2	1						1	1		45															
<i>Coturnix coturnix</i>	1	1	2	1	1	1					17	1			1						27															
<i>Perdix perdix</i>																					1															
<i>Merops apiaster</i>										1							10				11															
<i>Upupa epops</i>	1	1	1	1	3	1	1	2	1	1	1	3						2			28															
<i>Lanius minor</i>				2	1	1	1	1					5	2	1	2					16															
Total	1	8	10	3	3	0	3	2	2	16	2	2	1	4	2	32	8	18	33	16	65	8	7	14	11	22	6	6	25	12	22	11	4	1	1	383

BIRDS IN THE DIET OF BARN OWL *Tyto alba* IN SE BULGARIA

Ptice v prehrani pegaste sove *Tyto alba* v JV Bolgariji

BOYAN MILCHEV¹, ZLATOZAR BOEV² & VALERI GEORGIEV³

¹ University of Forestry, Wildlife Management Department, 10 Kl. Ochridski Blvd., BG-1756 Sofia, Bulgaria, e-mail: boyan.m@ltu.bg

² National Museum of Natural History, Tzar Osvoboditel 1, BG-1000 Sofia, Bulgaria, e-mail: boev@nmnh.bas.bg

³ Ministry of Environment and Water, Maria Luisa 22, BG-1000 Sofia, Bulgaria, e-mail: nnpsf@moew.government.bg

Forty avian species of 4 orders have been detected in the diet of Barn Owl *Tyto alba* at 28 breeding localities in SE Bulgaria, with 24 species recorded as prey for the first time in the country. Passeriformes represent 99% by number and 96% by biomass of birds. House Sparrow *Passer domesticus* is the dominant species, representing 34% of prey individuals and 30% of the prey biomass from birds. The mean body weight of the individual avian prey is 31.5 g. The presence of birds in the diet of Barn Owl has decreased five- to tenfold during the last three to four decades. The number of the synanthropic bird species has significantly declined, while the share of the openland, scrubland and woodland species has significantly increased.

Key words: birds, Barn Owl, *Tyto alba*, diet

Ključne besede: ptice, pegasta sova, *Tyto alba*, prehrana

1. Introduction

Barn Owl *Tyto alba* preys mainly on small mammals, which constitute up to 90% of its diet. Birds comprise a much smaller share (MIKKOLA 1983, CRAMP 1985, GLUTZ VON BLOTZHEIM & BAUER 1991, TAYLOR 1994, ROULIN 2004). Specialized predation on birds is an exception for this species (GÖRNER 1978, GLUTZ VON BLOTZHEIM & BAUER 1991). Usually, House Sparrow *Passer domesticus* is the most common avian prey species. Research in Bulgaria in the 1960s and 1970s showed that birds represented between 7.5 and 18.2% by number of prey individuals, where House Sparrow accounted for 72.8 to 82.3% of the avian prey individuals (SIMEONOV 1978, SIMEONOV *et al.* 1981). Pellets from 32 Barn Owl breeding sites in SE Bulgaria showed that birds are only 1.5% of the number of prey individuals, and that the House Sparrow represents up to 33.5% of the avian prey (MILTSHEV *et al.* 2004).

This paper examines bird species composition and distribution in the diet of Barn Owl in SE Bulgaria.

2. Material and methods

The characteristics of the study area and the methods for collecting and identifying material have been described by MILTSHEV *et al.* (2002) and MILTSHEV *et al.* (2004). The avian component in the diet of Barn Owl were examined at 28 breeding sites (UTM coordinates of a 10-km grid: MG05, MG37, MG39, MG45, MG47, MG48, MG59, MG64, MG66, MG68, MG76, MG89, MG99, MH10, MH20, MH60, MH80, MH90, NG09, NG18, NG24, NG38, NG39, NG49, NG67, NH00, NH01, NH30). Sites without avian prey species are not part of the study. The birds have been identified by their bone remains, using the comparative osteological collection of "Fossil and Recent Birds Department" of the National Museum of Natural History, BAS. The feathers have been determined by J. Menzel. The body mass of the prey species is given according to GLUTZ VON BLOTZHEIM & BAUER (1991). Incompletely identified passerines (Oscines) and specimens identified

to a genus that includes species with different habitat preferences were excluded in the distribution of prey according to their main habitats. Statistical differences in frequencies of the ecological groups were calculated by a chi-square test, with $p < 0.05$ for significance.

3. Results

Table 1 gives the composition of birds in the diet of Barn Owl. The prey species come from four orders of

birds, where the passerines (Passeriformes) were present at all sites and represent 98.65% by number and 95.63% by biomass of all birds. Sparrows (Passeridae) and Swallows (Hirundinidae) as the commonest prey – 36% and 10% by number (Figure 1). Both families are mainly synanthropic. The House Sparrow is the dominant species and only two other species, Barn Swallow *Hirundo rustica* and Starling *Sturnus vulgaris*, have over 5% by number. They comprise 47% by number of all birds as prey. Three species surpass 5% by

Table 1: Birds in the diet of the Barn Owl *Tyto alba* in SE Bulgaria

Tabela 1: Ptice v prehrani pegaste sove *Tyto alba* v JV Bolgariji

Bird taxa / Takson ptic	N	Frequency on locations/ Frekvenca po lokacijah (%)	Proportion by number/ Delež po številu (%)	Proportion by biomass/ Delež po biomasi (%)
<i>Coturnix coturnix</i>	1	3.57	0.27	0.86
<i>Porzana parva</i>	1	3.57	0.27	0.47
<i>Porzana pusilla</i>	1	3.57	0.27	0.38
<i>Athene noctua</i> (juv.)	2	7.14	0.54	2.66
<i>Dendrocopos minor</i>	1	3.57	0.27	0.21
<i>Calandrella</i> sp.	2	7.14	0.54	0.51
<i>Alauda arvensis</i>	18	39.29	4.86	5.56
<i>Galerida / Melanocorypha</i>	4	10.71	1.08	1.37
<i>Hirundo rustica</i>	23	25.00	6.22	4.15
<i>Delichon urbica</i>	13	3.57	3.51	2.12
<i>Motacilla alba</i>	2	3.57	0.54	0.36
<i>Motacilla flava</i>	8	17.86	2.16	1.24
<i>Anthus</i> sp.	2	7.14	0.54	0.34
<i>Troglodytes troglodytes</i>	2	7.14	0.54	0.15
<i>Prunella modularis</i>	1	3.57	0.27	0.15
Turdinae	1	3.57	0.27	0.56
<i>Phoenicurus phoenicurus</i>	1	3.57	0.27	0.12
<i>Phoenicurus</i> sp.	1	3.57	0.27	0.13
<i>Saxicola torquata</i>	2	3.57	0.54	0.21
<i>Turdus philomelos</i>	1	3.57	0.27	0.57
<i>Turdus merula</i>	2	7.14	0.54	1.49
Sylviidae	2	7.14	0.54	0.21
<i>Sylvia</i> sp.	2	7.14	0.54	0.25
<i>Acrocephalus scirpaceus</i>	1	3.57	0.27	0.09
<i>Acrocephalus</i> sp.	2	3.57	0.54	0.19
<i>Locustella luscinioides</i>	3	10.71	0.81	0.37
<i>Hippolais pallida</i>	1	3.57	0.27	0.08
<i>Phylloscopus collybita</i>	1	3.57	0.27	0.06

continuation of Table 1 / nadaljevanje tabele 1

Bird taxa / Takson ptic	N	Frequency on locations (%) / Frekvenca po lokacijah (%)	Proportion by number	Proportion by biomass
			(%) / Delež po številu (%)	(%) / Delež po biomasi (%)
<i>Phylloscopus trochilus</i>	1	3.57	0.27	0.07
<i>Phylloscopus</i> sp.	2	7.14	0.54	0.14
<i>Parus lugubris</i>	2	7.14	0.54	0.33
<i>Parus major</i>	2	7.14	0.54	0.33
<i>Aegithalos caudatus</i>	1	3.57	0.27	0.07
<i>Remiz pendulinus</i>	1	3.57	0.27	0.08
<i>Lanius collurio</i>	1	3.57	0.27	0.25
<i>Lanius senator</i>	1	3.57	0.27	0.26
<i>Sturnus vulgaris</i>	25	25.00	6.76	16.09
<i>Passer domesticus</i>	124	67.86	33.51	30.33
<i>Passer montanus</i>	10	21.43	2.7	1.97
<i>Fringilla coelebs</i>	3	10.71	0.81	0.57
<i>Carduelis carduelis</i>	4	10.71	1.08	0.55
<i>Carduelis chloris</i>	4	14.29	1.08	0.96
<i>Carduelis cannabina</i>	6	14.29	1.62	0.93
<i>Carduelis</i> sp.	1	3.57	0.27	0.15
<i>Coccothraustes coccothraustes</i>	7	21.43	1.89	3.30
<i>Emberiza cia</i>	1	3.57	0.27	0.21
<i>Emberiza cirrus</i>	1	3.57	0.27	0.21
<i>Emberiza citrinella</i>	4	10.71	1.08	1.00
<i>Emberiza schoeniclus</i>	1	3.57	0.27	0.15
<i>Miliaria calandra</i>	9	28.57	2.43	3.75
<i>Emberiza</i> sp.	5	14.29	1.35	1.12
Oscines	53	42.86	14.32	12.31
Total	370	28 locations	100	100 11.651 g

biomass: House Sparrow, Starling, and Skylark *Alauda arvensis*. They total 52% by biomass. Only these four species and the Corn Bunting *Miliaria calandra* were captured in more than 25% of the study sites.

The average body weight of the captured birds is 31.5 g. Young Little Owl (*Athene noctua* – 155 g) and Quail (*Coturnix coturnix* – 100 g) are the heaviest prey, while Chiffchaff *Phylloscopus collybita* – 7.5 g) is the lightest prey of Barn Owls.

Synanthropic birds (65% by number) (Table 2), followed by the open-area birds (16%) and the woodland and shrubland birds (16%), are the most common prey. Thus, settled areas, open areas, wood and shrub habitats comprise the main hunting grounds for birds by Barn Owls in SE Bulgaria.

4. Discussion

The Barn Owl hunts mostly small, communally roosting birds as sparrows, swallows, starlings, finches (Fringillidae) and thrushes *Turdus* spp. (CRAMP 1985, GLUTZ VON BLOTZHEIM & BAUER 1991, MEBS & SCHERZINGER 2000). The first four groups are the most common prey species in SE Bulgaria. Turdids are an exception, representing barely 2% by number, in view of the wide distribution of *Turdus* species in the hunting territories of the Barn Owl. Species of two other families, Alaudidae and Emberizidae, occur more often in the diet: Skylark and Corn Bunting were the most frequent prey. They are common breeding birds in the region and also occur in flocks during the non-breeding period, therefore fitting the description of the commonest bird prey species.

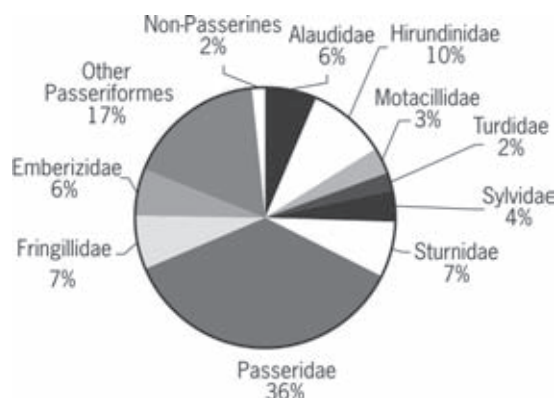


Figure 1: Bird families representation in the diet of the Barn Owl *Tyto alba* in SE Bulgaria by percent of number of species

Slika 1: Ptičje družine v prehrani pegaste sove *Tyto alba* v JV Bolgariji po procentu števila vrst

The variety of bird species preyed upon is much wider than previously known for Bulgaria (SIMEONOV 1978, SIMEONOV *et al.* 1981). This study establishes 24 avian species for the first time in Bulgaria as Barn Owl prey. These results likely stem from the much larger sample, as analyzed by MILTSHEV *et al.* (2004). The Barn Owl is not a strictly specialized predator on a small number of bird species. The number of the bird species recorded increases with the increasing number of the sites examined and the variety of habitats of the hunting grounds.

In contrast to the previous research in Bulgaria (SIMEONOV 1978, SIMEONOV *et al.* 1981), the Barn Owl has a reduced relative share of birds in its diet by five- to ten-fold. Now they represent 1.5% by number of prey in SE Bulgaria (MILTSHEV *et al.* 2004), and 2.3% in the NW part of Upper Thracian Plane (MILTSHEV *et al.* 2006). Statistically very significant differences exist

in the distribution of birds by habitats ($\chi^2 = 53.63$, $p < 0.001$) (Table 2). The synanthropic birds constitute over 90% by number in the previous studies, where the House Sparrow exceeded 70% of all bird prey species (SIMEONOV 1978, SIMEONOV *et al.* 1981). Data for the last five years show a significant decrease in the share of synanthropic birds and significant increase in birds of non-settled areas, fallow land, woodland and shrubland habitats. The decrease in synanthropic birds is due to the 50% decline of House Sparrow in the Barn Owl diet. Until now, the larger share of the House Sparrow and some other commensal species in the Barn Owl diet in Eastern Europe has been explained by intact traditional methods of agriculture and the traditionally developed practices of harvesting and food storage (TAYLOR 1994, SCHMIDT 1973).

We could only speculate that the House Sparrow has become less profitable prey for Barn Owl after 1991, when private land-ownership and farms, more careful harvesting and storage of harvests, replaced the former mode of agriculture and stock-breeding typical of the socialist cooperative farms (*own data*). That transformation could explain why the House Sparrow population decreased and the species became more difficult prey. Nevertheless, the increased share of the openland, woodland and shrubland species, chiefly of larks, finches and buntings taken together, do not compensate for the drastic decline of House Sparrows. More likely, in the absence of another small common bird species as alternative prey to replace the House Sparrow, Barn Owl hunting of birds has decreased.

Acknowledgments: We thank Mr J. Menzel for the identification of the feathers. We express our deep gratitude to Dr J. Weigand for improving the English.

Table 2: Distribution of birds in the diet of the Barn Owl *Tyto alba* in Bulgaria according to preferred nesting habitats (% by number).

Tabela 2: Razporeditev ptic v prehrani pegaste sove *Tyto alba* v Bolgariji glede na izbrani gnezditveni habitat (% po številu).

Habitats / Habitati	SIMEONOV (1978)	SIMEONOV <i>et al.</i> (1981)	MILTSHEV <i>et al.</i> (2006)	Present study/ ta študija
open areas / odprte površine	0.5	3.1	10.1	15.7
wetlands / močvirja	0	3.4	3.0	3.3
urban areas / urbana območja	99.4	90.1	72.7	65.0
woodland and shrubland / gozdovi in grmišča	0.1	3.4	14.1	16.0

5. Povzetek

V prehrani pegaste sove *Tyto alba* na 28 gnezdiščih v jugovzhodni Bolgariji so bili odkriti 4 redovi ptic, med katerimi je bilo 24 vrst ptic, kot sovji plen zabeleženih prvič v tej državi. Pevke so bile zastopane z 99% po številu in 96% po biomasi ptic. Prevladujoči plen je bil domači vrabec *Passer domesticus*, in sicer s 34% uplenjenih osebkov in 30% biomase ptičjega plena. Povprečna telesna teža plena je znašala 31,5 g. Delež ptic v prehrani pegaste sove se je v zadnjih treh do štirih desetletjih zmanjšal za pet- do desetkrat. Število sinantropnih vrst se je občutno zmanjšalo, medtem ko se je delež ptic odprte pokrajine, grmišč in gozdov v precejšnji meri povečal.

6. References

- CRAMP, S. (ed.) (1985): The birds of the western Palearctic, Vol. 4. – Oxford Univ. Press, Oxford.
- GLUTZ VON BLOTZHEIM, U. & BAUER, K. (1991): Handbuch der Vögel Mitteleuropas, Bd. 9. – Aula, Wiesbaden.
- GÖRNER, M. (1978): Schleiereule, *Tyto alba*, als Vogeljäger. – Beitr. Vogelkd. 24 (5): 273–275.
- MEBS, T. & SCHERZINGER, W. (2000): Die Eulen Europas. Biologie, Kennzeichen, Bestand. – Franckh-Kosmos Verl.-GmbH & Co., Stuttgart.
- MIKKOLA, R. 1983: Owls of Europe. – T. & A.D.Poyser. Calton.
- MILTSHEV, B., GEORGIEV, V. & KOVATSCHEV, A. (2002): Brutbestand und Brutplatzwahl der Schleiereule (*Tyto alba*) in Südost-Bulgarien. – Egretta 45: 114–120.
- MILTSHEV, B., BOEV, Z. & GEORGIEV, V. (2004): Die Nahrung der Schleiereule (*Tyto alba*) in Südost-Bulgarien. – Egretta 47: 66–77.
- MILCHEV, B., BOEV, Z. & KODJABASHEV, N. (2006): Breeding distribution and diet composition of the Barn Owl (*Tyto alba* (SCOPOLI, 1769)) (Aves: Strigiformes) in the North-Western Upper Thracian Plane (Bulgaria). – Acta zool. bulg. 58 (1): 83–92.
- ROULIN, A. (2004): Covariation between plumage colour polymorphism and diet in the Barn Owl *Tyto alba*. – Ibis 146: 509–517.
- SCHMIDT, E. (1973): Über die Vogelnahrung der Schleiereule *Tyto alba* und der Waldohreule *Asio otus* in Ungarn. – Ornithologica 49 (3–4): 98–102.
- SIMEONOV, S. (1978): Über die Nahrung der Schleiereule (*Tyto alba* Scopoli) in einigen Gegenden Bulgariens. – Ecology, Sofia 4: 65–71. (In Bulgarian with English summary).
- SIMEONOV, S., MICHEV, T. & SIMEONOV, P. (1981): Materialien zur Brutverbreitung und zum Nahrungsspektrum der Schleiereule (*Tyto alba* (Scopoli)) in Bulgarien. – Ecology, Sofia 8: 49–54. (In Bulgarian with English summary).
- TAYLOR, I. (1994): Barn Owls: predator-prey relationships and conservation. – Cambridge Univ. Press., Cambridge.

Arrived / Prispelo: 29.11.2005

Accepted / Sprejeto: 5.10.2006

SOME NEW FINDINGS OF PIGMY OWL *Glaucidium passerinum* AND TENGMALM'S OWL *Aegolius funereus* IN WESTERN AND SOUTHERN BULGARIA

Nekaj novih odkritij malega skovika *Glaucidium passerinum* in koconogega čuka *Aegolius funereus* v zahodni in južni Bolgariji

PETER S. SHURULINKOV¹, GEORGI P. STOYANOV²

¹ Institute of Zoology, Bulgarian Academy of Science, Tsar Osvoboditel, 1, BG-1000 Sofia, Bulgaria, e-mail: shurulinkov@mail.bg

² Centre for conservation and support of the wild fauna Durrell, Golyam Bratan, 23, fl.2, ap.2, BG-1618 Sofia, Bulgaria, e-mail: georgips@abv.bg

Distribution and numbers of the Pigmy Owl *Glaucidium passerinum* and Tengmalm's Owl *Aegolius funereus* were studied in some Bulgarian mountains. A total of four new localities of Pigmy Owl and eight new localities of Tengmalm's Owl were found. The Pigmy Owl was found for the first time on Mt Pirin, in the Bulgarian part of Mt Rhodopes, and in Northeastern Rila. The Tengmalm's Owl was found in southern parts of Pirin and Rila, in Western Stara planina and western Rhodopes. Both species were confirmed for the second time in Mt Slavyanka. The two species inhabited old prime coniferous forests in the mountains at fairly high altitudes.

Key words: Pigmy Owl, *Glaucidium passerinum*, Tengmalm's Owl, *Aegolius funereus*, Bulgaria

Ključne besede: mali skovik, *Glaucidium passerinum*, koconogi čuk, *Aegolius funereus*, Bolgarija

1. Introduction

Pigmy Owl *Glaucidium passerinum* and Tengmalm's Owl *Aegolius funereus* occur as rare glacial relicts in the mountains of southern Europe (MIKKOLA 1983, SIMEONOV *et al.* 1990). In Bulgaria, their distribution and numbers are unclear to a great extent, especially as regards the Pigmy Owl (SIMEONOV *et al.* 1990). Until recently, both species were considered as very rare breeders, whereas the Pigmy Owl was even supposed to be an extinct species in Bulgaria (SIMEONOV 1985). During the last ten years, much new valuable data on the distribution of these species has been gathered in Bulgaria.

2. Material and methods

A total of nine expeditions were held in the mountains of western and southern Bulgaria in 2005, with the aim to obtain new data on the current range and numbers of the studied owl species. The studied mountains were Pirin, Rila, Rhodopes, Maleshevska,

Vlahina, Slavyanka and western Stara planina. The investigations were made during the spring period (April – May) and in the autumn (September – October) during the period of abortive autumn vocal activity by the owls. The birds were provoked to call by the imitation of their mating calls during the evening and early morning hours.

3. Results and discussion

3.1. Pigmy Owl

Until now, this species has been confirmed to live in Bulgaria only on Mt Rila, Mt central Stara planina ("Central Balkan" National Park) and Mt Slavyanka (SIMEONOV 1985, SPIRIDONOV & MILEVA 1988, KOUZMANOV *et al.* 1995, SPIRIDONOV 1999, NIKOLOV *et al.* 2001, NANKINOV 2002, SHURULINKOV & STOYANOV 2005B). According to the latest data, its breeding population in Bulgaria has been estimated at between 80 and 120 pairs (NANKINOV *et al.* 2004). During the present study, the Pigmy Owl was registered for the

first time on Mt Pirin, in the Bulgarian part of Mt Rhodopes and in the northeastern part (Ibar) of Mt Rila. The exact localities were as follows:

- “Mlakite” area below the peak of Mutorok (1970 m a.s.l.), Southern Pirin (UTM GL19): a male was heard singing its typical mating song and then observed in the evening of 2 Apr 2005. The bird began to sing almost immediately after the beginning of our imitation and it sang between 19.32 and 19.58 h, making some short pauses. The Pigmy Owl sang from lateral branches of an old Spruce *Picea abies* tree and often changed its position. When excited during its singing, it wagged its tail. The habitat included a very old Spruce forest growing in a flat area with glades, at 1670 m a.s.l. The weather was clear and calm, -4°C , with thick snow cover.
- “Dulgiyat chuchur” area, to the south of Popovi Livadi pass, Southern Pirin (UTM GL29): a male Pigmy Owl was heard in the evening of 26 Apr 2005 (21.33 h). The bird produced only 7 – 8 calls. The habitat was an old Spruce forest with some Scots Pine *Pinus silvestris* trees, at 1550 m a.s.l. The weather was clear and almost calm, about $+10^{\circ}\text{C}$.
- “Gazinchevtsi” area, close to the northeastern border of the “Beglika” Nature Reserve, Western Rhodopes (UTM KG64): a single male was heard singing in the evening of 11 Oct 2005 (between 19.05 and 19.13 h). The bird started singing almost immediately after the beginning of our imitation. The habitat was an old Spruce forest with glades, at 1650 m a.s.l. The weather was cloudy and calm, about $+8$ to $+9^{\circ}\text{C}$. The species was found in the 1980s in the Greek part of Rhodopes (BAUER & BOHR 1987).
- Upper course of the Kriva river, some 2.5 – 3 km below Belmeken Dam Lake, Northeastern Rila (Ibar part) (UTM GM37): a male was singing in the morning of 13 Oct 2005 between 7.07 and 7.10 h. The habitat was Spruce forest with some Macedonian Pine *Pinus peuce* trees in the upper part of the mountain valley with steep slopes of mostly northern exposition. The altitude was 1860 m a.s.l. The weather was clear, calm, about -2°C .
- “Livade” area, Mt Slavyanka (UTM GL18): one singing male was heard and seen in the evening of 27 Apr 2005 between 20.13 and 20.45 h and

again between 21.30 and 22.15 h. The habitat included old Bosnian Pine *Pinus heldreichii* forest around wide meadow at 1750 m a.s.l. with northern exposition of the slope. The weather was clear with mild western wind. In the same place and exactly in the same territory, a male Pigmy Owl was heard singing for the first time on 26 Apr 2003 (SHURULINKOV & STOYANOV 2005B).

3.2. Tengmalm's Owl

The species is rare in the forest zone of some high Bulgarian mountains. Most of the records were from Mt Rila, Central Stara planina, Mt Pirin and Mt Vitosha (SPIRIDONOV *et al.* 1982, SIMEONOV 1985, PAČENOVSKY 1996, NIKOLOV *et al.* 2001, SHURULINKOV *et al.* 2003). In the last years, it was found locally also in Western Stara planina, Mt Slavyanka, Mt Osogovo, Mt Plana and Western Rhodopes (KOUZMANOV *et al.* 1995, NIKOLOV *et al.* 2001, NANKINOV 2002; SHURULINKOV & STOYANOV 2005a). According to the latest estimates, the breeding population of the species in Bulgaria was supposed to be between 1,000 and 1,200 pairs (NANKINOV *et al.* 2004). Here we also report on the following new Tengmalm's Owl localities in Southern Pirin, Western Rhodopes, Western Stara planina and Southern Rila:

- “Mlakite” area below the peak of Mutorok (1970 m a.s.l.), Southern Pirin (UTM GL19): two males were heard singing their mating song about 500 m from each other on the evening of 26 Apr 2005 (A. DUTSOV, S. VELKOV *pers. comm.*). As for the habitat there – see Pigmy Owl localities. The weather was clear, windless, $+10^{\circ}\text{C}$.
- “Dulgiyat chuchur” area to the south of the Popovi Livadi pass, Southern Pirin (UTM GL29): a singing male was heard in the evening of 26 Apr 2005 (between 21.28 and 21.43 h). As for the habitat there – see Pigmy Owl localities. The weather was clear and almost calm, about $+10^{\circ}\text{C}$.
- “Pionerskiyat lager” area to the south of the Popovi livadi pass, Southern Pirin (UTM GL29): two singing males were registered in the evening of 23 Apr 2005 (R. STANCHEV *pers. comm.*). The habitat (at 1500 m a.s.l.) included an old Spruce forest with some Scots Pine trees.
- At the eastern border of “Beglika” Nature Reserve, Western Rhodopes (UTM KG64): two birds were heard producing “smacking call” 5 – 6 times in the

evening of 11 Oct 2005 (between 20.50 and 20.54 h). The area situated at 1600 m a.s.l. was covered by an old forest with sparse Spruce trees. The weather was cloudy, calm with light rain, about +7°C.

- Above the hut Treshtenik, Southern Rila (UTM GM16): one individual made its “smacking call” in the evening of 13 Oct 2005 (at 20.28 h). The forest was mixed Spruce – Scots Pine with many glades. The immediate vicinity of the forest is built up by many small buildings. The altitude of this locality was 1820 m a.s.l. The weather was clear with some clouds, almost calm, about +2°C.
- “Semkovo” area, Southern Rila (UTM GM05): a male was heard during April and May 2004 (R. KOLCHAGOV *pers. comm.*)
- “Shishkovitsa” area, Southern Rila (UTM GM16): one male was seen in active display during May 2004, at about 2000 m a.s.l. (R. KOLCHAGOV *pers. comm.*)
- “Bekinska shobarka” area in “Chuprene” Nature Reserve, Western Stara planina (UTM FP31): two birds were heard singing their mating song in the evening of 2 May 2005, the first between 21.31 and 22.00 h in a dense old Spruce forest at 1595 m a.s.l., the second between 21.58 and 22.30 in a Spruce forest close to a Beech *Fagus sylvatica* forest at 1340 m a.s.l.
- “Livade” area, Mt Slavyanka (UTM GL18): one singing male was heard on 27 Apr 2005 between 21.50 and 22.00 h. As for the habitat there – see Pigmy Owl localities. The weather was clear with mild western wind. At the same place, but from the other sides of the valley, two singing males were registered also on 26 Apr 2003 (SHURULINKOV & STOYANOV 2005b).

According to the obtained results, we can assume that the Pigmy Owl is widely distributed and much more numerous in Bulgaria compared with the estimates made so far. In the future, as a result of more precise and special investigations, the estimated number of the national population will possibly grow. It is of great importance to study the numbers and distribution of Pigmy Owl in the Rhodopes, where the largest areas of the species’ prime habitat exist – old Spruce forests at altitudes between 1400 and 1900 m a.s.l. The Tengmalm’s Owl was found in the

southern parts of Mt Pirin for the first time, and the previous single findings of the species in Western Stara planina and southern parts of Mt Rila (KOUZMANOV *et al.* 1995, NANKINOV 2002) were confirmed again. The species was found in its most favourable habitats in Bulgaria – old coniferous (mostly Spruce) forests between 1500 and 2000 m a.s.l.

Acknowledgements: This investigation was made thanks to the funding by PIN-Matra – Netherlands within the frame of the project of establishing a Natura 2000 network in Bulgaria, conducted by the Balkani Wildlife Society and Information and Education Centre of Ecology. We are grateful also to our colleagues and friends L. Spassov, R. Kolchagov, G. Daskalova, A. Dutsov, S. Velkov, R. Stanchev, K. Hristov and A. Ralev who helped us during the field work and gave us some useful advice.

4. Povzetek

Avtorja pričujočega prispevka sta preučevala razširjenost in številčnost malega skovika *Glaucidium passerinum* in koconogega čuka *Aegolius funereus* v nekaterih bolgarskih gorah. Malega skovika sta kot prva odkrila na gori Pirin, in sicer v bolgarskem delu Rodopov, in v severovzhodnem delu Rile, koconogega čuka pa v južnih delih Pirina in Rile, v zahodnem delu Stare planine in v zahodnih Rodopih. Tako mali skovik kot koconogi čuk sta bila že drugič najdena na gori Slavyanka. Oba sta naseljevala stare gorske iglaste gozdove na kar precejšnjih nadmorskih višinah.

5. References

- BAUER, W. & BOHR, H. (1987): Unser Kenntnis der südlichen Arealgrenzen einiger Vogelarten in den griechischen Rhodopen. – *Vogelwelt* 108: 1–13.
- KOUZMANOV, G., TODOROV, R. & STOYANOV, G. (1995): Information sur la repartition et la situation des rapaces nocturnes en Bulgarie. – *Newsletter of the WWGBP* 21/22: 14–17.
- MIKKOLA, H. (1983): Owls of Europe. – T&AD Poyser, Calton.
- NANKINOV, D. (2002): [Recent state of owls populations in Bulgaria]. – *Berkut* 11(1): 48–60. (in Russian)
- NANKINOV, D., DUTSOV, A., NIKOLOV, B., BORISSOV, B., STOYANOV, G., GRADEV, G., GEORGIEV, D., POPOV, D., DOMUSCHIEV, D., KIROV, D., TILOVA, E., NIKOLOV, I., IVANOV, I., DICHEV, K., POPOV, K., KARAIVANOV, N., TODOROV, N., SHURULINKOV, P., STANCHEV, R., ALEKSOV, R., TSONEV, R., DALAKTCHIEVA, S., IVANOV, S., MARIN, S., STAJKOV, S., NIKOLOV, S. & NIKOLOV, H. (2004): Breeding totals of the ornithofauna of Bulgaria. – Green Balkans, Plovdiv.

- NIKOLOV, B., HRISTOV, I., SHURULINKOV, P., NIKOLOV, I., ROGUEV, A., DUTSOV, A. & STANCHEV, R. (2001): [New data on some poorly-studied forest species of owls (*Strix uralensis*, *Glaucidium passerinum*, *Aegolius funereus*) in Bulgaria]. – Forest science 38(1/2): 75–86. (in Bulgarian)
- PAČENOVSKY, S. (1996): Owls of the Stara planina Mountains. – Buteo 8: 109–112.
- SIMEONOV, S. (1985): Pigmy Owl (*Glaucidium passerinum*). pp. 124 In: [Red Data Book of PR Bulgaria]. – BAS, Sofia. (in Bulgarian)
- SIMEONOV, S., MICHEV, T. & NANKINOV, D. (1990): [The Fauna of Bulgaria]. Vol. 20. Aves. Part I. – BAS, Sofia. (in Bulgarian)
- SPIRIDONOV, J. (1999): Breeding ornithofauna of NP "Rila" and its conservation importance. pp. 385–414 In: SAKALYAN M. (ed.): Biodiversity of NP "Rila". – USAID.
- SPIRIDONOV, J. & MILEVA, L. (1988): [Endangered and rare bird species in "Steneto" biosphere reserve]. – Orn. inf. bull. 23/24: 99–105. (in Bulgarian)
- SPIRIDONOV, J., SPASSOV, N. & MILEVA, L. (1982): New data on the distribution of the Ural Owl (*Strix uralensis*) and Tengmalm's Owl (*Aegolius funereus*) in Bulgaria. Nat. Conf. of Nature Protection, 1–5.09.1982, Sunny Beach 1: 341–343. (in Bulgarian)
- SHURULINKOV, P., STOYANOV, G., TZVETKOV, P., VULCHEV, K., KOLCHAGOV, R. & ILIEVA, M. (2003): Distribution and abundance of Tengmalm's Owl *Aegolius funereus* on Mount Pirin, south-west Bulgaria. – Sandgrouse 25: 103–109.
- SHURULINKOV, P. & STOYANOV, G. (2005A): New data on the distribution of Tengmalm's Owl (*Aegolius funereus*) in Western Bulgaria. – Buteo 14: 61–66.
- SHURULINKOV, P. & STOYANOV, G. (2005B): Über die südlichste Grenze des Sperlingskauz *Glaucidium passerinum* Vorkommens. – Orn. Mitt. 57(6): 198–200.

Arrived / Prispelo: 14.10.2005

Accepted / Sprejeto: 5.10.2006

FIRST DATA ON THE BREEDING OF FIELDFARE *Turdus pilaris* IN BOSNIA AND HERZEGOVINA

Prvi podatki o gnezdenju brinovke *Turdus pilaris* v Bosni in Hercegovini

DUBRAVKO DENDER¹ & DRAŽEN KOTROŠAN²

¹ Ornitološko društvo «Naše ptice», Semira Frašte 6, 71000 Sarajevo, Bosnia and Herzegovina, e-mail: dubravko_dender@yahoo.com

² Zemaljski muzej Bosne i Hercegovine, Zmaja od Bosne 3, 71000 Sarajevo, Bosnia and Herzegovina, e-mail: kotrosan@bih.net.ba

Till 2006, the Fieldfare *Turdus pilaris* had been recorded in Bosnia and Herzegovina mainly during the periods of autumn migration and wintering. In the area of Sarajevo, the earliest record of the species was made in August 2004. During the regular bird watching carried out in April and May 2006, nesting of Fieldfare was recorded in the area of Ilidža near Sarajevo (UTM BP85). On those occasions, four nests were found. One on of them was located in a hollow of a Small-leaf Lime *Tilia cordata*, the remaining three among the branches of maple *Acer* sp. and ash *Fraxinus* sp. trees. The presented data confirm the Fieldfare's first nesting in Bosnia and Herzegovina.

Key words: Fieldfare, *Turdus pilaris*, Bosnia and Herzegovina

Ključne besede: brinovka, *Turdus pilaris*, Bosna in Hercegovina

1. Introduction

In the course of the 20th century, Fieldfare *Turdus pilaris* spread its breeding range from the north of Europe towards central and southern Europe. Especially significant spreading of the species was recorded in the second half of the 20th century (TIAINEN *et al.* 2003).

According to MATVEJEV (1976), Fieldfare had not bred in the Balkans until mid 1970s. According to the "avifauna overview" (as there were no numeric parameters in Catalogus made in the former Yugoslavia), the species was registered in the area, although not as a breeder (MATVEJEV & VASIĆ 1973). The first actual nesting in the former Yugoslavia was recorded in 1975 at Podkoren, 3 km away from Kranjska Gora (Slovenia), when the species apparently spread its nesting range towards the south (GREGORI 1977). During the 1980s, its nesting was for the first time recorded in Macedonia (TIAINEN *et al.* 2003). At the turn of the century, the first nesting of Fieldfare in Croatia was registered in Gorski kotar (near Prezid, and in Singer near Mrkopalj) (RADOVIĆ *et al.* 2003).

In Bosnia and Herzegovina, Fieldfare has so far been registered mainly during the periods of autumn migration and wintering, while in the region of

Sarajevo the first record was made in August 2004 (KOTROŠAN 2005).

The aim of this article is to present the first data on the nesting of Fieldfare in Bosnia and Herzegovina.

2. Research area and methods

During the avifaunal research carried out in April and May 2006 in Sarajevo and its close surroundings, several field trips were made to the area of Ilidža. In its wider area, spreading at an altitude of about 550 m a.s.l., nesting of Fieldfare was being observed at Veliki Park, situated between the hotels Bosnia, Herzegovina and Serbia (UTM BP85).

Deciduous trees dominate in the park. The most numerous species of trees and shrubs in the park are of the Maple genus (Common Maple *Acer campestre*, Boxelder *A. negundo*, Norway Maple *A. platanoides* and Sycomore *A. pseudoplatanus*), Forsythia genus (European Forsythia *Forsythia europaea* and Border Forsythia *F. intermedia*), White Cedar *Thuja occidentalis*, European Larch *Larix decidua*, European Silver Fir *Abies alba*, Common Spruce *Picea abies*, Chinese Juniper *Juniperus chinensis*, Common Horse Chestnut *Aesculus hippocastaneum*, Silver Birch *Betula*



Figure 1: Position of the research area

Slika 1: Lega raziskovanega območja

pendula, European Ash *Fraxinus excelsior*, Small-leaf Lime *Tilia cordata*, Tatarian Honeysuckle *Lonicera tatarica*, Common Elder *Sambucus nigra*, Snowberry *Symphoricarpos albus*, Mock Orange *Philadelphus coronarius* etc. (ŠILIC & ABADŽIĆ 1981).

3. Results and discussion

During the visit to Iliđa on 6 Apr 2006, 6 – 7 Fieldfare specimens foraging around the park near Velika Aleja were noted. The same situation was recorded during the ensuing visits to the area on 2 and 3 May. On 3 May 2006, two individuals were noticed chasing each other in a tree. An individual carrying something in its beak was also noticed, indicating a possibility of nest building, but the nest was not found on that day.

Three days later, on 5 May 2006 in the afternoon (around 15.00 h), the first author of this article noticed, after a long watch, a Fieldfare carrying earthworm to the hollow in the Small-leaf Lime, and eventually tossing droppings out of it. Also, during the watch, a Fieldfare's fight with a Hooded Crow *Corvus corone cornix* and a Jackdaw *Corvus monedula* was also witnessed. Around 18.00 h, a pair was seen collecting caterpillars and carrying them to the nest. On 9 May 2006 (around 16.00 h), we visited the same area in order to confirm Fieldfare's nesting and make photo-documentation. On that occasion, we heard chicks calling from the nest. In the adjacent grass,

6 foraging Fieldfares were noticed. During our stay there, a Fieldfare was seen on several occasions chasing a Jackdaw and a Hooded Crow that clearly came too close to the nest. Three days later, the first author found two more Fieldfare's nests in the same area. The second nest was in a maple tree *Acer* sp., 20 m away from the nest seen previously. The nest was among branches, and there were also the chicks seen when the parents came close to it. The third nest, too, was in a maple tree, on forked branches at some 10 m above the ground. Chasing of crows and Jackdaws was seen here as well. The last nest was seen on 16 May 2006, near the second nest in an ash tree *Fraxinus* sp., some 12 m high. Chasing of crows was seen yet again. One of the Fieldfares hit a crow with droppings, and after



Figures 2: Hollow of a Small-leaf Lime *Tilia cordata* in the area of Iliđa near Sarajevo, where Fieldfare's *Turdus pilaris* nest was situated (April and May 2006)

Slika 2: Duplo v lipovcu *Tilia cordata* na sarajevski Iliđi, v katerem je bilo odkrito gnezdo brinovke *Turdus pilaris* (april in maj 2006)

the attack it sang in flight. The observed specimens were usually foraging together with Starlings *Sturnus vulgaris*, but fights between these species were not noticed. In the area between Velika Aleja and Stojčevac, no Fieldfares were observed.

A comparison of the Fieldfare's behaviour during its nesting at Iliđa with that in Stockholm and Uppsala, observed on 23 and 24 Apr 2006, has shown that the "Swedish" individuals were somewhat tamer during their encounters with humans than the "Bosnian" ones, but generally the species does not show great fear of human presence. Namely, if they are found on the ground they can be approached very closely, without them flying away. This confirms a high degree of the species' adaptation to humans.

It is generally known that this species nests

individually and in colonies (TIAINEN *et al.* 2003; HOGSTAD 2004). Data on the nesting of Fieldfare in Bosnia and Herzegovina coincide in many details (smaller colony, ways of building the nest etc.) with the first data obtained on its nesting in Slovenia (GREGORI 1977). The only special feature is its nesting in a tree hollow, a fact that was not found in the literature. Also, its behaviour towards other species found near the nests (e.g. Hooded Crow) is in accordance with descriptions given by HOGSTAD (2004).

Finally, it can be concluded that the data on the Fieldfare's occurrences in Bosnia and Herzegovina in the summer of 2004 (KOTROŠAN 2005) showed a possibility of the species' nesting in the area of Sarajevo and its close surroundings, which has actually been confirmed during the recent research. Data from Croatia (RADOVIĆ *et al.* 2003) and Europe generally (TIAINEN *et al.* 2003) confirm the observations made by GREGORI (1977) about the species spreading its nesting range, so the process is expected to continue.

4. Povzetek

V Bosni in Hercegovini je bila brinovka *Turdus pilaris* do leta 2006 opažena večinoma v času jesenske selitve in prezimovanja. Na območju Sarajeva so jo prvič zabeležili avgusta 2004. V obdobju rednega opazovanja ptic (april in maj leta 2006) je bilo gnezdenje brinovk zabeleženo na območju Ilidže in Sarajeva (UTM BP 85), ko so bila najdena štiri gnezda, eno v duplu lipovca *Tilia cordata*, preostala tri pa na vejah javorja *Acer* sp. in jesena *Fraxinus* sp. V članku predstavljeni podatki potrjujejo prvo gnezdenje brinovk v Bosni in Hercegovini.

5. References

- GREGORI, J. (1977): Vom Brüten der Wachholdredrossel, *Turdus pilaris* L., in Slowenien, Jugoslawien. – Larus, 29–30: 83–88.
- HOGSTAD, O. (2004): Nest defence strategies in the Fieldfare *Turdus pilaris*: responses on avian and mammalian predator. – Ardea 92 (1): 79–84.
- KOTROŠAN, D. (2005): Letnje zadržavanje drozda borovnjaka (*Turdus pilaris*) u Sarajevu (Bosna i Hercegovina). – Ciconia 14: 129–130.
- MATVEJEV, S.D. & VASIĆ, V.F. (1973): Catalogus faune Jugoslaviae IV/3, Aves. – Academia Scientiarum et Artium Slovenica, Ljubljana.
- MATVEJEV, S.D. (1976): Pregled faune ptica Balkanskog poluostrva (*Piciformes* et *Passeriformes*). – Posebna izdanja, Srpska Akademija nauka i umjetnosti, knjiga CDXCI, Odjeljenje Prirodno-matematičkih nauka knjiga 46, Beograd.

- RADOVIĆ, D., KRALJ, J., TUTIŠ, V. & ČIKOVIĆ, D. (2003): Crvena knjiga ugroženih ptica Hrvatske. – Ministarstvo zaštite okoliša i prostornog uređenja, Zagreb.
- ŠILIĆ, Č. & ABADŽIĆ, S. (1981): Stanje i upotrebnost vrijednost ekosistema sarajevskog područja. – Prvo savjetovanje o zelenilu urbanih područja, Sarajevo.
- TIAINEN, J., ŠTASTNY, K. & BEJCEK, V. (1997): Fieldfare *Turdus pilaris*, pp. 546–547 In: HAGEMAJER, W.J.M. & BLAIR, M.J. (eds): The EBCC Atlas of European Breeding Birds. – T & AD Poyser, London.

Arrived / Prispelo: 1.6.2006

Accepted / Sprejeto: 5.10.2006

ALI JE VZROK UPADA POPULACIJE JREBICE *Perdix perdix* V SLOVENIJI PRIKRITA KOMPETICIJA S FAZANOM *Phasianus colchicus*?

Is the Grey Partridge *Perdix perdix* population decline in Slovenia the result of apparent competition with the Pheasant *Phasianus colchicus*?

AL VREZEC

Nacionalni inštitut za biologijo, Večna pot 111, SI-1000 Ljubljana, Slovenija, e-mail: al.vrezec@nib.si

Changes in agriculture are believed to be the main reason for the drastic decline in the Grey Partridge *Perdix perdix* population in Europe since 1950. Tompkins *et al.* (1999) suggested that apparent competition with the Pheasant *Phasianus colchicus* could also be responsible. This is an indirect interaction mediated by parasitic nematode *Heterakis gallinarum*. The parasite is transmitted from Pheasant to Grey Partridge, seriously affecting the latter species and, to a lesser extent, the reservoir host species, the Pheasant. The final effect is therefore competitive exclusion of Grey Partridge from the system. In Slovenia, the population of Pheasant increased, according to hunters' data, 11.5-fold in the 1949 - 1972 period, as a consequence of intensive input of reared birds. The author of the present paper tried to evaluate the critical point / year when the effect of competitive exclusion began to be expressed. This was done, arbitrarily, in two ways: as a temporal unit of growth at half growth (t_{50}) in the logistic growth curve of the Pheasant population, and as the year of population maximum in Grey Partridge. The critical point appeared to be between the years 1958 and 1959. Both Pheasant and Grey Partridge populations showed a positive population trend before that period, but that of the latter then became negative, while the Pheasant trend remained significantly positive. Apparent competition is suggested as the main reason, although other reasons (eg. habitat changes) could not be eliminated, since the degree of influence of parasite infection on the Grey Partridge population is not clear. For effective Grey Partridge conservation and population increase, the author suggests a systematic study of habitat selection, ecological densities and population size of both species in Slovenia. After that, the effectiveness of Grey Partridge artificial repopulation in areas with low or zero Pheasant populations should be measured, taking into consideration the breeding success, mortality and ecological densities of Grey Partridges. The results of such a study would provide the basis for preparing a management plan for the Grey Partridge population in Slovenia.

Key words: Grey Partridge, *Perdix perdix*, Pheasant, *Phasianus colchicus*, apparent competition, population dynamics, Slovenia

Ključne besede: jrebica, *Perdix perdix*, fazan, *Phasianus colchicus*, paraziti, prikrita kompeticija, populacijska dinamika, Slovenija

1. Uvod

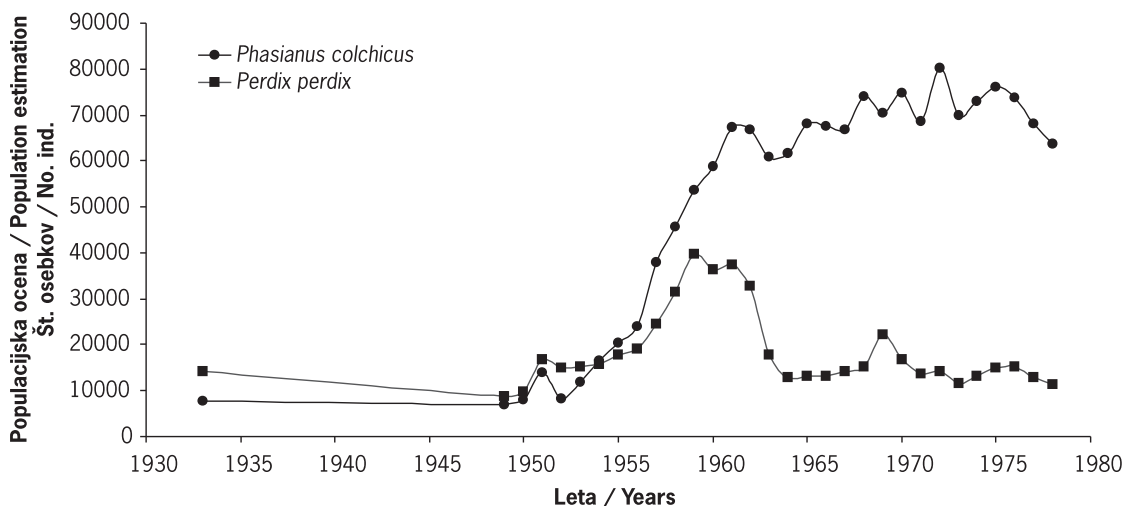
Medvrstni odnosi ali interakcije med vrstami so osnovno gibalno v oblikovanju združb, torej vrstne sestave in abundance posameznih vrst. Interakcije lahko potekajo med vrstami znotraj enega ali med vrstami različnih trofičnih nivojev, in sicer neposredno ali posredno. Čeprav se je večina ekoloških študij ukvarjala z neposrednimi interakcijami, vključno z eksploatacijsko ali izkoriščevalsko tekmovalnostjo (zbrano v ODUM 1971, PIANKA 1981, SCHOENER 1982, TARMAN 1992, NEWTON 1998), lahko z direktnimi razmerji le delno pojasnimo strukturo združb in ekosistemov. Nedavna spoznanja so namreč pokazala na velik pomen indirektnih oziroma posrednih razmerij za obstoj kompleksnih ekoloških sistemov (BEGON *et al.* 1996, WOOTTON 2002). Na obstoj vrst v naravnih združbah vpliva cela vrsta drugih vrst, ki delujejo nanje neposredno, tako pozitivno kot negativno (npr. MÜLLER & GODFRAY 1999), vendar je učinek posrednih interakcij lahko še veliko večji, posledica pa je v večini primerov celo popolna izključitev vrste iz sistema (npr. BONSALE & HASSELL 1997, HUDSON & GREENMAN 1998). S posrednimi interakcijami je bil pojasnjen tudi marsikateri naravovarstveni problem izumiranja vrst, še posebej na primerih uspešnih vnosov tujerodnih vrst ali eksotov v naravno okolje (KRYŠTUFEK 1999).

Če smo si neposredna razmerja pojasnjevali kot interakcije med dvema vrstama, kjer zaradi delovanja ene vrste številčnost druge upada ali raste, imamo pri posrednih razmerjih opraviti s sistemom treh ali več vrst. Pravzaprav gre za splet različnih direktnih interakcij, v katerih dve vrsti, ki nista v neposrednem stiku, prek tretje posredniške vrste ali mediatorja vplivata druga na drugo. Mediatorjev je lahko celo več in celoten sistem se lahko razteza čez več trofičnih nivojev (npr. HARMON *et al.* 2000). Nekateri avtorji so mnenja, da izkoriščevalske tekmovalnosti ne moremo uvrščati med posredne interakcije, saj gre pri tem za neposredno tekmovalnost za isti vir in ne za posredni učinek vira hrane na oba odjemalca, pri čemer je vir hrane neka tretja vrsta (HUDSON & GREENMAN 1998). Vrsti, ki sta v posrednem razmerju, namreč kažeta določeno soodvisnost v populacijski dinamiki, ki pa jo je v večvrstnih sistemih zelo težko odkriti in prepoznati (VEECH 2000, WOOTTON 2002). Negativne posredne interakcije so opisali kot prikrito tekmovalnost (apparent competition), kjer se zaradi pojavljanja druge vrste populacija preučevane vrste zmanjšuje (BONSALE & HASSELL 1999, VEECH 2000, WOOTTON 2002). Obstoj prikrute tekmovalnosti so tudi eksperimentalno dokazali (BONSALE & HASSELL 1997).

Ker je pojav prikrute tekmovalnosti v slovenski ekološki znanosti manj znan, naj si ga dovolim poimenovati z izrazom prikrita kompeticija. Če bi prevedli angleški izraz *apparent competition*, bi bila to pravzaprav *navidezna kompeticija*, kar pa ni povsem ustrezen izraz. Navidezna bi namreč pomenilo, da je opaziti neke učinke kompeticije, čeprav ta v resnici med vrstama ne obstaja, torej je le navidezna. V našem primeru pa ta kompeticija dejansko obstaja, le da je zaradi posrednih razmerij prek mediatorja nevidna oziroma vsaj težje zaznavna. Torej obstaja, a je ne opazimo, to pa je značilnost prikritih pojavov.

Naravovarstveno odmevnejši primer prikrute kompeticije je bil nedavno odkrit med jerebico *Perdix perdix* in fazanom *Phasianus colchicus*, kjer ima vlogo posrednika glista *Heterakis gallinarum* kot parazitski mediator (TOMPKINS *et al.* 1999). Vrstno nespecifičen parazit je močno kompetitivno orožje (HALDANE 1949). Prikrita kompeticija prek patogenov in parazitov lahko znatno vpliva na strukturo združb in na spremembe v populacijski dinamiki gostiteljev (HUDSON & GREENMAN 1998). Učinek vrstno nespecifičnega parazita je večji na občutljivejšo gostiteljsko vrsto (vulnerable host species), v našem primeru jerebico, kot pa na rezervoarno gostiteljsko vrsto (reservoir host species), v našem primeru fazana. Prek prikrute kompeticije je namreč skoraj vedno iz sistema izključena občutljiva gostiteljska vrsta, kljub temu da je reprodukcijska uspešnost in rast parazita večja v rezervoarni gostiteljski vrsti (TOMPKINS *et al.* 2001). Gre preprosto za to, da odpornejši gostitelj, ki predstavlja dominantnega prikritega kompetitorja, prenaša parazite na manj odpornega podrejenega prikritega kompetitorja (TOMPKINS *et al.* 1999). Prikrita kompeticija med jerebico in fazanom povzroči popolno izključitev jerebice iz sistema (TOMPKINS *et al.* 1999, 2000A, 2000B & 2001). Odkritje je zanimivo zlasti v luči izrazitega vseevropskega upada populacije jerebice po letu 1950 (TUCKER & HEATH 1994, AEBISCHER & KAVANAGH 1997), ki smo ga zaznali tudi v Sloveniji (ČERNE 1980, GEISTER 1995).

Namen pričujočega dela je z analizo populacijskih podatkov o fazanu in jerebici ugotoviti, ali je prek učinkov prikrute kompeticije med vrstama tudi v Sloveniji mogoče pojasniti upadanje jerebice. Več avtorjev je namreč drastičen upad jerebice v Sloveniji po drugi svetovni vojni povezovalo predvsem z intenzifikacijo kmetijstva in izginjanjem ustreznega habitata (npr. ČERNE 1980 & 2000, GEISTER 1995 & 1998, UMEK 2003). Poleg tega so bili v Sloveniji opravljeni poskusi ponovne vzpostavitve populacije jerebice z umetnimi vlaganji, a brez vidnejšega uspeha (ČERNE 2000).



Slika 1: Populacijska dinamika fazana *Phasianus colchicus* in jerebice *Perdix perdix* v Sloveniji glede na ocene staleža (statistika Lovske zveze Slovenije; ČERNE 1980)

Figure 1: Population dynamics of Pheasant *Phasianus colchicus* and Grey Partridge *Perdix perdix* in Slovenia according to the population estimates (data from hunters collected in ČERNE 1980)

2. Metode

2.1. Parazitološki in populacijski podatki iz Slovenije

Parazitološke podatke iz Slovenije sem povzel po pregledni študiji zajedavcev pri pticah v Sloveniji (BRGLEZ 1977 & 1981). Iz podatkov sem izbral tiste parazitske vrste sesačev (Trematoda), trakulj (Cestoda), glist (Nematoda) in ježerilcev (Acanthocephala), ki zajedajo v fazanu ali jerebici. Pojavljanje parazitskih vrst pri obeh kurah sem dopolnil s podatki iz NEIMANIS & LEIGHTON (2004) in MARTINEZ (1999). Paraziti, ki zajedajo tako fazana kot jerebico, so potencialni mediatorji v parazitsko uravnani prikriti kompeticiji med gostiteljema.

Populacijsko dinamiko jerebice in fazana sem povzel po lovski statistiki, in sicer glede na odstrel za obdobje od 1877 do 1997 in glede na oceno staleža za obdobje od 1933 do 1978 (ČERNE 1980 & 2000).

2.2. Statistična analiza

V statistični analizi sem obdelal podatke o oceni staleža, ki domnevno odsevajo dejansko število osebkov v okolju (ČERNE 1980). Za analizo sem uporabil zgolj obdobje med letoma 1949 in 1978, za

katero so na voljo zvezni podatki o populacijski oceni obeh vrst (ČERNE 1980). Ker sta jerebica in fazan vrsti z razmeroma podobnimi ekološkimi zahtevami (npr. SNOW & PERRINS 1998), domnevam, da razmere v okolju podobno vplivajo na rast populacij obeh vrst. Po drugi strani pa po hipotezi o prikriti kompeticiji med fazanom in jerebico prihaja do izključevanja jerebice šele ob določeni stopnji stika med vrstama (TOMPKINS *et al.* 2000B), kar je povezano z ekološko gostoto. Iz razpoložljivih lovskih podatkov ni mogoče oceniti natančne kritične meje fazanje populacije, pri kateri bi se začel izražati učinek prikrite kompeticije, zato sem kritično točko skušal arbitrarno oceniti na dva načina. Po prvem načinu sem kritično leto določil kot točko prevoja (t_{50}) v logističnem modelu rastne krivulje (RICKLEFS 1967) fazanje populacije. Z drugim načinom sem določil kritično mejo empirično z letom najvišjega populacijskega viška jerebice v Sloveniji. Pri obeh metodah sem se izognil vplivu dolžine časovne serije, ki je posledica obdobja, v katerem so bili zbrani podatki. Tako točka prevoja v rastni krivulji kot populacijski višek jerebice sta določena na podlagi dogajanja v populacijski dinamiki obeh obravnavanih vrst. S Spearmannovim korelacijskim koeficientom sem opisal populacijske trende rasti populacije jerebice in fazana ter njuno soodvisnost.

3. Rezultati in diskusija

3.1. Paraziti fazana in jerebice v Sloveniji

V Sloveniji je bilo ugotovljenih 20 vrst sesačev, trakulj in glist, ki parazitirajo na jerebici ali fazanu (tabela 1). Med temi je bilo devet parazitskih vrst potrjenih pri obeh pticah (ena vrsta sesača, ena vrsta trakulje in sedem vrst glist). Te vrste so potencialni mediatorji v prikriti kompeticiji med kurama. Med njimi je bila v

Sloveniji najdena tudi glista *Heterakis gallinarum*, ki je potrjen mediator v prikriti kompeticiji med fazanom in jerebico (TOMPKINS *et al.* 1999). Glista *H. gallinarum* je vrstno nespecifični parazit, ki parazitira pretežno kure (Galliformes), v manjši meri tudi plojkokljune (Anseriformes). V Sloveniji so jo našli pri domači kokoši *Gallus gallus* in puranu *Meleagris gallopavo*, med prostoživečimi vrstami pa pri divjem petelinu *Tetrao urogallus* in gozdnem jerebu *Bonasa bonasia* (BRGLEZ 1981). Sicer pa BRGLEZ (1981), TOMPKINS *et*

Tabela 1: Seznam v Sloveniji registriranih notranjih parazitov (Trematoda, Cestoda, Nematoda), ki parazitirajo v jerebici *Perdix perdix* ali fazanu *Phasianus colchicus*. Podatki za Slovenijo so povzeti po BRGLEZ (1977 & 1981), pojavljanje parazitskih vrst pri obeh gostiteljih pa je bilo dopolnjeno po MARTINEZ (1999) in NEIMANIS & LEIGHTON (2004). Vrste, ki parazitirajo oba gostitelja, so označene s krepkim tiskom, saj gre za potencialne ali dejanske mediatorje v prikriti kompeticiji med fazanom in jerebico. S + so označena tista pojavljanja, ki so bila potrjena v Sloveniji, s (+) pa preostale, ugotovljene zunaj Slovenije.

Table 1: List of endoparasites (Trematoda, Cestoda, Nematoda) found in birds from Slovenia, which infect Grey Partridge *Perdix perdix* or Pheasant *Phasianus colchicus*. Data for Slovenia are from BRGLEZ (1977 & 1981), and the occurrence of parasites in each host species was supplemented after MARTINEZ (1999) and NEIMANIS & LEIGHTON (2004). Parasite species found in both hosts are in bold as they constitute potential or actual mediators in apparent competition between Pheasant and Grey Partridge. Occurrence of the parasite confirmed in Slovenia is marked +, but if the occurrence was confirmed only in other regions it is marked (+).

Parazitska vrsta / Parasite species	Red / Ordo	Fazan / Pheasant <i>Phasianus colchicus</i>	Jerebica / Grey Partridge <i>Perdix perdix</i>
<i>Echinoparyphium cinctum</i> (Rudolphi, 1802)	Trematoda	(+)	
<i>Brachylaemus fuscatus</i> (Rudolphi, 1819)	Trematoda	(+)	
<i>Postbarmostomum gallinum</i> (Witenberg, 1923)	Trematoda	(+)	(+)
<i>Davainea proglottina</i> (Davaine, 1860)	Cestoda		+
<i>Raillietina echinobothrida</i> (Megnin, 1881)	Cestoda	+	
<i>Choanotaenia infundibulum</i> (Bloch, 1779)	Cestoda	(+)	+
<i>Rhabdometra nigropunctata</i> (Crety, 1890)	Cestoda		+
<i>Drepanidolepis anatina</i> (Krabbe, 1869)	Cestoda		(+)
<i>Paseripelis crenata</i> (Goeze, 1782)	Cestoda	(+)	
<i>Capillaria columbae</i> (Rudolphi, 1819)	Nematoda	+	+
<i>Capillaria picorum</i> (Rudolphi, 1819)	Nematoda	(+)	
<i>Thominx contorta</i> (Creplin, 1839)	Nematoda	(+)	(+)
<i>Trichostrongylus tenuis</i> (Mehlis, 1846)	Nematoda	(+)	(+)
<i>Syngamus trachea</i> (Montagu, 1811)	Nematoda	+	+
<i>Ascaridia galli</i> (Schränk, 1788)	Nematoda	+	
<i>Heterakis gallinarum</i> (Schränk, 1788)	Nematoda	(+)	(+)
<i>Ganguleterakis isolonche</i> (Linstow, 1906)	Nematoda	+	(+)
<i>Cyrnea spinosa</i> (Gendre, 1922)	Nematoda	(+)	
<i>Acuaria hamulosa</i> (Diesing, 1851)	Nematoda	+	
<i>Dispharynx nasuta</i> (Rudolphi, 1819)	Nematoda	+	(+)

al. (2002) in NEIMANIS & LEIGHTON (2004) navajajo, da je bila omenjena glista najdena še pri nekaterih drugih vrstah, ki se vsaj potencialno pojavljajo tudi v Sloveniji: pri domači gosi *Anser anser*, pegatki *Numida meleagris*, kotorni *Alectoris graeca*, turški kotorni *A. chukar*, španski kotorni *A. rufa* in virginijskem kolinu *Colinus virginianus*. V Sloveniji glista *Heterakis gallinarum* še ni bila potrjena pri fazanu in jerebici (BRGLEZ 1981), kar verjetno bolj kaže na nezadostno parazitološko raziskanost obeh vrst pri nas kot pa na to, da gliste dejansko ni.

Populacija fazana se je v Sloveniji po drugi svetovni vojni izrazito povečala, saj je zrasla iz prvotnih 6.938 osebkov v letu 1949 na največ 80.277 osebkov v letu 1972 (slika 1), kar pomeni več kot 11,5-kratno povečanje. Obdobje največje populacijske rasti je bilo med letoma 1952 in 1961 ($r = 1,0$; $p < 0,001$), ko se je populacija povečala za več kot 7,25-krat s povprečnim letnim prirastkom 6.578 osebkov. Od leta 1961 do 1978 se je intenziteta rasti zmanjšala z opaznimi medletnimi nihanji populacije (slika 1), vendar je bila rast še vedno statistično značilno pozitivna ($r = 0,5$; $p < 0,05$). Rast fazanje populacije lahko pripišemo predvsem intenzivnim vlaganjem in ugodnim življenjskim razmeram, ki zlasti v zimskem obdobju niso povzročile prevelike smrtnosti ptic (ČERNE 1980).

Podobno kot populacija fazana je v 50-tih letih naraščala tudi populacija jerebice, vendar je kasneje jerebica izrazito upadla, čeprav je fazanja populacija še vedno naraščala (slika 1). Večina študij in razprav povezuje upad s poslabšanjem življenjskih razmer v habitatu jerebice (npr. ČERNE 1980, TUCKER & HEATH 1994, AEBISCHER & KAVANAGH 1997, GEISTER 1998, UMEK 2003, KAISER *et al.* 2005). Verjetno ta domneva drži le deloma, saj podobnega drastičnega upada denimo ni bilo opaziti pri fazanu in poljskem zajcu *Lepus europaeus*, ki naseljujeta podoben življenjski prostor kot jerebica, temu v prid pa govorijo tudi neuspeli poskusi vlaganja jerebice (ČERNE 1980). Kot drugo možnost upada lahko zato navedem kompetitivni odnos med jerebico in fazanom, zlasti v smislu prikrite kompeticije (TOMPKINS *et al.* 1999). Na možnost kompeticijskega izključevanja kaže predvsem neenak razvoj populacije fazana in jerebice v Sloveniji (slika 1), ki sem ga skušal opisati s populacijskimi trendi rasti obeh vrst glede na kritično mejo oziroma leto, ki naj bi pomenila začetek kompeticijskega izključevanja jerebice iz sistema ob pojavljajočem se fazanu. Čeprav sta fazan in jerebica ekološko podobni vrsti, so manjše razlike v njunem izboru habitata dovolj, da se ob ustrezno velikih populacijah vrsti prostorsko ločita tudi na območjih sobivanja, kar preprečuje uspešen

prenos parazita. V tem primeru se prikrita kompeticija ne izrazi in vrsti lahko uspešno sobivata, če je vsaj 43% populacije jerebic prostorsko ločene od fazanov (TOMPKINS *et al.* 2000B). Z umetnim povečevanjem populacije fazana (vlaganja) pa se gostota fazanov lahko poveča do te mere, da fazan zasede tudi zanj manj ugodna okolja, s čimer se prostorska ločenost med vrstama zmanjšuje. Kdaj je do tega v Sloveniji prišlo, je iz danih lovskih podatkov težko natančno določiti, zato sem kritično leto ocenil arbitrarno kot prevoj (t_{50} ; asimptotična vrednost: 80.300 osebkov) v logistični rasti krivulji populacije fazana (leto 1958) in kot leto populacijskega viška jerebice (leto 1959; populacijski višek: 39.800 osebkov). Po obeh metodah sem dobil kritično leto v bolj ali manj istem obdobju, torej leto 1958 oziroma 1959, zato so si populacijski trendi obeh vrst glede na obe oceni podobni (tabela 2). Tako fazan kot jerebica namreč kažeta močan pozitiven populacijski trend pred kritičnim letom. Po tem letu pa se je fazanja populacija še vedno povečevala, čeprav z manjšim trendom rasti, medtem ko je populacija jerebice izrazito upadla (tabela 2). Podatki iz Slovenije torej nakazujejo negativno soodvisnost populacij obeh vrst, čeprav v medsebojni primerjavi tega statistično ne izkazujejo (tabela 2). Slednje je lahko posledica različnih dejavnikov, ki potencialno vplivajo na populacijsko dinamiko obeh vrst, denimo kmetijstvo, umetno gospodarjenje s populacijami lovnih vrst, vremenske razmere, ipd. Ti dejavniki lahko zabišejo populacijske učinke procesa kompeticijskega izključevanja.

Zakaj jerebica v Sloveniji ni ob visoki rasti fazanje populacije že izumrla? Še v letu 1997 je bilo v Sloveniji denimo odstreljenih 1.820 jerebic (ČERNE 2000), čeprav ni jasno, kolikšen delež od tega je sestavljal komercialni lov, ki ga v ugotavljanju populacijskih gibanj ne moremo upoštevati. Deloma so populacijo jerebice v Sloveniji vzdrževali lovci sami z umetnimi vlaganji, deloma pa lahko predpostavimo, da je prostorska ločenost med jerebico in fazanom ob sedanji majhni jerebičji populaciji, ki po ornitoloških ocenah znaša 800 do 1.200 parov (GEISTER 1995), zadosti majhna, da ne omogoča ustreznih velikih prenosov parazitov s fazana na jerebico in s tem nadaljnega kompeticijskega izključevanja jerebice. Ključni dejavnik preprečevanja prikrite kompeticije je torej omejitev infekcije jerebic oziroma prenosa gliste *Heterakis gallinarum* s fazana na jerebice, saj je prenos parazita z drugih vrst na jerebico glede na redke stike v naravi nepomemben (TOMPKINS *et al.* 2000B). Pri omejevanju infekcij so pomembna mesta okužbe, t.i. vroče točke, kjer so gostejše agregacije parazitov (SAUNDERS *et al.* 1999).

Tabela 2: Trendi rasti populacije fazana *Phasianus colchicus* in jerebice *Perdix perdix* ter njuna soodvisnost glede na arbitrarno določeno kritično mejo glede na logistično rastno krivuljo populacije fazana (leto prevoja t_{50} = 1958) in glede na populacijski višek pri jerebici (leto 1959) v Sloveniji (Spearmanov korelacijski koeficient)

Table 2: Population trends of Pheasant *Phasianus colchicus* and Grey Partridge *Perdix perdix* and their intercorrelation before and after the critical point/year, which was arbitrary defined as the temporal unit of growth at half growth (t_{50}) in the logistic growth curve of the Pheasant population (year 1958) and as the year of population maximum in Grey Partridge (year 1959) in Slovenia (Spearman correlation coefficient).

Trend populacijske rasti glede na kritično leto po logistični rastni krivulji populacije fazana (t_{50}) / Population trend according to the critical year after logistic growth curve of Pheasant population (t_{50})		
Obdobje / Period	1949 – 1958	1958 – 1978
<i>Phasianus colchicus</i>	$r = 0,96$; $p < 0,001$	$r = 0,69$; $p < 0,001$
<i>Perdix perdix</i>	$r = 0,93$; $p < 0,001$	$r = -0,66$; $p < 0,001$
<i>Ph. colchicus</i> : <i>P. perdix</i>	$r = 0,99$; $p < 0,001$	$r = -0,26$; NS
Trend populacijske rasti glede na kritično leto maksimalnega populacijskega viška jerebice / Population trend according to the critical year of maximal population peak in Grey Partridge population		
Obdobje / Period	1949 – 1959	1959 – 1978
<i>Phasianus colchicus</i>	$r = 0,97$; $p < 0,001$	$r = 0,64$; $p < 0,01$
<i>Perdix perdix</i>	$r = 0,94$; $p < 0,001$	$r = -0,62$; $p < 0,01$
<i>Ph. colchicus</i> : <i>P. perdix</i>	$r = 0,99$; $p < 0,001$	$r = -0,17$; NS

To so zlasti skupna prehranjevališča, denimo krmišča, ali počivališča obeh vrst. Slabšanje življenjskih razmer v habitatu jerebice v smislu intenzivnega kmetijstva in spreminjanja strukturiranosti kmetijskih površin z zmanjševanjem deleža mejic in grmovnih zarasti med polju, t.i. remiz (ČERNE 2000, UMEK 2003), pa domnevno še dodatno prispeva k zmanjševanju ustreznih prehranskih in gnezditvenih razmer in posledično tudi k povečevanju intenzitete kompeticije med fazanom in jerebico. Prikrita parazitsko uravnavana kompeticija je morda glavni razlog, da si populacija jerebic ne opomore (TOMPKINS *et al.* 2002) po večjih številčnih padcih, kakršen je bil v Sloveniji denimo v zimi 1962/63 (ČERNE 1980).

Teoretično bi se lahko prikrita kompeticija med fazanom in jerebico izrazila tudi v primeru, ko bi imel vlogo mediatorja skupni plenilec. Prikrito kompeticijo s plenilskim mediatorjem so razlagali zlasti na primerih herbivorije (RAND 1999, VEECH 2000), vendar lahko princip prenesemo tudi na višje trofične nivoje. Plenilci poljskih kur namreč lahko vplivajo na populacijsko dinamiko v negativnem ali celo pozitivnem smislu (npr. BOBEK *et al.* 2005). Vsekakor pa lahko povečevanje populacijske gostote ene izmed vrst plena, v našem primeru fazana, teoretično vpliva na povečevanje populacije plenilca, s čimer se povečuje predacijski pritisk tudi na kompetitivno

podrejeno vrsto, v našem primeru jerebico. Tovrstna oblika prikrita kompeticije v praksi še ni bila potrjena. Ugotavljanje vpliva nekaterih pomembnejših plenilcev fazana in jerebice, denimo lisice *Vulpes vulpes* in ujed (ČERNE 2000), na populacijsko dinamiko obeh vrst je namreč zelo kompleksno, saj so poljske kure zgolj alternativni plen omenjenih plenilcev, zato je lahko vpliv nanje omejen.

4. Zaključek

Hipoteza o prikriti kompeticiji kot vzroku za drastičen upad jerebice po Evropi ob koncu 20. stoletja v ničemer ne izpodbija predhodnih stališč, da je upad jerebice povezan z intenzifikacijo kmetijstva in spremembami v kulturni krajini, pač pa jih zgolj nadgrajuje. Še vedno namreč ni povsem jasno, v kolikšni meri lahko prenos parazita s fazana na jerebico dejansko vpliva na velikost populacije jerebice. Hipoteza, ki so jo postavili TOMPKINS *et al.* (1999), ima lahko tudi velike gospodarske posledice, zato je bila izpostavljena tudi kasnejšim eksperimentalnim preverjanjem. SAGE *et al.* (2002) so na primer ponovili poskus umetne okužbe jerebic z glisto *Heterakis gallinarum*, pri čemer se je izkazalo, da učinek parazita na jerebico ni bil takšen kot v poskusu, ki so ga napravili TOMPKINS *et al.* (2001). Razlike med raziskavama lahko pripišemo predvsem

nekaterim bistvenim metodološkim razlikam v izvedbi poskusa (SAGE *et al.* 2002), vsekakor pa takšen razkorak kaže na druge fenomene pojava. Velikost vpliva parazita se namreč lahko bistveno razlikuje v različnih ekoloških razmerah, kot so kvaliteta habitata, prehrane, stres ipd., ki vplivajo na fiziološko stanje jerebic. Ključno je torej razumevanje dogajanja pri prostoživečih pticah, kjer so razmere nekoliko drugačne kot v voljerah. Raziskava smrtnosti jerebic v naravi je pokazala, da je bil pri 15% najdenih in z radijskimi oddajniki označenih mrtvih jerebic vzrok smrti okuženost s paraziti in da so jerebice v naravi dejansko izpostavljene parazitskim okužbam (BROWNE *et al.* 2006). V omenjeni študiji opozarjajo, da je letalno delovanje parazitov v tesni povezavi s prehranjenostjo jerebic, ki so v s hrano revnih in degradiranih okoljih manj odporne na bolezni. Vidik na upadanje populacije jerebice v Evropi je torej večplasten in zajema tako vplive degradiranega okolja kot vplive bolezni, kot ena od hipotetičnih možnosti pa je izpostavljena tudi kompeticija jerebice s fazanom. Tudi s populacijskimi podatki iz Slovenije ni mogoče nedvoumno dokazati, da je populacijska rast fazana vplivala na populacijski upad jerebice, čeprav tega glede na rezultate te študije ni mogoče povsem izključiti. Na kompeticijo med vrstama bi bilo treba pogledati iz več zornih kotov. Prvi so učinki neposrednih interakcij, kjer lahko fazan in jerebica neposredno tekmujeta za vire okolja, tako za hrano, skrivališča kot za gnezditveni prostor. Drugi vidik so posredne interakcije, prikrita kompeticija, kjer lahko številčnejši fazan iz okolja izključuje jerebico prek mediatorja, ki je lahko skupni parazit ali plenilec. Vsekakor bi morali kompeticijo med vrstama upoštevati pri nadaljnjih naporih ponovnega vzpostavljanja populacije jerebice z umetnimi vlaganji. V Sloveniji bi bila nujno potrebna natančna raziskava populacijskega stanja jerebice in fazana, s posebnim poudarkom na ugotavljanju ekoloških gostot, izbora habitata in gnezditvenega uspeha obeh vrst. Glede na dosedanje hipoteze o vplivu prikrite kompeticije na jerebice domnevam, da bi vlaganja na območja z nizko fazanjo populacijo ali celo brez nje lahko dala pozitivne rezultate. Ukrep bi bilo zato treba uresničiti postopoma s predhodnim testiranjem uspešnosti vložitve jerebic na izbrano območje, kjer bi predhodno odstranili morebitno populacijo fazanov. Ob tem bi bilo treba spremljati različne populacijske parametre, kot so smrtnost, gnezditveni uspeh in ekološka gostota. Pri takšnem projektu bi bilo nujno sodelovanje strokovnjakov različnih strok, lovcev, biologov, agronomov in veterinarjev. Šele uspešno testiranje bi bila lahko podlaga za pripravo načrta ponovne vzpostavitve populacije jerebic na širšem območju Slovenije.

Primer kompeticijskega izključevanja avtohtone jerebice s strani alohtonega fazana pa odpira še drug problem, problem vnosa tujerodnih vrst v okolje. Ta se kaže kot pereč vir ogrožanja pri različnih rastlinskih in živalskih vrstah tudi v Sloveniji (npr. POVŽ & SKET 1990, KRYŠTUFEK 1999, JOGAN 2000). Gre torej za obliko degradacije okolja, ki po svoji razsežnosti tudi pri pticah v Sloveniji ni več tako majhna (npr. VREZEC 2001, CIGLIČ & ŠERE 2004). Zadeva je seveda povsem v rokah človeka in odvisna od njegovih želja in znanja, kakšno okolje in ekosistem naj ga obkroža.

Zahvala: Za vzpodbudo in nasvete ob pisanju članka se zahvaljujem dr. Davorinu Tometu, za dodatne sugestije v zvezi z drugimi vidiki na prikrito kompeticijo med fazanom in jerebico pa Tomažu Jančarju.

5. Povzetek

Kot vzrok za drastični upad populacije jerebice *Perdix perdix* v Evropi po letu 1950 večina avtorjev navaja velike spremembe v kmetijstvu in kulturni krajini. Kot alternativno hipotezo so TOMPKINS *et al.* (1999) kot vzrok upada predstavili prikrito kompeticijo jerebice s fazanom *Phasianus colchicus*. Pri tej obliki kompeticije gre za posredno interakcijo med vrstama prek parazita, gliste *Heterakis gallinarum*, ki se prenaša s fazana na jerebico. Fazan, kot rezervoarni gostitelj, je ob infekciji prizadet precej manj kot jerebica. Končni učinek je zato kompeticijska izključitev jerebice iz sistema. Glede na statistične podatke Lovske zveze se je v Sloveniji populacija fazana med letoma 1949 in 1972 povečala za 11,5-krat, kar je verjetno predvsem posledica intenzivnega umetnega vlaganja. Avtor je v članku arbitrarno določil kritično leto, ko naj bi se v Sloveniji pričel izražati učinek prikrite kompeticije. Po dveh metodah (točka prevoja v logističnem modelu rastne krivulje fazanje populacije in točka populacijskega viška jerebice) se je to zgodilo med letoma 1958 in 1959. Pred tem obdobjem sta tako fazan kot jerebica imela statistično značilen pozitiven populacijski trend. Po tem obdobju pa je jerebica izkazovala značilno negativen populacijski trend, medtem ko se je populacija fazana še vedno značilno povečevala. Kot najverjetnejši vzrok za to avtor navaja prikrito kompeticijo, čeprav ne izključuje drugih negativnih vplivov na populacijo jerebice, denimo sprememb v habitatu, saj še vedno ni jasen vpliv parazitov na velikost jerebičje populacije. Kot ukrep za dvig populacije jerebice avtor predlaga sistematično raziskavo izbora habitata, ekoloških gostot in velikosti populacij fazana in jerebice v Sloveniji. Glede na to bi

bito treba testirati uspešnost umetne naselitve jerebic na območju z zelo nizko fazanjo populacijo ali celo brez nje, s posebnim poudarkom na spremljanju gnezditvenega uspeha, smrtnosti in ekoloških gostot jerebice na območju. Šele rezultati takšnega testiranja bi dali podlage za oblikovanje nadaljnjih ukrepov za upravljanje s populacijo jerebice na območju Slovenije.

6. Literatura

- AEBISCHER, N. & KAVANAGH, B. (1997): Grey Partridge *Perdix perdix*. pp. 212–213 In: HAGEMEIJER, W.J.M. & BLAIR, M.J. (eds.): The EBCC Atlas of European Breeding Birds: Their Distribution and Abundance. – T & AD Poyser, London.
- BEGON, M., HARPER, J.L. & TOWNSEND, C. R. (1996): Ecology – individuals, populations and communities, 3rd ed. – Blackwell Science, London.
- BROWNE, S.J., AEBISCHER, N.J., MOREBY, S.J. & TEAGUE, L. (2006): The diet and disease susceptibility of grey partridges *Perdix perdix* on arable farmland in East Anglia, England. – *Wildlife Biology* 12 (1): 3–10.
- BOBEK, B., ZAJAC, R., SZMYD-GOLBA, K. & WASILEWSKI, R. (2005): Population dynamics of brown hare (*Lepus europaeus*) and grey partridge (*Perdix perdix*) in the Bottom Valley of Vistula River. pp. 293–294 In: POHLMAYER, K. (ed.): Extended Abstracts of the XXVIIth Congress of the International Union of Game Biologists. – DSV-Verlag Hamburg, Hannover.
- BONSALL, M.B. & HASSELL, M.P. (1997): Apparent competition structures ecological assemblages. – *Nature* 388: 371–373.
- BONSALL, M.B. & HASSELL, M.P. (1999): Parasitoid-mediated effects: apparent competition and the persistence of host-parasitoid assemblages. – *Res. Popul. Ecol.* 41: 59–68.
- BRGLEZ, J. (1977): Zajedavci pri pticah v Sloveniji – Trematoda. – Zbornik Biotehniške fakultete Univerze v Ljubljani, Veterinarstvo, Supplement 3, Ljubljana.
- BRGLEZ, J. (1981): Zajedavci pri pticah v Sloveniji – Cestoda, Nematoda, Acanthocephala. – Zbornik Biotehniške fakultete Univerze v Ljubljani, Veterinarstvo, Supplement 5, Ljubljana.
- CIGLIČ, H. & ŠERE, D. (2004): Pregled pojavljanja tujerodnih rac v Sloveniji. – *Acrocephalus* 25 (121): 79–83.
- ČERNE, A. (1980): Mala divjad. – Zlatorogova knjižnica 10, Lovska zveza Slovenije, Ljubljana.
- ČERNE, L. (2000): Ureditvev lovišč in gospodarjenje z malo divjadjo. – Zlatorogova knjižnica 26, Lovska zveza Slovenije, Ljubljana.
- GEISTER, I. (1995): Ornitološki atlas Slovenije. – DZS, Ljubljana.
- GEISTER, I. (1998): Ali ptice res izginjajo? – Tehniška založba Slovenije, Ljubljana.
- HALDANE, J.B.S. (1949): Disease and evolution. – *Ric. Sci. (Suppl.)* 19: 68–76.
- HARMON, J.P., IVES, A.R., LOSEY, J.E., OLSON, A.C. & RAUWALD, K.S. (2000): *Coleomegilla maculata* (Coleoptera: Coccinellidae) predation on pea aphids promoted by proximity to dandelions. – *Oecologia* 125: 543–548.
- HUDSON, P. & GREENMAN, J. (1998): Competition mediated by parasites: biological and theoretical progress. – *TREE* 13 (10): 387–390.
- JOGAN, N. (2000): Neofiti – rastline pritepenke. – *Proteus* 63 (1): 31–36.
- KAISER, W., STORCH, I. & CARROLL, J.P. (2005): Link between habitat use and survival in grey partridge (*Perdix perdix*) pairs in Bavaria, Germany. pp. 360–361 In: POHLMAYER, K. (ed.): Extended Abstracts of the XXVIIth Congress of the International Union of Game Biologists. – DSV-Verlag Hamburg, Hannover.
- KRYŠTUFEK, B. (1999): Osnove varstvene biologije. – Tehniška založba Slovenije, Ljubljana.
- MARTINEZ, A.M.Q. (1999): Parasitologia. Anexo II., III., IV. – Departamento de Biología de Organismos y Sistemas, Universidad de Oviedo, <<http://www.uniovi.es/bos/Asignaturas/Parasit/>>, (Downloaded on: 15 Sep 2005).
- MÜLLER, C.B. & GODFRAY, H.C.J. (1999): Predators and mutualists influence the exclusion of aphid species from natural communities. – *Oecologia* 119: 120–125.
- NEIMANIS, A.S. & LEIGHTON, F.A. (2004): Health risk assessment for the introduction of Eastern wild turkeys (*Meleagris gallopavo silvestris*) into Nova Scotia. – Canadian Cooperative Wildlife Health Centre, University of Saskatchewan, Saskatoon.
- NEWTON, I. (1998): Population Limitation in Birds. – Academic Press, London.
- ODUM, E.P. (1971): Fundamentals of Ecology. – W.B. Saunders Company, Philadelphia.
- PIANKA, E.R. (1981): Competition and Niche Theory. In MAY, R.M. (ed.): Theoretical ecology. Principles and applications. – Blackwell Scientific Publications, Oxford.
- POVŽ, M. & SKET, B. (1990): Naše sladkovodne ribe. – Mladinska knjiga, Ljubljana.
- RAND, T.A. (1999): Effects of environmental context on the susceptibility of *Atriplex patula* to attack by herbivorous beetles. – *Oecologia* 121: 39–46.
- RICKLEFS, R.E. (1967): A graphical method of fitting equations to growth curves. – *Ecology* 48 (6): 978–983.
- SAGE, R.B., WOODBURN, M.I.A., DAVIS, C. & AEBISCHER, N.J. (2002): The effect of an experimental infection of the nematode *Heterakis gallinarum* on hand-reared grey partridges *Perdix perdix*. – *Parasitology* 124: 529–535.
- SAUNDERS, L.M., TOMPKINS, D.M. & HUDSON, P.J. (1999): Investigating the dynamics of nematode transmission to the red grouse (*Lagopus lagopus scoticus*): studies on the recovery of *Trichostrongylus tenuis* larvae from vegetation. – *Journal of Helminthology* 73: 171–175.
- SCHOENER, T.W. (1982): The Controversy over Interspecific Competition. – *American Scientist* 70: 586–595.

- SNOW, D.W. & PERRINS, C.M. (1998): The Birds of the Western Palearctic. Vol. 1, Non-Passerines. – Oxford University Press, Oxford, New York.
- TARMAN, K. (1992): Osnove ekologije in ekologija živali. – DZS, Ljubljana.
- TOMPKINS, D.M., DICKSON, G. & HUDSON, P.J. (1999): Parasite-mediated competition between pheasant and grey partridge: a preliminary investigation. – *Oecologia* 119: 378–382.
- TOMPKINS, D.M., DRAYCOTT, R.A.H. & HUDSON, P.J. (2000A): Field evidence for apparent competition mediated via the shared parasites of two gamebird species. – *Ecology Letters* 3: 10–14.
- TOMPKINS, D.M., GREENMAN, J.V. ROBERTSON, P.A. & HUDSON, P.J. (2000B): The role of shared parasites in the exclusion of wildlife hosts: *Heterakis gallinarum* in the ring-necked pheasant and the grey partridge. – *Journal of Animal Ecology* 69: 829–840.
- TOMPKINS, D.M., GREENMAN, J.V. & HUDSON, P.J. (2001): Differential impact of a shared nematode parasite on two gamebird hosts: implications for apparent competition. – *Parasitology* 122: 187–193.
- TOMPKINS, D.M., PARISH, D.M.B. & HUDSON, P.J. (2002): Parasite-mediated competition among Red-legged Partridges and other lowland gamebirds. – *J. Wildl. Manage.* 66 (2): 445–450.
- TUCKER, G.M. & HEATH, M.F. (1994): Birds in Europe: their conservation status. – BirdLife Conservation Series no. 3, BirdLife International, Cambridge.
- UMEK, M. (2003): Možnosti ponovne naselitve poljske jerebice (*Perdix perdix* L.) na Krško-Brežiško polje. – Diplomsko delo, Oddelek za gozdarstvo in obnovljive gozdne vire, Biotehniška fakulteta, Univerza v Ljubljani, Ljubljana.
- VEECH, J. (2000): Predator-mediated interactions among the seeds of desert plants. – *Oecologia* 124: 402–407.
- VREZEC, A. (2001): Položaj alohtonih vrst v slovenski avifavni. – *Acrocephalus* 22 (106/107): 69–71.
- WOOTTON, J.T. (2002): Indirect effects in complex ecosystems: recent progress and future challenges. – *Journal of Sea Research* 48: 157–172.

Arrived / Prispelo: 12.9.2005

Accepted / Sprejeto: 5.10.2006

RED-FOOTED FALCON *Falco vespertinus* BREEDING IN MAGPIE'S *Pica pica* NEST BUILT ON A PYLON

Gnezdenje rdečenoge postovke *Falco vespertinus* v gnezdu srake *Pica pica*, zgrajenem na nosilcu daljnovoda

MARCO GUSTIN, MICHELE MENDI & MARIO PEDRELLI

LIPU, Conservation Department, Via Trento 49, 43100 (Pr), Italy, e-mail: marco.gustin@lipu.it

Although in Europe the Red-footed Falcon *Falco vespertinus* has declined by 20% over the last 20 years (TUCKER & HEATH 1994, BIRDLIFE INTERNATIONAL 2004), the species has been constantly increasing in Italy: the first breeding was observed in 1995 in Parma province (BRICHETTI *et al.* 1995, GRASSI *et al.* 1999), and in subsequent years the species has expanded westwards (PIACENZA, AMBROGIO *et al.* 2001), to the southeast (Modena and Ferrara provinces, (TINARELLI 1997, PIRAS 1999) and northwards (Treviso province, NARDO & MEZZAVILLA 1999).

The species usually nests in old corvids nests (up to 13 - 20 m above ground and within 3 - 4 m from tree tops), especially along hedgerows and occasionally on cliffs or on the ground (CRAMP 1980, SNOW & PERRINS 1999).



Figure 1: Red-footed Falcon *Falco vespertinus* nesting in Magpie's *Pica pica* nest built on a pylon

Slika 1: Rdečenoga postovka *Falco vespertinus* gnezdi v srakinem *Pica pica* gnezdu, zgrajenem na drogu nosilcu daljnovoda

In Italy, Red-footed Falcons breed preferentially in open agricultural plain landscape dominated by intensive agriculture with tree lines (Mezzano), irrigation ditches and natural and artificial wetlands.

Pairs are usually grouped in loose colonies of 5 to 10 pairs or isolated and situated on abandoned corvids nests on trees.

In mid-May 2004, a pair of Red-footed Falcon occupied a Magpie *Pica pica* nest built on a pylon in Diolo, Soragna Municipality (Parma; Figure 1). The height of the nest was 10.5 m, and on 19 Jul 2004, 4 pulli were fledged.

In the study area, 29 pairs have been identified and all were nesting in trees (White Poplar *Populus alba*, English Elm *Ulmus campestris*, Black Locust *Robinia pseudoacacia*, etc.), occupying Magpie (80%) and Carrion Crow *Corvus corone corone* nests (20%). In the neighbouring Piacenza province, two breeding pairs used an old Magpie nest and an old Carrion Crow nest on poplars *Populus nigra* and *Populus* sp. in 2000 (AMBROGIO *et al.* 2001).

Povzetek

V Diolu (Parma, Italija) je leta 2004 par rdečenogih postovk *Falco vespertinus* gnezdil v srakinem *Pica pica* gnezdu na drogu električnega daljnovoda; 19.7.2004 so se speljali 4 mladiči.

References

- AMBROGIO, A., FIGOLI, G. & ZIOTTI, L. (2001): Atlante degli uccelli nidificanti nel Piacentino. - LIPU.
- BIRDLIFE INTERNATIONAL (2004): Birds in Europe: population estimates, trends and conservation status. BirdLife Conservation Series No. 12. - BirdLife International, Cambridge.
- BRICHETTI, P., ARCAMONE, E. & COI (1995): Comitato Omologazione Italiano (C.O.I.) 10. Riv. Ital. Orn. 65 (2): 147-149.
- CRAMP, S (1980): Handbook of the Birds of Europe the Middle East and North Africa. The Birds of the Western Palearctic, Volume II. Oxford University Press, Oxford.
- GRASSI, L., LICHERI, D. & SPONZA, S. (1999): Nidificazione di Falco cuculo *Falco vespertinus* in provincia di Parma. Avocetta 23: 141.
- NARDO, A. & MEZZAVILLA, F. (1997): Nidificazione di falco cuculo, *Falco vespertinus*, in Veneto. - Riv. Ital. Orn. 67 (2): 169-174.
- PIRAS, G. (1999): Dati preliminari su una colonia di *Falco vespertinus* in provincia di Ferrara (Vertebrata, Aves). - Soc. Ven. Sc. Nat. 24: 37-40.
- SNOW, D.W. & PERRINS, C.M. (1999): The Birds of the Western Palearctic. Concise Edition, Vol. 1, Non-Passerines. - Oxford University Press, Oxford.

TINARELLI, R (1997): La nidificazione del falco cuculo *Falco vespertinus* nell'Emilia Romagna orientale. – *Picus* 23: 111–112.

TUCKER, G.M. & HEATH, M.F (1994): *Birds in Europe, Their Conservation Status.* – BirdLife International, Cambridge: 600 pp.

Arrived / Prispelo: 20.3.2006

Accepted / Sprejeto: 5.10.2006

STRONG AGONISTIC REACTION OF TERRITORIAL MALE BLACKBIRD *Turdus merula* AGAINST ITS SELF-IMAGE

Močna agonistična reakcija teritorialnega samca kosa *Turdus merula* proti lastni podobi

AL VREZEC

Nacionalni inštitut za biologijo, Večna pot 111, SI-1001 Ljubljana, Slovenija, e-mail: al.vrezec@nib.si

In spring, high level of testosterone in males induces the vigorous territorial behaviour and song production (CATCHPOLE & SLATER 1995). However, birds usually try to avoid direct agonistic interactions, since they can cause serious injuries. Therefore, territorial males communicate with threat postures and song rather than with the direct attacks (GILL 1995). Usually, both visual and vocal stimuli are important for an aggressive male to attack.

However, on 17 Apr 2006 I observed, at Hrastje near Modraže in NE Slovenia (UTM WM53), a 2Y male Blackbird attacking his self-image in a mirror, although no vocal communication was present (Figure 1). The bird was constantly attacking the mirror through the whole day. When scared, it flew away, but was soon back again repeating its attacking behaviour



Figure 1: Strong agonistic reaction of 2Y male Blackbird *Turdus merula* against its self-image, recorded on 17 Apr 2006 at Hrastje near Modraže in NE Slovenia (UTM WM53)

Slika 1: Močno agonistično vedenje drugoletnega samca kosa *Turdus merula* proti lastni podobi v ogledalu, opaženo dne 17.4.2006 v Hrastju pri Modražah (SV Slovenija; UTM WM53)

(Figure 1). I made a small experiment and placed a predator dummy, a stuffed Tawny Owl *Strix aluco*, to see if mobbing or predator-induced behaviour would prevail over social or territorial behaviour as known in some other bird species, e.g. Arabian Babbler *Turdoides squamiceps* (SOMMER & MUNDY 2005). At the beginning, the territorial Blackbird inspected the dummy, but later continued with attacks on its own image. When the mirror was removed, the bird came back several times to search for the "intruder".

The search lasted for approximately 15 minutes, and then the male engaged in singing or vocal display. The case shows that the territoriality in mating season can induce, at least in some males, strong agonistic reaction to intraspecific intruders. There is a question, however, whether this is a general phenomenon or is just restricted to some more aggressive or young males establishing their territories.

Povzetek

Opazovanje drugoletnega teritorialnega samca kosa *Turdus merula*, ki je 17.4.2006 v zaselku Hrastje pri Modražah (UTM WM53, SV Slovenija) silovito napadal lastno podobo v ogledalu. Z agresivnim vedenjem ni prenehal niti tedaj, ko mu je bila nastavljena lutka penilca, nagačena lesna sova *Strix aluco*. Napadati je nehal šele po odstranitvi ogledala. Primer kaže na močne agresivne odzive teritorialnih samcev v gnezditveni sezoni, zato bi bilo v prihodnje koristno preveriti, ali se pojav kaže le pri nekaterih osebkih ali gre za splošen pojav.

References

- CATCHPOLE, C.K. & SLATER, P.J.B. (1995): Bird Song. – Cambridge University Press, Cambridge.
- GILL, F.B. (1995): Ornithology. – W.H. Freeman and Company, New York.
- SOMMER, C. & MUNDY, R. (2005): Do social rank and predator type influence the structure of predator-induced calls in Arabian babblers? pp. 30 In: TRILAR, T. (ed.): XX. Congress of International BioAcoustic Council (IBAC), Book of Abstracts. – Prirodoslovni muzej Slovenije, Ljubljana.

Arrived / Prispelo: 19.4.2006

Accepted / Sprejeto: 5.10.2006

THE NUMBER OF SPANISH SPARROW *Passer hispaniolensis* NESTS IN THE NERETVA DELTA (S DALMATIA, CROATIA)

Število gnezd travniškega vrabca *Passer hispaniolensis* v delti Neretve (J Dalmacija, Hrvaška)

JASMINA MUŽINIĆ¹ & JENŐ J. PURGER²

¹ Institute for Ornithology CASA, Gundulićeva 24, HR-10000 Zagreb, Croatia, e-mail: jasmina@hazu.hr

² University of Pécs, Institute of Biology, Ifjúság útja 6, H-7624 Pécs, Hungary, e-mail: purger@ttk.pte.hu

The Neretva delta region has probably played an important part in the expansion of the Spanish Sparrow, as this was the source area from where these birds colonized north Dalmatia and the islands further away in the late 1970's (LUKAČ 2004). Relying on his own data and literature reports on only 353 known nests in South Dalmatia, LUKAČ (2004) estimates the amount of Spanish Sparrows breeding in the region at around 3,500 – 19,000. As there is little information about Spanish Sparrows breeding in the Neretva delta (KRALJ 1996), it is important to publish as much data about the number of breeding pairs as possible.

Between 3 – 10 Apr 2006, we travelled several times from Metković to Lake Kutina. Along the 11 km long road between Bijeli Vir and Kutina, a total of 263 Spanish Sparrow nests were counted (no nests were found in Dubravica and Kosa). The distribution of the nests was as follows: in Bijeli Vir (YH16) 186 nests in 21 poplar trees *Populus* sp., and 2 in 1 willow *Salix* sp. In Mlinišće (YH16) 21 in 1 plane tree *Platanus* sp., 14 in 1 mulberry tree *Morus* sp., and 28 in 4 willows. In single poplars in Mislina (YH16), Badžula (YH16, YH15) and Kutina (YH15), 2, 7 and 3 nests were found, respectively.

The number of these nests (263) provides information on the breeding period of the previous year (2005). In case some of the breeding pairs built new nests for the second clutch, that meant somewhat less pairs. However, it is not known how many of the nests were lost during the winter, and how many of the nests were overlooked by the observers. Also, a certain number of nests inside the colonies might have been used by other sparrow species (*Passer domesticus*,

P. montanus). The number of Spanish Sparrows that may breed in the area seems to be a realistic figure. Any deviation in the survey result could be eliminated by repeating the counts both in the breeding season and after the leaves have fallen away.

Povzetek

Avtorja sta napravila popis travniških vrabcev *Passer hispaniolensis* v delti Neretve (J Dalmacija, Hrvaška) na osnovi štetja gnezd v aprilu 2006. Skupno število gnezd je bilo 263.

References

- KRALJ, J. (1996): Povijesni pregled ptičjeg svijeta područja donjeg toka rijeke Neretve: rezultati istraživanja od 1817 – 1988. – Hrvatsko ornitološko društvo, Zagreb.
- LUKAČ, G. (2004): About the widening of the range and the status of the Spanish Sparrow (*Passer hispaniolensis*) in Croatia at the beginning of the 21th century. – Paklenički zbornik 2: 113–122.

Arrived / Prispelo: 17.8.2006

Accepted / Sprejeto: 5.10.2006

NOVA OPAZOVANJA SELITVE UJED NA VOLOVJI REBRI (J SLOVENIJA)

New observations of birds of prey migrating over Volovja reber (S Slovenia)

TOMAŽ MIHELIC¹ & IGOR BRAJNIK²

¹ DOPPS, pp 2990, SI–1001, Ljubljana, Slovenija,
e-mail: tomaz.mihelic@dopps-drustvo.si

² DOPPS, pp 2990, SI–1001, Ljubljana, Slovenija,
e-mail: igor.brajnik@dopps-drustvo.si

Ujede se med selitvijo pogosto odzivajo na topografijo, kar se kaže v večjem koncentriranju teh ptic vzdolž gorskih grebenov in prelazov (HAUGH 1972). V sklopu raziskav selitve ujed v Sloveniji je bilo v jeseni 2006 organizirano opazovanje na več lokacijah po Sloveniji. Opazovanja so se začela konec avgusta in že prvi dan opazovanja so se na Volovji rebri (UTM VL44) pokazali zanimivi rezultati.

Selitev ujed na Volovji rebri smo opazovali 29.8.2006 med 7.30 in 15.00 h. Ponoči je deževalo po vsej Sloveniji, zjutraj pa se je v zahodni Sloveniji razjasnilo. Meja med oblačnostjo na vzhodu in jasnino na zahodu je bila prek celotnega opazovalnega dne nad točko opazovanja. Na območju je nad tlemi pihal srednje močan SV veter, zračne mase pa so se sodeč po oblakih že kakih 100 – 200 m nad temi premikale v nasprotni smeri.

Selitev sva večino časa opazovala dva opazovalca na grebenu med Veliko Milanjo (1099 m) in Devinom (1088 m). Za opazovanje sva uporabljala daljnogleda s karakteristikami 7 × 42 in 19 × 42, ter teleskopa 20 – 60 × 80 ter širokokotni 30 × 80.

Ob prihodu na opazovalno točko sta z vrha Lunjevica (1014 m) zletela dva beloglava jastreba *Gyps fulvus*, ki sta tu verjetno prenočevala, saj je bila Lunjevica v tem času še v megli oz. oblakih. Jastreba sta sedela na boru in odletela proti SZ. Grebenu sta se spet približala nad Belimi ovcami (1030 m) in do Milanke (948 m) letela okrog 50 m nad grebenom.

Najštevilčnejša vrsta znotraj časa opazovanja je bil rjavi lunj *Circus aeruginosus*. Prvi osebek je preletel območje ob 8.15, zadnji pa ob 11.01. Lunji so preletavali območje posamič ali v skupinah do max. 5 osebkov. Skupaj je bilo opazovanih 22 rjavih lunjev. Lunji so širše območje Volovje rebri preletavali v dveh zgoštitvah. Devet jih je preletelo greben med Belimi ovcami in Milanko, ter nadaljevali let v smeri JZ. Greben so preleteli v pasu med 10 in 100 metri nad tlemi. Druga zgoštitvev rjavih lunjev, po kateri je

območje preletelo 12 ptic, je bila vzhodno od Velike Milanje, kjer so ptice prek Devina, prav tako v pasu pod 100 m, nadaljevale pot naravnost proti jugu.

Zelo podobno kot rjavi lunji so območje preletavali sršenarji *Pernis apivorus*. Opaženih je bilo 10 sršenarjev, od katerih se je en par vedel teritorialno (svatovski let) in se je stalno zadrževal nad Suhim vrhom (1171 m). Drugi so območje preleteli na istih mestih kot rjavi lunji. Svatovanje para sršenarjev se je časovno ujemalo s preletom drugih sršenarjev in rjavih lunjev. Teritorialno vedenje para je zanimivo, saj naj bi sršenarji gnezdišča v tem času že zapuščali (CRAMP 1980).

Od selečih se vrst je bil opazovan še ribji orol *Pandion haliaetus*, ki je greben preletel na višini okrog 40 metrov, med Veliko Milanko in Devinom, ter nadaljeval proti JZ.

Druge opazovane vrste ujed smo uvrstili med stalnice. V času opazovanja je območje dvakrat preletel planinski orol *Aquila chrysaetos*, prek celega dopoldneva so se med Belimi ovčami in Devinom pojavljali skobec *Accipiter nisus*, postovka *Falco tinnunculus* ter kanje *Buteo buteo* v skupinah po največ 2 osebka. Seleče se vrste ujed smo opazovali samo med 8.15 in 11.10 h, stalnice pa tudi v preostalem času opazovanja.

Pri opazovanjih je bila zanimiva predvsem nizka višina preleta ujed nad grebenom, kar pripisujemo vetrnim razmeram. Ocenjujemo, da so bile razmere za jadranje s pomočjo vzgornjnikov zelo slabe. Noben od sršenarjev ni izkoriščal vzgornjnikov za jadranje, kljub temu da sodijo v tipično skupino selivk, ki se selijo s pomočjo jadrnja v vzgornjnikih (SPAR 1997). Enako smo opazili pri rjavih lunjih, za katere v nasprotju z drugimi lunji prav tako velja, da v ugodnih razmerah v vzgornjnikih jadrajo kar pogosto (SPAR & BRUDERER 1997). Let obeh vrst se prav tako ni razlikoval od leta ribjega orla, ki ne velja za jadralca in v nasprotju z jadrajočimi vrstami pogosto prečka večja območja brez termike (KERLINGER 1985). Vse tri vrste so nadaljevale pot v nizkem ravnem jadrajočem letu, pogosto prekinjenem s kratkimi intervali zamahovanja s perutmi. Na celotni opazovani poti, ki je bila zaradi dobre vidljivosti dolga več kilometrov, so se tlom najbolj približale edino na grebenu Volovje rebri. Razlog za to je bil verjetno v izkoriščanju vetra, ki je nad grebenom pihal v smeri njihovega leta, zračne mase pa so se na višjih nadmorskih višinah pomikale v obratni smeri.

Summary

Preliminary results of the observation of birds of prey during migration on Volovja reber (UTM VL44, S Slovenia) are presented. On 29 Aug 2006 several

interesting species were observed: 2 Griffon Vultures *Gyps fulvus* resting on the ground, 22 Marsh Harriers *Circus aeruginosus*, 10 Honey Buzzards *Pernis apivorus* and 1 Osprey *Pandion haliaetus*. The birds were flying in the belt below 100 m above the ridge.

Reference

- CRAMP, S. (1980): Handbook of the Birds of Europe the Middle East and North Africa. Volume II. Oxford University Press, Oxford.
- HAUGH, J.R. (1972): A study of Hawk Migration in Eastern North America. – Search 2: 1–60.
- KERLINGER, P. (1985): Water-crossing behavior of raptors during migration. – Willson Bulletin 97(1): 109–113.
- SPAR, R. (1997): Flight strategies of migrating raptors; a comparative study of interspecific variation in flight characteristics. – Ibis 137(3): 523–535.
- SPAR, R. & BRUDERER, B. (1997): Migration by flapping or soaring: Flight strategies of Marsh, Montagu's and Pallid Harriers in Southern Israel. – The Condor 99: 458–496.

Arrived / Prispelo: 1.9.2006

Accepted / Sprejeto: 5.10.2006

NEW DATA ON THE BIRDS OF PONOR MOUNTAINS, (W BULGARIA)

Novi podatki o pticah pogorja Ponor (Z Bolgarija)

STOYAN CH. NIKOLOV

Central Laboratory of General Ecology (BAS),
Gagarin 2, BG-1113 Sofia, Bulgaria,
e-mail: nikolov100yan@abv.bg

Up to year 2000 only fragmentary data about birds of the Ponor Mountain existed. After that more extensive studies were carried out. The bird species composition and status was determined by STOYANOV (2001) and breeding bird distribution and number by NIKOLOV (2003) and NIKOLOV & VASSILEV (2003 & 2004). The aim of the present study was to broaden the knowledge of bird species composition and status.



Figure 1: Location of the Ponor Mountains in Bulgaria

Slika 1: Položaj pogorja Ponor v Bolgariji

The Ponor Mountains is a part of the Western Stara Planina (STEFANOV 2002; Figure 1) and belongs to the continental moderate climatic zone (VULEV 1997). The study area comprises a total of 272 km² between 360 and 1601 m a.s.l. and borders to the west on the Ginska River, to the south on the Iskretska River; to the east on the Iskar River and abuts to north on the Koznica Mountains. The eastern border of the Ponor Mountains lies on the Via Aristotelis migration route. The major plant communities are formed by trees such as oak *Quercus* sp., hornbeam *Carpinus* sp. and Beech *Fagus sylvatica* (BONDEV 1991).

The present study was carried out during 8 years between 1996 and 2003, for a total of 115 days of

fieldwork. All habitats were visited and observations were made in all seasons. The status of species was described following SVENSSON *et al.* (2000) with some modifications: rB – resident breeding species: present during the whole year; mB – migratory breeding species: coming in spring, breeding in study area and migrating in autumn; P – passage visitor: present only during migration; W – winter visitor: present only during winter period; V – vagrant species: present occasionally, out of migration period and not breeding or wintering in the in the studied area; E – extinct species: conspicuous resident breeders in the study region, which were not proved for the present survey; NF – species with no fixed status: shy resident or migrating breeders, found during past works, but not observed during the present survey.

Till 2001 176 species were known for the Ponor Mountains (STOYANOV 2001). During the present study 9 species unrecorded before in the study area were found (Table 1).

As a final result the number of bird species observed in the Ponor Mountains is 185. Most of them are

Status of birds in the Ponor mountains

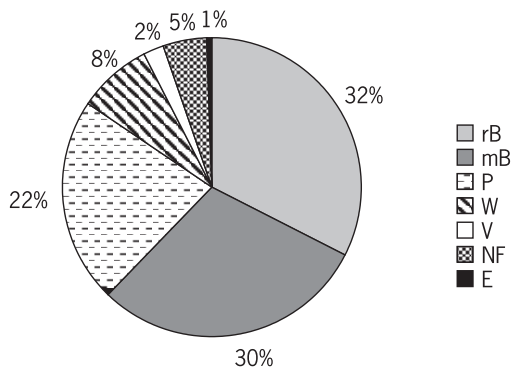


Figure 2: Proportion of different groups of birds according to their status in the Ponor Mountains (legend see text)

Slika 2: Delež skupin ptic glede na njihov status v pogorju Ponor (legenda glej tekst)

breeders – 115 species (NIKOLOV & VASSILEV 2004), where 60 are resident and 55 are migratory. The rest 70 species are not breeding in the study area: the passage visitors during spring and autumn migrations are 41, the winter visitors – 15, the vagrants – 4, these with no fixed status – 9 and there is 1 extinct species (Figure 2).

Table 1: New species found in the Ponor Mountains during the present survey, their status and observation details (abbreviations see text).**Tabela 1:** Nove vrste najdene med raziskavo v pogorju Ponor, njihov status in podrobnosti opazovanja (okrajšave glej tekst).

Species / Vrsta	Status	Date / Datum	N	Location / Kraj
<i>Circus pygargus</i>	P	9 May 1999	1 male	2 km north of Zimevitza village at 1400 m a.s.l.
<i>Pandion haliaetus</i>	P	15 Oct 2000	1	along the Iskar river near Svoге town
<i>Gallinula chloropus</i>	mB	Apr – Sep; 2001 & 2002	4	small marsh along the Iskar river near Svoге town
<i>Alectoris chukar</i>	NF			according to the information from local rangers the Chukar was introduced in the region (Manastirishte area) for hunt in the 90s but it was not confirmed during the present study
<i>Aegolius funereus</i>	rB	Feb – Jun; 2000 & 2002	4 males	near Dobravitzza village in 2000 and near Brakyovtzi village in 2002 in Beech <i>Fagus sylvatica</i> forest (NIKOLOV 2003).
<i>Apus pallida</i>	mB	May 2002	6 (3 pairs)	the hut Petrohan
<i>Anthus campestris</i>	mB	24 Jun 2002	2 (pair)	northwest of Breze village
<i>Anthus pratensis</i>	P	9 Apr 1999	3	Zimevishki Kladenec valley
		15 Oct 2000	5	Shiroki Val valley
<i>Acrocephalus schoenobaenus</i>	P	15 Oct 2000	1	outflow of Iskretska river

Acknowledgments: My most cordial thanks go to Associate Prof. Tanyo Michev for his valuable advice and guidance during the preparation of this work.

Povzetek

Članek prispeva nove podatke o sestavi in statusu nekaterih vrst ptic v pogorju Ponor, Z Bolgarija. Ugotovljenih je bilo devet novih vrst, obdobje raziskave pa je trajalo kar 8 let, opravljenih pa je bilo 115 terenskih dni med leti 1996 in 2003. Skupno število vrst tega območja se je tako povečalo s 176 na 185 vrst. Na pogorju gnezdi 115 vrst (60 stalnic in 55 selivk), ostale vrste pa so: 41 preletnih gostov, 15 zimskih gostov, 4 klateži, 1 izumrla vrsta in 9 vrst, ki imajo nejasen status.

References

- BONDEV, I. (1991): The Vegetation in Bulgaria – Univ. Press “St. Kl. Ohr.”, Sofia. (in Bulgarian)
- NIKOLOV, S. (2003): New locality in unusual habitat of Tengmalm’s Owl (*Aegolius funereus*) in Bulgaria. – *Buteo* 13: 89–93.
- NIKOLOV, S. & VASSILEV, V. (2003): Census of breeding birds in the Ponor Mountains, western Bulgaria. – *Bird Census News* 16 (2): 42–56.
- NIKOLOV, S. & VASSILEV, V. (2004): Breeding bird atlas of the Ponor Mountains, western Bulgaria. – *Sandgrouse* 26(1): 7–22.
- STEFANOV, P. (2002): [The Stara Planina mountain system]. pp. 31–33 In: *Geography of Bulgaria*. – For Com, Sofia. (in Bulgarian)
- STOYANOV, G. (2001): [The birds of Ponor Mountain]. – *Forestry Ideas* 25: 101–125. (in Bulgarian)
- SVENSSON, L., GRANT, P., MULLARNEY, K. & ZETTERSTRÖM, D. (2000): The most complete guide to the birds of Britain and Europe. – Harper Collins, London.
- VULEV, S. (1997): [Climatic regions – Physical geography of Bulgaria]. – BAS, Sofia. (in Bulgarian)

Arrived / Prispelo: 9.2.2005

Accepted / Sprejeto: 5.10.2006

A SHORT REVIEW OF THE STATUS OF BONNELLI'S EAGLE *Hieraaetus fasciatus* IN BULGARIA

Kratek pregled statusa kraguljega orla *Hieraaetus fasciatus* v Bolgariji

STOYAN CH. NIKOLOV¹, BOJIDAR IVANOV², PETAR IANKOV³ & JEAN-LOUIS DAMBIERMONT⁴

¹ Central Laboratory of General Ecology (Bulgarian Academy of Sciences), 2 Gagarin Str., BG-1113 Sofia, Bulgaria, e-mail: nikolov100yan@abv.bg

² Institute of Zoology, 1 bul. Tzar Osvoboditel, BG-1000 Sofia, Bulgaria, e-mail: bai_bobo@yahoo.com

³ Bulgarian Society for the Protection of Birds/ BirdLife Bulgaria, BG-1111 Sofia, P.O. Box 50, Bulgaria, e-mail: petar.iankov@gmail.com

⁴ 5A Their des malades, B-4500, Belgium, e-mail: jean-louis.dambiermont@skynet.be

The Bonelli's Eagle is rather rare in Bulgaria with breeding population estimated at one to three pairs for the 1996 – 2002 period (BIRDLIFE INTERNATIONAL 2004) and one possible breeding pair for 2004 (NANKINOV *et al.* 2004). There have been seven published localities of the species so far and only one nest found in the country (SIMEONOV *et al.* 1990). Present below are three observations of Bonelli's Eagle in the region of Madjarovo town in the Eastern Rhodopes.

On 3 May 2003 two adult birds were observed flying together and taking liberties with one another in the region of Madjarovo town (UTM MG01). On 25 May 2005 a 3y Bonelli's Eagle was observed soaring at about 2 km north of Madjarovo town. The bird flew away in north-eastern direction. Second 3y Bonelli's Eagle was observed near the dam of the Studen Kladenetz Reservoir (UTM LG80) flying to the east along the Arda River at about 120 m height at 12.02 h on 21 May 2006. The bird was in transitional plumage with reddish-brown underbody and under wing-covers beginning to develop under wing black bar and dark trailing tail band (SVENSSON *et al.* 2000).

It is probable that the Bonelli's Eagle breeds in the area of Madjarovo town because the landscape there corresponds a lot to the habitat preferred by the species: arid, sparsely vegetated mountainous areas, with foothills, river valleys, gorges and steep cliffs (REAL *et al.* 1997).

Povzetek

Avtorji podajajo nove podatke o pojavljanju kraguljega orla v letih 2003, 2005 in 2006 v bližini mesta Madjarovo v vzhodnih Rodopih (UTM MG01; Bolgarija), kjer je možna tudi gnezditve.

References

- BIRDLIFE INTERNATIONAL (2004): Birds in Europe: population estimates, trends and conservation status. – BirdLife Conservation Series No. 12, Cambridge, UK.
- NANKINOV, D. *et al.* (2004): Breeding totals of the ornithofauna in Bulgaria. – Green Balkans, Plovdiv.
- REAL, J., PALMA, L. & ROCAMORA, G. (1997): Bonelli's Eagle *Hieraaetus fasciatus* In: HAGEMEIJER, E.J.W. & BLAIR M.J. (eds.). The EBCC Atlas of European breeding birds: their distribution and abundance. – T & AD Poyser, London;
- SIMEONOV, S., MICHEV, T. & NANKINOV, D. (1990): Fauna of Bulgaria. Vol. 20, Aves, Part I. – BAS, Sofia.
- SVENSSON, L., GRANT, P., MULLARNEY, K. & ZETTERSTRÖM, D. (2000): The most complete guide to the birds of Britain and Europe. – HarperCollins Publishers, London.

Arrived / Prispelo: 23.6.2006

Accepted / Sprejeto: 5.10.2006

A RECENT EVIDENCE OF THE SPRING MIGRATION OF MEDITERRANEAN SHEARWATER *Puffinus yelkouan* ALONG THE BULGARIAN BLACK SEA COAST

Novi dokazi o pomladni selitvi sredozemskega viharnika *Puffinus yelkouan* vzdolž obale Črnega morja v Bolgariji

STOYAN CH. NIKOLOV¹, DIMITER GEORGIEV²,
BOJIDAR IVANOV³ & PETAR IANKOV⁴

¹ Central Laboratory of General Ecology (Bulgarian Academy of Sciences), 2 Gagarin Str., BG-1113 Sofia, Bulgaria, e-mail: nikolov100yan@abv.bg

² Bulgarian Society for the Protection of Birds/ BirdLife Bulgaria, P.o. Box 492, BG-9000 Varna, Bulgaria, e-mail: dimiter.georgiev@neophron.com

³ Institute of Zoology, 1 bul. Tzar Osvoboditel, BG-1000 Sofia, Bulgaria, e-mail: bai_bobo@yahoo.com

⁴ Bulgarian Society for the Protection of Birds/ BirdLife Bulgaria, BG-1111 Sofia, P.O. Box 50, Bulgaria, e-mail: petar.iankov@gmail.com

After the 1970s, the Mediterranean Shearwater has been observed passing along the western Black Sea coast in flocks of up to 13,500 or even 20,000 individuals in some years (SIMEONOV *et al.* 1990). It is known that the species is more numerous near the Bulgarian Black Sea coast between July and October (SIMEONOV *et al.* 1990). The data presented below for the past four years shows that the species passes in significant numbers near the Bulgarian Black Sea coast also in April and May.

In 2003: on 28 Apr, a flock of 30 Mediterranean Shearwaters was observed offshore in the region of Durankulak Lake (UTM PJ23); on 29 Apr, two groups of birds (consisting of 170 and 70 birds) were seen flying to the north offshore near Cape Kaliakra (UTM PJ01); on 5 May, a group of 272 Mediterranean Shearwaters flying to the north at about 1 km far from the coast was seen in the region of the village of Kamen Brjag (UTM PJ12) (NIKOLOV, B., NIKOLOV, S. & DUCOV, A. *pers. comm.*); on 10 May, a flock of 2,000 individuals was seen off the coast of Lake Atanasovsko (UTM NH03) (MICHEV *et al.* 2004); between 14 and 17 May, several groups consisting of 1,200 to 10,000 birds were observed feeding at the entrance of Varna

Gulf (UTM NH87) (MITEV, D. *pers. comm.*); on 19 and 20 May, few groups consisting of 5,400 to 12,000 birds were observed feeding at a distance of 400 to 2,000 m from the coast and spending the night in smaller groups (up to 500 – 1,000 individuals) in the region of Cape Kaliakra; on 28 May, a flock of 50 birds was seen flying to the north at a distance about 1 km from the coast in the region of Lake Alepu (UTM NG95). In 2004: on 9 May, two flocks consisting of 100 and 200 individuals were observed in the gulf of the Sveti Vlas village (UTM NH25) (PAPPS, S. *pers. comm.*); on 10 and 11 May, groups of respectively 6 and 21 birds were observed at the foregoing site; on 11 May, a flock of 10 birds was seen offshore flying to the south near Irakli Bay (UTM NH73); on 13 May, 8 individuals were observed flying to the north on Cape Kaliakra; on 30 May, 2 birds were seen near the Sveti Vlas village. In 2005: on 10 May, one Mediterranean Shearwater was seen in the sea flying to the east in the region of the Sarafovo village (UTM NH41) and 9 birds (6 flying to the south-east, and 3 to the north) were observed offshore on Cape Emine (UTM NH72); on 12 May, a flock consisting of 450 individuals was observed offshore in the region of Durankulak Lake. In 2006: on 23 May, 50 birds were seen flying to the south at 1 km offshore in the region of Durankulak Lake at 9.30 h and a group of about 1,300 individuals was observed feeding together with 10 dolphins at a distance of 500 – 800 m from the coast at 16.30 h in the region of the Kamen Brjag village; on 25 May, a group of 3 birds was seen flying to the north at about 1.5 km distance from the coast in the region of Nesebar town (UTM NH25) at 10.00 h and 53 birds were seen feeding at a distance of about 2 km offshore in the region of Cape Kaliakra at 16.30 h; on 26 May, a group of 4 birds flying to the north at about 1 km distance from the coast was seen in the area of Lake Durankulak at 10.05 h and two groups consisting of 1,300 and 1,000 individuals were observed simultaneously flying to the north at distances 1.5 and 2 km respectively from the coast in the region of the Kamen Brjag village between 16.20 and 16.50 h.

Povzetek

Avtorji podajajo nove dokaze o spomladanski selitvi sredozemskega viharnika *Puffinus yelkouan* vzdolž obale Črnega morja v Bolgariji; navajajo podatke za zadnja štiri leta (2003 – 2006), ki kažejo, da se sredozemski viharnik pojavlja redno in v precejšnjem številu, največje zabeleženo število pa je bilo 12.000 osebkov.

References

- SIMEONOV, S., MICHEV, T. & NANKINOV, D. (1990): Fauna of Bulgaria. Vol. 20, Aves, Part I. – BAS, Sofia.
- MICHEV, T., PROFIROV, L., DIMITROV, M. & NYAGOLOV, K. (2004): The Birds of Lake Atanasovsko. – Bourgas Wetlands Publication Series No 5, Bourgas.

Arrived / Prispelo: 23.6.2006

Accepted / Sprejeto: 5.10.2006

EVIDENCE FOR THE REGULAR SPRING AND AUTUMN MIGRATION OF TEREK SANDPIPER *Xenus cinereus* ALONG THE WESTERN BLACK SEA COAST

Dokazi o redni spomladanski in jesenski selitvi sabljastega martinca *Xenus cinereus* vzdolž zahodne obale Črnega morja

STOYAN CH. NIKOLOV¹, DIMITER GEORGIEV²,
BOJIDAR IVANOV³ & PETAR IANKOV⁴

¹Central Laboratory of General Ecology (Bulgarian Academy of Sciences), 2 Gagarin Str., BG-1113 Sofia, Bulgaria, e-mail: nikolov100yan@abv.bg

²Bulgarian Society for the Protection of Birds/ BirdLife Bulgaria, P.O. Box 492, BG-9000 Varna, Bulgaria, e-mail: dimitr.georgiev@neophron.com

³Institute of Zoology, 1 bul. Tzar Osvooboditel, BG-1000 Sofia, Bulgaria, e-mail: bai_bobo@yahoo.com

⁴Bulgarian Society for the Protection of Birds/ BirdLife Bulgaria, BG-1111 Sofia, P.O. Box 50, Bulgaria, e-mail: petar.iankov@gmail.com

The Terek Sandpiper is a regular migrant to the region of the eastern Black Sea with important route between the Ural and Volga rivers and birds also passing through Transcaucasus and Ukraine (DEMENTIEV & GLADKOV 1951). The species is considered to be a rare visitor or vagrant farther west, including the Balkans (CRAMP 1983) and there are few published observations in Bulgaria (NANKINOV *et al.* 1997, MICHEV *et al.* 2004).

On 16 Sep 2002, a juvenile Terek Sandpiper was seen on the beach of nature protected site Poda (UTM NH03). The species was observed at the same site in the ensuing year (on 16 Sep). A Terek Sandpiper was seen on 22 and 31 Sep 2004 at Shablenska Tuzla salty lake (UTM PJ22). The observed individuals stayed separately from the other Waders presented at the foregoing sites. On 14 Aug 2005, two adult Terek Sandpipers in summer plumage were seen together at 14.00 h in the northern part of Pomorie Lake salt pans (UTM NH51). The birds were staying close (3 – 5 meters) to a number of Curlew Sandpipers *Calidris ferruginea*, Little Stints *C. minuta*, Dunlins *C. alpina*, Kentish Plovers *Charadrius alexandrinus*, Avocets *Recurvirostra avocetta* and one Broad-billed Sandpiper *Limicola falcinellus* all feeding around. The two Terek Sandpipers flew away together at 14.15 h. The species was observed during the next year at the same site:

in the middle part of Pomorie Lake salt pans between 9.06 and 9.28 h local time on 24 May 2006. It was an adult bird in breeding plumage: the body upperparts were brown-grayish with black feather centers, the legs were dingy orange and the up-curved bill was black with basal third tinged dirty orange (CRAMP 1983). The observed Terek Sandpiper stayed alone and did not join the Curlew Sandpipers, Little Stints, Avocets, Kentish and Ringed Plovers *Charadrius hiaticula* that were present nearby.

The foregoing observations reveal that almost every year several Terek Sandpipers pass (in spring and in autumn) along the western Black Sea coast through the Via Pontica flyway. In some years, some individuals even rest in Bulgaria during the summer (PETKOV 2005).

Povzetek

Avtorji povzemajo nove podatke o pojavljanju sabljastega martinca *Xenus cinereus* na črnomorski obali (V Bolgarija). Posamični primerki so se v obdobju 2002 – 2006 pojavljali skoraj vsako leto, spomladi in jeseni.

Reference

- CRAMP, S. (1983): The Birds of the Western Palearctic. Vol. III – Oxford Univ. Press., Oxford.
- DEMENTIEV, G. & GLADKOV, N. (1951): The Birds of Soviet Union. Vol. III – Moscow.
- MICHEV, T., PROFIROV, L., DIMITROV, M. & NYAGOLOV, K. (2004): The Birds of Lake Atanasovsko. – Bourgas Wetlands Publication Series No 5, Bourgas.
- NANKINOV, D., SIMEONOV, S. & MICHEV, T. (1997): Fauna of Bulgaria. Vol. 26, Aves, Part II. – Prof. M. Drinov, Sofia.
- PETKOV, N. (2005): Terek Sandpiper *Xenus cinereus*. – *Acrocephalus* 124: 59–60.

Arrived / Prispelo: 23.6.2006

Accepted / Sprejeto: 5.10.2006

RAZPRAVA: KOMENTAR NA ČLANEK MIHELIC, T. & GENERO, F. (2005):
 OCCURRENCE OF GRIFFON VULTURE *Gyps fulvus* IN SLOVENIA IN THE PERIOD
 FROM 1980 TO 2005. – ACROCEPHALUS 26 (125): 73–79

**Forum: Comments on the article MIHELIC, T. & GENERO, F. (2005): Occurrence
 of Griffon Vulture *Gyps fulvus* in Slovenia in the period from 1980 to 2005. –
 Acrocephalus 26 (125): 73–79**

PETER TRONTELJ

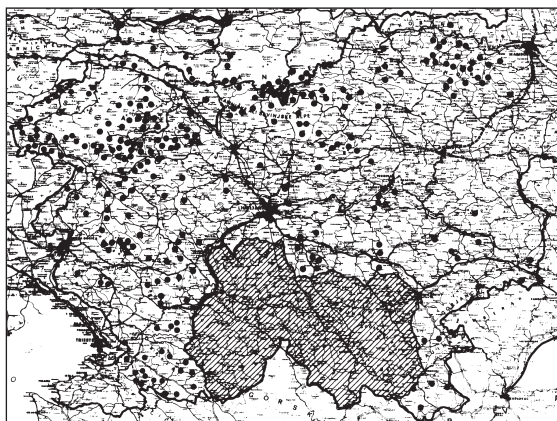
Oddelek za biologijo, Biotehniška fakulteta, Univerza v Ljubljani, p.p. 2995, Večna pot 111, SI-1001 Ljubljana, Slovenija, e-mail: peter.trontelj@bf.uni-lj.si

TOME (2005) v svoji kritiki zgoraj omenjenega članka poudarja metodološke vidike, zaradi katerih naj bi bili "zaključki analiz [...] precej neprepričljivi". Avtorjema očita, da podatki o pojavljanju beloglavega jastreba *Gyps fulvus* v Sloveniji niso bili zbrani zastavljenim ciljem primerno in da nista upoštevala "negativnih rezultatov". Neprepričljivi naj bi bili zaključki o času pojavljanja, ker avtorja "ne obravnava[ta] časa, v katerem so bili jastrebi iskani, a ne opaženi". Neprepričljivi naj bi bili tudi "...zaključki o geografskem vzorcu pojavljanja jastreb", ker "v prispevku izvemo vse o tem, kje so bili opaženi in v kakšnem številu, a nič o tem, kje so jih opazovalci iskali, pa ne tudi našli".

Kritika je v tem pogledu popolnoma zgrešena in metodološko neosnovana, ker gre za eksplorativni tip raziskave, ki temelji na iskanju vzorcev v celotni množici zbranih podatkov. Med take načine raziskovanja podatkov spada popularni pristop *data mining*, po slovensko odkrivanje zakonitosti v podatkih (npr. KRISPER & MEDICA 2004). Menedžerji si z njim pomagajo tako, da iz nepreglednih množic naključno zbranih podatkov izluščijo vzorce, pomembne za poslovno načrtovanje. Primerov, ki temeljijo zgolj na analizi zadetkov ali pozitivnih podatkov, je v biogeografiji veliko. Pravzaprav iz takih podatkov izhaja večina biogeografskega vedenja. Nazoren primer je poznavanje razširjenosti rjavega medveda *Ursus arctos* v Sloveniji zunaj njegovega osrednjega območja (slika 1). Zemljevid opažanj in drugače ugotovljene navzočnosti v letih 1980 – 91 kaže zgotovitve v alpskem prostoru in povezovalna migracijska območja (ADAMIČ 1994). Podatki o tem, kje so medveda "...iskali, pa ne tudi našli", niso bili upoštevani. Razumljivo je, da nihče ni izrazil skrbi, da je na ta način ugotovljeno območje pojavljanje rjavega medveda neprepričljivo. Srečanje z medvedom je samo po sebi tako neverjeten in nenadejan dogodek, da bi bilo načrtno iskanje zunaj

njegovega osrednjega območja jalovo početje. Prav zaradi tega lahko upravičeno sklepamo, da so si lovci, gozdarji in drugi sodelujoči zapomnili, če že ne zapisali, večino opažanj zunaj osrednjega območja. Zapisovanje negativnih podatkov je v takem primeru odveč: vsak trenutek, ki ga sodelavec take raziskave preživi zunaj in ko ne vidi medveda, je "negativen podatek". Kadar je vrsta dobro opazna, na primer zaradi telesne velikosti, ali enostavno zaznavna brez posebne popisne metode, lahko vzorec njenega pojavljanja ugotovimo tudi brez eksplicitne obravnave negativnih podatkov. Potrebujemo le dovolj veliko število podatkov in gotovost, da je bil pregledan večji del obravnavanega prostora. Tako gotovost nam v gosto naseljeni srednji Evropi lahko daje dolgo obdobje zbiranja podatkov.

Prispodoba z medvedom v polni meri velja za beloglavega jastreba. Srečanje z njim je na ozemlju Slovenije še bolj izjemen dogodek, zato si ga bo opazovalec toliko raje zapisal ali zapomnil. Ker so opažanja tako redka in nepredvidljiva, se beloglavih jastreb ne da načrtno iskati po vsej Sloveniji. Vsaj ne v časovno – finančno – kadrovske okvirih običajnih ornitoloških raziskav. Z veliko zanesljivostjo pa lahko kot "negativni rezultat" štejemo vsako prištevno zadrževanje sodelujočih ornitologov na prostem ob zadovoljivi vidljivosti. Vzemimo naslednji primer. Na svoji poti v službo in nazaj domov opazujem, kadar je še dovolj svetlo, na nebu nad Ljubljano mnoge vrste ptic, med drugimi sive čaplje, bele in črne štorke, rjave in močvirske lunje, sokole selce, postovke, škrjančarje, kanje, kragulje, skobce. Med njimi nikoli ni bilo beloglavega jastreba. V četrstoletnem obdobju, ki ga zajema raziskava Miheliča in Genera, sem opravil kakšnih 10.000 poti v osnovno, srednjo in visoko šolo ter v službo in nazaj domov, na katerih sem imel pogled vsaj del časa usmerjen v nebo. Avtorjema raziskave sem torej skupaj s pozitivnimi podatki o



Slika 1: Pojavljanje rjavega medveda *Ursus arctos* v Sloveniji (pike) zunaj njegovega osrednjega območja (šrafirano) iz časov pred geografskim informacijskim sistemom (obdobje 1980 – 1991). Zgostitve v alpskem prostoru so nedvoumne tudi brez eksplicitne analize "negativnih rezultatov" (po ADAMIČ 1994).

Figure 1: Occurrence of the brown bear *Ursus arctos* in Slovenia (dots) outside its central range (hatched) from the times prior to the geographical information system (1980 – 1991 period). The concentrations in the Alpine area are indubitable even without an explicit analysis of »the negative results« (after ADAMIČ 1994).

opažanjih beloglavih jastrebov implicitno predal še deset tisoč negativnih podatkov za območje Ljubljane. Ker sem se v tem času mudil tudi drugod po Sloveniji, je vključenih še kakšnih dva tisoč negativnih podatkov za preostalo Slovenijo, mnogi med njimi za območje jugozahodne Slovenije. Obenem sem v svojem vsakdanjiku nekako sodeloval pri raziskavi pojavljanja rjavega medveda (če bi kakšnega srečal na poti v službo, bi to zagotovo javil Zavodu za gozdove), zlatovranke, velike droplje... Naštevanje ad absurdum je možno, ker je nesmiselna že sama zahteva po "negativnih rezultatih", kadar gre za redke ali nenadejane in lahko zaznavne vrste hkrati.

Tome ne izpostavi nobenega posameznega neprepričljivega zaključka in ne predlaga alternativnih hipotez, kot je za znanstveno kritiko običajno. Svoje lastne teze v kritiki ne omenja, vendar jo je jasno formuliral ob drugih priložnostih. V presoji vplivov na okolje za vetrno elektrarno na Volovji rebri (TOME *et al.* 2004) pravi, da »Selitveni koridor jastreba poteka prek celotne Primorske (od Kopra do Postojne!), tako tudi prek Volovje rebri [...]. Turki [...] z vetrnico so možni, verjetnost pa je, zaradi precejšnje razpršenosti v prostoru, majhna. Ocenjujemo pa tudi, da obstaja enaka verjetnost trka [...] z vetrnico na kateri koli drugi lokaciji na Primorskem.«

Čeprav mu v komentarju ni uspelo ovreči ali omajati ugotovljenega vzorca pojavljanja beloglavih jastreb, kot ga predlagata Mihelič in Genero, vseeno pogledimo, kje bi glede na očitke lahko prišlo do napake. Možnosti sta dve: (1) zaradi lažnih negativnih podatkov je vzorec luknjast tam, kjer se jastrebi v resnici pogosto pojavljajo, a jih ni nihče opazil; (2) zaradi pristranskih pozitivnih podatkov je vzorec težišč pojavljanja lažen tam, kjer je večja gostota opazovalcev.

S prvo možnostjo se je treba spogledati že pred začetkom podatkovne obdelave. Mihelič in Genero ne bi mogla dobiti verodostojne slike pojavljanja beloglavega jastreba, če ne bi mogla računati z vsaj približno celotno pokritostjo območja raziskave. V razpravi svojo nenapisano predpostavko na kratko utemeljmeta z rezultati popisov za novi ornitološki atlas slovenskih gnezdk, ki potekajo v času spomladanskega viška pojavljanja. Utemeljitev bi bila popolnejša, če bi dodala še terensko pokritost, ki jo zagotavljajo dva predhodna atlasa (zimski in gnezditveni), stalno bivališče mnogih ornitologov na obravnavanem območju, intenzivni popisi za osem IBAjev, ki zavzemajo velik del obravnavanega območja, ter vsesplošna priljubljenost Primorsko-Kraške regije kot izletni ali dopustni cilj. Sila malo verjetno je, da bi ob tem vrvežu ljubiteljev ptic v četrto stoletje ostal kakšen večji kos neba nad jugozahodno Slovenijo, ki mu ornitološko oko ne bi namenilo pogledov. Beloglavi jastreb je ptica, ki jo v zraku le stežka spregledamo, zato registracija ne zahteva nobene posebne metode ali večšine. Tudi če obstaja še kakšno spregledano mesto koncentriranih pojavljanj, število jastreb tam ne more biti tako veliko, da bi v celoti porušilo ugotovljeni vzorec. Število potencialnih migrantov iz kvarnerske populacije ni dovolj veliko.

Druge možnosti ne moremo odpraviti vnaprej. Prepričani smo lahko, da razporeditev opazovalcev ni bila enakomerna ali naključna. Zelo veliko ornitoloških pogledov je na primer deležno nebo nad Kopro, z zaledjem, kjer delujeta DOPPSova pisarna in naravni rezervat, prav tako vzdolž cestne povezave med Ljubljano in Kopro, po kateri se dnevno vozijo ornitologi. Take zgostitve opazovalcev bi lahko delovale pristransko, če bi bili jastrebi razporejeni enakomerno ali naključno. Po drugi strani lahko na ugotovljeni vzorec sploh ne vplivajo, če se jastrebi ne pojavljajo naključno. Lahko bi prispevale le veliko količino "negativnih rezultatov". Ali so mesta z visoko gostoto opazovalcev pristransko vplivala na rezultate, lahko preverimo s testom: če je razporeditev jastreb naključna, pričakujemo koncentracijo opazovanj tam, kjer v nebo gleda največ ornitologov. To je poleg

že omenjenih avtoceste in Kopra še v Sečoveljskih solinah, v krajih, kjer sodelavci raziskave službujejo in stanujejo ali so stanovali (npr. Postojna, Ilirska Bistrica, Koritnice, Nova Gorica), na mestih stalne obročkovaške aktivnosti (npr. Korotan med Postojno in Razdrtim) in morda še kje. Pike na zemljevidu kažejo popolnoma drugačno razporeditev. Tometovo podmeno o enakomerno razpršenem pojavljanju beloglavih jastreb med Koprom in Postojno torej lahko zavrnamo.

Kritika se nanaša še na ugotovljeno letno obdobje pojavljanja: "...ne vemo, ali jastreb v mrzli polovici leta res ni, ali jih morda samo nihče ni iskal tako zavzeto kakor poleti". V tem pogledu je kritika enako zgrešena kot pri prostorskem vzorcu pojavljanja. Tudi tu njeno neumestnost potrjujejo sistematične terenske raziskave, npr. v okviru zimskega ornitološkega atlasa (SOVINC 1994) ali zimskega dela atlasa ptic Triglavskega narodnega parka (KMECL 1997). Obe raziskavi sta zajeli območje zgoščenega pojavljanja beloglavih jastreb, vendar nobena ni dala niti enega zimskega podatka. Edini meni znani zimski podatek je naveden v dodatku II Zimskega ornitološkega atlasa Slovenije (pisni viri iz obdobja pred ZOAS; SOVINC 1994): konec januarja 1912 en osebek ustreljen pri Raki na Dolenjskem.

S Tometom se strinjam, da bi bili podatki o vzgornikih, ki so jih zbrali jadralni padalci, potrebni previdnejše obravnave. A ta del je nebitven za njegov namen – relativirati pomen Volovje rebri kot dela migracijskega koridorja beloglavega jastreba. Pri tem mu je spodletelo tudi v zaključnem odstavku, v katerem skuša razvrednotiti kritizirano delo: "Precej bolj 'znanstveno' bi članek deloval, če bi avtorja analize predstavila kot hipoteze in ne kot zaključke raziskave". Znanost ni stvar oblike in vtisa. Vseeno je, ali izsledke imenujemo zaključke, hipoteze, teorije ali celo dejstva. Po svoji naravi so znanstvene ugotovitve lahko vedno le ovrgljive hipoteze, ali pa niso znanstvene. Pot do znanstvenega spoznanja ne vodi prek potrditve, ampak prek zavrnitve alternativnih možnosti z izkustvom (empirično) (POPPER 1963 & 1998). Mihelič in Genero sta ovrgla Tometovo hipotezo o naključno razpršenem pojavljanju z novim empiričnim znanjem – prostorsko analizo zbranih podatkov. Postavila sta novo hipotezo, da se beloglavi jastreb pojavljajo predvidljivo, vzdolž dinarskih grebenov, v povezavi s termičnimi in pobočnimi vetrovi. Dokler je ne bo kdo ovrgel z novimi izkustvenimi podatki, bo veljala kot najbolj verodostojna razlaga pojavljanja beloglavega jastreba v Sloveniji.

Literatura

- ADAMIČ, M. (1994): Ocena možnosti za spontano širjenje rjavega medveda (*Ursos arctos* L.) v Alpe, smeri glavnih emigracijskih koridorjev ter motnje v njihovem funkcioniranju. pp. 131–143 In: ADAMIČ, M. (ed.): Zbornik posvetovanja o rjavem medvedu v deželah Aple-Adria. – Ministrstvo za kmetijstvo in gozdarstvo, Gozdarski inštitut Slovenije, Ljubljana.
- KMECL, P. (1997): Zimski ornitološki atlas Triglavskega narodnega parka. Projektno poročilo. – DOPPS, Ljubljana.
- KRISPER, M. & MEDICA, P. (2004): Uporaba metod odkrivanja zakonitosti v podatkih za spremljanje družbenega in ekonomskega razvoja. pp. 61–106 In: SOČAN, L. (ed.): Simulacije trajnostnega razvoja 3. – Založba FDV, Ljubljana.
- POPPER, K.R. (1963): Conjectures and refutations: The growth of scientific knowledge. – Routledge, London.
- POPPER, K.R. (1998): Logika znanstvenega odkritja. – Studia humanitatis, Ljubljana.
- SOVINC, A. (1994): Zimski ornitološki atlas Slovenije. – Tehniška založba Slovenije, Ljubljana.
- TOME, D. (2005): Komentar na članek MIHELIC, T. & GENERO, F. (2005): Occurrence of Griffon Vulture *Gyps fulvus* in Slovenia in the period from 1980 to 2005. – *Acrocephalus* 26 (125): 73–79. – *Acrocephalus* 26 (127): 195.
- TOME, D., ŠERE, D., VREZEC, A., ČUHALEV, I., PATERNOSTER, M., ALATIČ, Z. & KOKALJ, D. (2004): Presoja vplivov na okolje za vetrno elektrarno na Volovji rebri in povezovalni 110 kV daljnovod; povzetek ocen vplivov na okolje za segment naravno okolje; referat št. 1657. – Elektroinštitut Milan Vidmar, Ljubljana.

POVZETKI DIPLOMSKIH, MAGISTRSKIH IN DOKTORSKIH DEL

Thesis Summaries

KUHAR, B. (2005): **Prehrana lesne sove (*Strix aluco*) v Kozjanskem regijskem parku [Diet of the Tawny Owl (*Strix aluco*) in Kozjansko Regional Park]. – BSc thesis. Maribor University. Pedagogical Faculty, Department of Biology, Maribor.**

Mentor / Supervisor:

Assist. Prof. Franc Janžekovič, PhD

UDC 57(043.2), 57/59:378.242, 85 pages

Author's e-mail: branka.kuhar@gmail.com

Tawny Owl *Strix aluco* is the most common and generally distributed European owl species. It inhabits deciduous and mixed forests, feeding mainly on woodland species of small mammals, particularly mice and voles.

The main objective of the research we carried out was to find as many Tawny Owl's pellet localities as possible in the area of Kozjansko Regional Park and thus to confirm the Owl's presence in this area, as well as to gather the greatest possible amount of pellets, which is necessary for the analysis of its diet.

Kozjansko Regional Park is situated in the eastern part of Slovenia, along the Sotla river that delineates the national boundary with Croatia. Deciduous forests predominate in the Park, with the highest shares going to Beech – Spanish Chestnut (*Castaneo sative-Fagetum*) and Beech – Hop-hornbeam (*Ostryo-Fagetum*) associations. The infrastructure of the area, where individually owned smallholds prevail, is poorly developed.

During the period from April 2004 to April 2005, 40 buildings and 23 Tawny Owl's potential resting places in the forests or Spruce *Picea abies* plantations were examined within the Park, i.e. belfries and neighbourhood of 14 churches, lofts and surroundings of 10 barns and 14 abandoned or old houses, house ruins, and Pišečki Castle. The Owl's pellets were found at 12 localities: in the lofts of 3 barns and a house, in Pišečki Castle, in five Spruce plantations, and on the ground under a Poplar as well as in the forest.

365 pellets from 8 localities were analysed. The analysis, which included scattered material (incomplete pellets and separate bones), yielded remains of 1,322 animals. The size of the pellets ranged from 37 – 46 x 21 – 26 x 16 – 19 mm. The average ovalness index was 0.66, indicating that the Tawny Owls living within

the Park produced semi-oval pellets. On average, it disgorged 2.67 animals per pellet, with average pellet biomass reaching 53.0 g and average mass of prey 19.9 g.

In the entire study area, the highest share in the Tawny Owl's diet was contributed by mammals (55.3%), followed by insects (34.0%), birds (8.1%) and amphibians (2.6%). As far as mammals are concerned, the Tawny Owl preyed most often on mice and, to a lesser extent, on voles and dormice. The most frequently preyed on species was the Yellow-necked Mouse *Apodemus flavicollis* with 16.0% share in the entire Tawny Owl's diet, followed by Woodmouse *Apodemus sylvaticus* with 8.4% and Fat Dormouse *Glis glis* with 6.1%. Concerning the insects, the Tawny Owl preyed most often on grasshoppers, to a lesser extent on beetles, amongst which Longhorn Beetles (Cerambycidae) and Scarab Beetles (Scarabaeidae) prevailed. The highest share in terms of biomass went to mammals (88.6%), followed by birds (7.2%) and amphibians (2.4%). The share of insects was low. The most salient species, as far as biomass share is concerned, were the Fat Dormouse (34.2%) and Yellow-necked Mouse (14.3%). In Kozjansko Regional Park, the Tawny Owl preyed most often on animals weighing from 10 to 50 g, which except for of the small share of birds and amphibians belonged to small mammals. It was established that the Tawny Owl has a wide diet niche in the Park, considering that the trophic diversity value reached 0.863. It preyed on 20 to 25 known species of the potential fauna of the Park's small mammals. In its diet, forest species prevailed, such as the Yellow-necked Mouse, Fat Dormouse, Hazel Dormouse *Muscardinus avellanarius*, and Bank Vole *Clethrionomis glareolus*.

In the pellets, remains of two zoogeographically interesting small mammals were identified, i.e. the Striped Field Mouse *Apodemus agrarius*, with which its occurrence on the northern limit of its known range was confirmed, and the Alpine Pine Vole *Microtus multiplex*, never recorded in this particular region prior to this research.

The characteristics of the Tawny Owl's seasonal diet were studied at locality Podsreda 28. Pellets were collected every three months, four times altogether. The smallest pellets, which at the same time contained the smallest amount of prey units per pellet (up to 3), were disgorged during the winter. The largest pellets

with the highest amount of prey units per pellet (up to 12) were gathered, on the other hand, in the autumn. It was established that the seasonal diet was changing subject to the abundance of prey in the area. A high share in the spring diet went to insects (44.4%); in comparison with other seasons, the share of birds and amphibians was higher as well. In the summer and autumn diet, the share of insects further increased: in it, grasshoppers with their 53.6% share in the entire diet prevailed. The Tawny Owl preyed on larger mammals – Fat Dormouse, Water Vole *Arvicola terrestris* – only during the summer and autumn months, when lush undergrowth reduces the effectiveness of preying on smaller species. During the winter months, mammals constituted 88.9% share of the diet, and apart from them the Tawny Owl preyed on birds only.

With the similarity index, the diet of Tawny Owls from different areas of eastern Slovenia (Kozjansko, Goričko, Slovenske gorice and Pohorje) was compared, and eventually a moderate similarity was established with its aid. In the diet of Tawny Owls inhabiting eastern Slovenia, mice and voles prevail.

IZ ORNITOLOŠKE BELEŽNICE

From the ornithological notebook

SLOVENIJA / SLOVENIA

POLARNI SLAPNIK *Gavia arctica*

Black-throated Loon – on 6 Oct 2005 landing on a parking place in Novo mesto (UTM WL17)



Dne 6.10.2005 sem prejel obvestilo, da je na parkirišču pri trgovini Spar v Novem mestu pristala čudna ptica. Ko sem prišel na kraj dogodka, sem v škatli prepoznal značilno obarvanega polarnega slapnika. Spomnil sem se na podoben primer, ki se je pred leti zgodil v Črnomlju. Tudi takrat so polarni slapniki pristali na asfaltnem parkirišču, ki je bilo po dežju s ptičje perspektive videti kot večja vodna površina. Utrujene ptice so se bržkone hotele začasno odpočiti, a so presenečene pristale na asfaltu. S trdih tal slapnik ne more vzleteti, saj mora najprej z vso hitrostjo steči po vodni površini. Ptico sem odnesel v enega izmed bajerjev v Zalogu, kjer se je najprej navdušeno okopala in očedila, proti večeru pa je odletela (glej sliko).

Andrej Hudoklin, Ob Sušici 15, SI-8350 Dolenjske Toplice, Slovenija

BOBNARICA *Botaurus stellaris*

Bittern – winter observation at Dolenjske Toplice (UTM WL06, SE Slovenia)

Bele zime velikokrat zagodejo zgodnjim selivcem, med katere sodi tudi bobnarica. Ta se iz južnih prezimovališč odpravi že zelo zgodaj, saj njeno teritorialno oglašanje na gnezdiščih pogosto beležijo že konec februarja ali v začetku marca. Očitno je nesrečno bobnarico na selitvi prek Balkana presenetilo sneženje. Povsem onemogla je bila najdena 23.2.2005 na cesti v Dolenjskih Toplicah. Ptica se je delno opomogla po hrani, ki ji jo je bilo treba na silo stlačiti v grlo. Da bi jo tudi ustrezno veterinarsko oskrbeli, sem jo odpeljal



v zatočišče za živali prosto živečih vrst v Kranju. Žal je ptica že naslednji dan poginila (glej sliko).

Andrej Hudoklin, Ob Sušici 15, SI-8350 Dolenjske Toplice, Slovenija

ČAPLJICA *Ixobrychus minutus*

Little Bittern – late observation of 1y individual on 19 Oct 2004 on Medvedce water reservoir SE of Pragersko (UTM WM53, NE Slovenia), walking on mudflat between the water and the edge of *Typha* sp. and *Phragmites australis* stand

Takoj po prihodu iz Turčije se mi je zahotel obisk vodnega zadrževalnika Medvedce (JV od Pragerskega, SV Slovenija). Tako sem ga 19.10.2004 tudi zares obhodil. Zaradi izlova rib so začeli spuščati vodo in njena gladina je bila kakega pol metra pod višino trstičja *Phragmites australis* in rogoza *Typha* sp. Ob tej nižani gladini sem v dotočnem kanalu na severnem delu zadrževalnika lahko opazoval tamariskovko *Acrocephalus melanopogon*, svojo prvo na Medvedcih. Nekaj bolj zanimivega me je čakalo nekaj metrov dalje, saj se je po novem obrežju sprehajal mladosten osebek čapljice. Skozi teleskop sem jo spremljal skoraj petnajst minut, vse dokler ni izginila v trstičju. Zaradi skrivnega življenja so srečanja s čapljico redka, še posebej v jesenskem času. Glavnina selitvenih osebkov odide med avgustom in septembrom, z izjemami, ki ostanejo tudi po oktobru. Gre večinoma za mladiče [CRAMP, S. (ed.) (1978): Handbook of the birds of Europe, the Middle East, and North Africa, Vol. I: Ostrich to Ducks. – Oxford University Press, Oxford].

Dejan Bordjan, Ulica 8. februarja 50, SI-2204 Milklavž, Slovenija, e-mail: dejanonih@email.si

SIVA ČAPLJA *Ardea cinerea*

Grey Heron – nesting of a single pair with three chicks on the river Temenica near Prečna (UTM WL07, Central Slovenia)



Opazanja sivih čapelj v porečju Krke in Kolpe kažejo, da njihova populacija raste. V jugovzhodni Sloveniji je znana le ena stalna gnezdilna kolonija ob reki Kolpi. Gre za stabilno kolonijo, v kateri je bilo v gnezdilni sezoni 2005 aktivnih okoli 50 do 60 gnezd. Od več posameznikov sem prejel obvestila o gnezdenju sivih čapelj na različnih lokacijah ob reki Krki, vendar se je po preverjanju izkazalo, da gre le za stalno pojavljanje ptic na posameznih odsekih. Gnezdenje je bilo potrjeno le ob spodnjem toku reke Temenice pri Prečni, kjer so bili leta 2005 v osamljenem gnezdu izvaljeni trije mladiči (glej sliko).

Andrej Hudoklin, Ob Sušici 15, SI-8350 Dolenjske Toplice, Slovenija

GAGA *Somateria mollissima*

Eider – a female and a second-year male observed on 19 Mar 2006 at Strunjan (UTM UL94); most records from the Slovene coast come from the Sečovelje salt pans

Dne 19.3.2006 sem na morskih bojah pred Strunjanom opazoval dve (2) gagi, in sicer samico ter drugoletnega samca. Ptici sta skorajda nepremično ležali na sosednjih bojah in se v več kot eni uri le nekajkrat pretegnili. Večina podatkov o pojavljanju gag na Obali je iz Sečoveljskih solin [npr. BORDJAN, D. (2003): Brkata sinica *Panurus biarmicus*. – *Acrocephalus* 24 (119): 151].

Jurij Hanžel, Židovska ulica 1, SI-1000 Ljubljana, Slovenija, e-mail: jurij.hanzel@siol.net

BELOLISKA *Melanitta fusca*

Velvet Scoter – 6 females observed on 21 Jan 2006 in Polje Bay (UTM VL04, SW Slovenia); no Velvet Scoters were recorded at this site during the IWC (International Waterfowl Census) carried out in 2006 a week earlier; most Velvet Scoter records in this area come from the Sečovelje salt pans

Dne 21.1.2006 smo v zalivu Polje pri Ankaranu opazovali jato 6 samic beloliske. Četudi smo jih odkrili le teden dni po januarskem štetju vodnih ptic, takrat v zalivu Polje niso bile opažene (P. KMECL *ustno*). Preseneča tudi njihova številčnost, saj se pri nas večinoma pojavljajo v jatah do največ 6 osebkov, izjemna je bila jata 17 ptic na Ptujskem jezeru leta 1986 [SOVINČ, A. (1994): Zimski ornitološki atlas Slovenije. – Tehniška založba Slovenije, Ljubljana]. Večina podatkov z Obale se nanaša na opazovanja v Sečoveljskih solinah, največja jata je štela 8 samic (B. RUBINIČ *ustno*). Letos je bilo ob IWC prav tako v Sečoveljskih solinah opazovanih 5 belolisk, od teh so bili trije (3) drugoletni samci, kar je zanimiv podatek, saj se pri nas pojavljajo skoraj izključno samice (B. RUBINIČ *ustno*). Leta 2002 je bilo na Obali opazovanih 8 belolisk [ŠTUMBERGER, B. (2002): Rezultati štetja vodnih ptic v januarju 2002 v Sloveniji. – *Acrocephalus* 23 (110–111): 43–47], leta 2003 nobena [ŠTUMBERGER, B. (2005): Rezultati štetja vodnih ptic v januarju 2003 v Sloveniji. – *Acrocephalus* 26 (125): 99–103], leta 2004 2 osebkov, leta 2005 pa nobeden (L. BOŽIČ, *v pripravi*).

Jurij Hanžel, Židovska ulica 1, SI-1000 Ljubljana, Slovenija, e-mail: jurij.hanzel@siol.net

MALI ŽAGAR *Mergellus albellus*

Smew – rare observation on the Slovene coast; 1 male and 2 females recorded on 18 Feb 2006 on freshwater lake at Fiesa (UTM UL84, SW Slovenia)

Mali žagar je na prezimovanju v Sloveniji predvsem ptica celinskih voda, zlasti na reki Dravi, medtem ko je ob morski obali izjemno redek [SOVINČ, A. (1994): Zimski ornitološki atlas Slovenije. – Tehniška založba Slovenije, Ljubljana]. Celo med rednim vsakoletnim štetjem ptic v Sloveniji (IWC) je bil na Obali med letoma 1997 in 2005 zabeležen zgolj enkrat, v letu 2003 [ŠTUMBERGER, B. (2005): Rezultati štetja vodnih ptic v januarju 2003 v Sloveniji – *Acrocephalus* 26 (125): 99–103]. Spričo redkosti pojavljanja malega žagarja ob morju se mi zdi zanimivo opazovanje enega samca in dveh samic dne 18.2.2006. Tudi tokrat sem nekako potrdil vezanost vrste na sladkovodno okolje, saj sem skupinico opazoval na našem morju najbližjem sladkovodnem jezeru Fiesi (UTM UL84). Race sem opazoval na velikem jezeru, sprva le svatovsko obarvanega samca, kasneje pa sta

se mu pridružili še samici, ki sta prileteli z malega jezera. Kot kontrast zimskega izbiranja habitata naj navedem še 6 srednjih žagarjev *Mergus serrator*, ki so plavali na morju pred Fieso. Vrsti, fizično oddaljeni zgolj 100 m, a vendar v povsem različnem in vsaka v svojem okolju.

Al Vrežec, Pražakova 11, SI-1000 Ljubljana, Slovenija, e-mail: al.vrezec@nib.si

BELOGLAVI JASTREB *Gyps fulvus*

Griffon Vulture – passage by one individual on 22 May 2006 over Gonjače (UTM UL89, W Slovenia, Goriška brda,)

Krokanje dveh krokarjev *Corvus corax* nad hišo je bilo tisto, kar je pritegnilo mojo pozornost, a ko sem pogledal, kaj se dogaja, sem nad njima (ca. 100 m nad hišo) zagledal nekaj ogromnega in takoj prepoznal beloglavega jastreba. Z daljnogledom sem si lahko ogledal vse glavne značilnosti te veličastne ptice. Prijadral je iz smeri SZ in letel v smeri JV. Pri tem ni niti enkrat zamahnil s perutmi in tudi smeri ni spreminjal. Pihal je šibak SZ veter (ob 12.30 h je obrnilo na jugozahodnik). Po preletu »našega« griča je zaradi ugodnejše termike pridobil na višini. S to vrsto sem se srečal še 27.5.06, ko je ob 12.00 h en osebek jadral nad planinsko kočo na Sabotinu.

Borut Kumar, Gonjače 1c, SI-5211 Kojsko, Slovenija

RJAVI LUNJ *Circus aeruginosus*

Marsh Harrier – two late observations of probably the same individual on 10 and 18 Dec 2004 at Medvedce reservoir (UTM WM53, NE Slovenia)

Rjavi lunj je sicer na zadrževalniku Medvedce pogosta vrsta. Še posebej pogost je v času jesenske selitve. Decembrskih podatkov za zadrževalnik je le malo. Eno takšnih je tudi z dne 10.12.2004, ko je rjavi lunj krožil nad obsežnim sestojem rogoza *Typha* sp. in šašja *Carex* sp. na zahodni strani zadrževalnika. Osem dni kasneje, 18.12. je verjetno isti osebek opazoval Luka Božič, le da je osebek tokrat sedel na suhem drevesu sredi istih sestojev. Gre za peti objavljeni zimski podatek za Slovenijo in šele tretji za SV Slovenijo [SOVINC. A. (1994): Zimski ornitološki atlas Slovenije.- Tehnološka založba Slovenije. Ljubljana; Božič, L. (1996): rjavi lunj *Circus aeruginosus*. – Acrocephalus 17 (78/79): 162–163].

Dejan Bordjan, Ulica 8. februarja 50, SI-2204 Miklavž, Slovenia, e-mail: dejanonih@email.si

SOKOL SELEC *Falco peregrinus*

Peregrine Falcon - an adult individual observed on 25 Jul 2005 at Medvedce reservoir (UTM WM53, NE Slovenia), while successfully catching a Lapwing *Vanellus vanellus*. On 18 Nov 2001, an individual was spotted unsuccessfully hunting for Teals *Anas crecca* and attacking a Great Egret *Egretta alba*. On 11 Mar 2005, one individual was even seen attacking a Red Fox *Vulpes vulpes*. On 31 Oct 2005, one individual was seen unsuccessfully chasing Finches (Fringillidae).

Sokola selca sem na zadrževalniku Medvedce videl že velikokrat, vendar je bilo opazovanj aktivnega ali celo uspešnega lova bolj malo. Dne 25.7.2005 sem nad zadrževalnikom opazil, da se je jata tridesetih prib *Vanellus vanellus* nenadoma razkropila na vse smeri in se kmalu spet strnila. Nekaj trenutkov kasneje sem opazil v moji smeri letečega sokola selca z uplenjeno pribo. Bil je odrasel osebek in s plenom je letel v proti JV. Po uplenjenem malem žagarju *Mergellus albellus* [BORDJAN, D. (2002): Sokol selec *Falco peregrinus*. Acrocephalus 23 (110–111): 52–53] je to šele moje drugo opazovano uspešno plenjenje sokola selca na zadrževalniku Medvedce. Poskuse plenjenja sem imel možnost opazovati večkrat. Poleg napada na malega sokola *Falco columbarius* [BORDJAN, D. (2002): Sokol selec *Falco peregrinus*. Acrocephalus 23 (112): 100] sem imel možnost opazovati še neuspešen lov na jato kreheljcev *Anas crecca* in več napadov na veliko belo čapljo *Egretta alba* dne 18.11.2001. Dne 11.3.2005 sem opazoval odrasel osebek med preganjanjem lisice *Vulpes vulpes*, dne 31.10.2005 pa sem opazoval neuspešen poskus lova na ščinkavce (Fringillidae).

Dejan Bordjan, Ulica 8. februarja 50, SI-2204 Miklavž, Slovenija, e-mail: dejanonih@email.si

ROCK PARTRIDGE *Alectoris graeca*

Kotorna – 2 osebkata opažena dne 12.7.2006 na Begunjščici (UTM VM44, Karavanke, S Slovenija)

On 12 Jul 2006, I flushed two Rock Partridges on Mt Begunjščica some 5 to 10 m away from me. Because I flushed them from such a small distance, I had a good look at them. The habitat they were found in was in the lower open part of Begunjščica in open *Festuca* spp. grassland surrounded by Norway Spruce *Picea abies*. Although of a very characteristic appearance, the Rock Partridge can be easily confused with the Red-legged Partridge *Alectoris rufa* and the Chukar *Alectoris chukar*. The latter two species have been introduced to Slovenia in the past [GEISTER, I. (1995): Ornitološki Atlas Slovenije. – DZS, Ljubljana]. Therefore a good description is needed. The first impression of the birds was like a large partridge with grey-bluish wings and back and red-brown

tail. Under the wing, on the body, was a vertical barred pattern. Around the white throat and the face, a solid black line could be seen. The Red-legged Partridge has a barred pattern around throat, while the Chukar has a brown spot in the black line behind the eye. While flying, the birds made a harsh 'pitsie' call. This observation is presumably the first for the Karavanke. Two other observations were made more to the east from the Julian Alps, but it is suspected that they were confused with the already mentioned other *Alectoris* species (GEISTER 1995). This observation could indicate that the Rock Partridge occurs in other parts of the Karavanke Mts as well.

Maarten de Groot, Redelonghijeva ulica 26 A, SI-1000 Ljubljana, Slovenija, e-mail: M.deGroot@rocketmail.com

PREPELICA *Coturnix coturnix*

Quail – 15 individuals found dead on 12 Oct 2005 at the factory lit by floodlights on the western margin of Novo mesto (UTM WL17)



Pri novi tovarni Adria Mobil d.o.o. na zahodnem obrobju Novega mesta je bilo 12. oktobra 2005 najdenih kakih 15 mrtvih prepelic. Domnevam, da so se ptice ujele v svetlobno past, ki jo ustvarja osvetljena okolica nove tovarne. Ptice so se očitno poškodovale z naletom v stene objekta, tako kot tudi nekatere druge vrste najdenih mrtvih ptic. Nekaj mrtvih osebkov je veterinarski inšpektor predal v podrobno analizo za ugotovitev vzroka smrti, vendar rezultat ni pokazal znakov okužbe. Zanimivo je, da je lokacija nove tovarne nastala v gozdnem prostoru, potencialnih travniških habitatov pa v neposredni bližini pravzaprav ni. Ptice je na selitvi očitno privabila svetloba. Sicer pa so opažanja prepelic v tem obdobju zelo redka, saj se običajno selitev začne konec avgusta, vrhunec pa je zaznan sredi septembra (glej sliko).

Andrej Hudoklin, Ob Sušici 15, SI-8350 Dolenjske Toplice, Slovenija

RUMENONOGI GALEB *Larus michahellis*

Yellow-legged Gull – one nesting individual and its young observed between Apr and May 2002 behind the chimney on a roof in Izola (UTM UL94, SW Slovenia)

Na začetku meseca aprila leta 2002 smo z družino opazovali zanimivo vedenje para rumenonogih galebcev na strehi naše sosednje hiše v Izoli. Galeba sta se vedla teritorialno, in sicer tako, da sta se pogosto značilno oglašala ter napadala druge ptice (sive vrane *Corvus corone cornix*, srake *Pica pica*, mestne golobe *Columba livia domestica*, turške grlice *Sreptopelia decaocto*), ki so se jima pogosto približevale. Ker se je takšno vedenje nadaljevalo tudi v prihodnjih tednih, sem sklepal, da sta morda galeba izbrala sosednjo stavbo za gnezdenje. Moj sum je dokazalo sprva značilno oglašanje galebčega mladiča, ki se je izvalil v mesecu maju, nato pa tudi njegovo opazovanje. Mladič je bil samo eden, medtem ko jajc zaradi nedostopnosti nisem mogel videti. Ker ima streha nekoliko naklona, menim, da sta galeba jajca izlegla za dimnikom, kjer sta se starša in mladič tudi večino časa zadrževala. Mladiča sem opazoval tudi v naslednjih mesecih. Zaradi moje odsotnosti v poletnih mesecih nimam podatka, kdaj je mladič zapustil gnezdo.

Peter Glasnovič, Ul. Alme Vivode 11, SI-6310 Izola, Slovenija, e-mail: vrba@pinkponk.com

KOZAČA *Strix uralensis*

Ural Owl – one individual attacked a forest worker on 2 Apr 2005 in Kočevski Rog (UTM VL96, S Slovenia)

Znano je, da se kozača v primeru, če so ogroženi njeni mladiči, lahko napadalno vede do vsiljivcev. Eno takšnih izkušenj ve povedati Franc Vidmar, delavec Gozdnega gospodarstva Novo mesto. Zgodilo se je 2.4.2005 na severnem pobočju Pečke v Kočevskem Rogu. Z motorno žago se je napotil k drevesu, ki je na tleh ležalo že nekaj časa. Izpod ležeče krošnj se je vanj nepričakovano zapodila kozača. Z nogami mu je pristala na prsih. Presenečeni gozdar jo je z eno roko zagrabil za predel vratu in jo začel odrivati od sebe, da ga ne bi kljunila v obraz, z drugo pa je poskušal le odrgati njene kremplje s prsi, a ga je sova tako krepko zgrabila z njimi, da so se mu zarili globoko v dlani in prste. Nenavadni boj je trajal več minut, saj sova nikakor ni hotela popustiti, kajti bolj ko jo je z roko držal za vrat, bolj ga je ta stiskala s kremplji. Gozdarju so popuščale moči, loteval se ga je strah, saj situaciji ni bil več kos. Začel je klicati na pomoč, a ga sodelavec ni slišal, ker je takrat tudi sam opravljal delo z motorno žago. Šele čez kakih 10 minut je prihital na pomoč ter z vejo pokončal sovo. Šokiranega delavca so

odpeljali k zdravniku, kjer so mu oskrbeli globlje rane na roki. Sodelavci so pozorno pregledali okolico, vendar gnezda niso našli nikjer. Podobno izkušnjo s srečnejšim koncem sem doživel tudi sam v srečanju s kanjo leta 1993 v Jovsih. Ob terenskem ogledu sem hodil po kolovozu vzdolž odvodnega jarka, obraslega z visokoraslo drevesno vegetacijo. Iznenada sem za hrptom zaznal piš. Ko sem se obrnil, sem lahko videl le senco kanje, ki je v strmem letu pikirala proti moji glavi in tik nad mano »odvila«. Od presenečenja sem počepnil. Ptica, verjetno samec, je potem pristala na bližnjem drevesu in se začela jezno oglašati, na drevesu nad mano pa mu je odgovarjala samica, ki je z mladiči čepela na gnezdu.

Andrej Hudoklin, Ob Sušici 15, SI-8350 Dolenjske Toplice, Slovenija

HUDOURNIK *Apus apus*

Swift – approx. 2000 individuals on 25 Apr 2004 at Lake Ptuj (UTM WM74, NE Slovenia)

Dne 25.4.2004 zvečer smo se pripeljali dobesedno v oblak hudournikov. To je bilo na južnem nasipu Ptujskega jezera. Letali so zelo nizko, pihal je namreč močan severni veter in ob nasipu se je naredil zračni tok, ki so ga hudourniki tako večje izrabljali za svoje letalske akrobacije, da smo kar strmeli. Po naši oceni jih je bilo kakih 2000. Nenadoma pa se je med njimi prikazal škrjančar *Falco subbuteo*. Hudourniki ga niso ne preganjali ne bežali pred njim. Spreletavali so se še vse tja do sončnega zahoda, potem pa nenadoma vsi hkrati izginili neznano kam.

Ana & Gorazd Klemenčič, Ormoška c. 45, SI-9240 Ljutomer, Slovenija

SREDNJI DETEL *Dendrocopus medius*

Middle Spotted Woodpecker – one individual spotted on 5 Feb 2004 in Sessile Oak *Quercus petraea* forest south of the village Dravski Dvor (UTM WM54, Dravsko polje, NE Slovenia).

Dne 5.2.2004 sva avtorja med sprehodom po gozdu na južni strani Dravskega Dvora na Dravskem polju v SV Sloveniji naletela na spreletajoči se osebek srednjega detla, ki sva ga takoj prepoznala po rdeči glavi in progastih bokih. Čeprav sva nanj naletela v gozdu, v katerem prevladuje hrast graden *Quercus petraea*, ga tam nisva pričakovala, saj je najbližje znano gnezdišče kakih 20 km proč v Krajinskem parku Šturmovci pri Ptujju. Zanimiv je tudi datum, ki je le za okrogel mesec "oddaljen" od gnezdilnega obdobja.

Dejan Bordjan, Ulica 8. februarja 50, SI-2204 Miklavž, Slovenija, e-mail: dejanonih@email.si,

Ana Vidmar, Polanškova 8, SI-1000 Ljubljana, Slovenija, e-mail: d.vidmar@siol.net

PEGAM *Bombycilla garrulus*

Waxwing – 15 individuals observed on 15 Feb 2006 at Ižanska cesta on Ljubljansko barje (290 m a.s.l., UTM VL69, C Slovenia), where Waxwing is a rare occasional winter guest

Na Ljubljanskem barju je pegam zgolj občasen zimski gost, z večino podatkov zabeleženih le na obrobju Barja [TOME D., SOVINČ, A. & TRONTELJ, P. (2005): Price Ljubljanskega barja. – Monografija DOPPS št. 3, DOPPS, Ljubljana]. Dne 5.2.2006 sva skupino 15 pegamov opazovala ob Ižanski cesti, skoraj na koncu strnjenege naselja tik pred odcepom za Kozlarjevo goščo (290 m n.v., UTM VL69). Ptice so se prehranjevale na bogato plodeči brogoviti *Viburnum opulus* in se ob tem cvrčče oglašale. Spričo redkosti opazovanj na Ljubljanskem barju se upravičeno sprašujeva, ali ni morda k nam v snežni in ostri zimi 2005/06 spet pljusnil invazijski val pegamov. Nazadnje se je to po dokumentiranih podatkih za Slovenijo zgodilo v zimi 1991/92 [BRAČKO, F. & GROŠELJ, P. (1994): Pojavljanje pegama *Bombycilla garrulus* v Sloveniji – nekoč in danes. – Acrocephalus 15 (62): 16–26], torej pred 13 leti. Širši pregled opazovanj pegamov v Sloveniji v zimi 2005/06 bi morda postregel z jasnejšim odgovorom.

Al Vrežec, Pražakova 11, SI-1000 Ljubljana, Slovenija, e-mail: al.vrezec@nib.si

Petra Vrh, Grič C. IX/1, SI-1310 Ribnica, Slovenija, e-mail: petravrh@yahoo.com

PROSNIK *Saxicola torquata*

Stonechat – several winter records of Stonechat for Dravsko polje; 1 individual spotted on 8 Dec 2001 near Miklavž na Dravskem polju; 2 individuals on 7 Dec 2003 on Medvedce reservoir, 1 individual on 25 Jan 2004 on Medvedce reservoir, 1 individual on 3 Dec 2004 again on Medvedce reservoir, and 1 individual on 8 Dec 2001 near Ormož (UTM WM84, outside Dravsko polje)

Prosnik v okviru ZOAS [SOVINČ, A. (1994): Zimski ornitološki atlas Slovenije. – Tehniška založba Slovenije, Ljubljana.] za Dravsko polje ni bil ugotovljen, edini objavljeni podatek za ta del Slovenije navaja Bračko [BRAČKO, F. (2002): Prosnik *Saxicola torquata*. Acrocephalus 22 (109): 233–241] za december 2001 pri Loki. Tako navajam nekaj lastnih opazovanj te vrste. En osebek je bil opazovan 8.12.2001 v sotočju kanala reke Drave in zbirnega kanala Bohova – Miklavž pri Miklavžu na Dravskem polju. Dva osebk sta bila opazovana 7.12.2003 na zadrževalniku Medvedce. Namigovanje o prezimovanju spodbuja en osebek, opazovan 25.1.2004 na zadrževalniku Medvedce. Možno je, da gre za en osebek iz decembra. Na zadrževalniku je bil prosnik opazovan tudi 3.12.2004, prav tako en osebek.

En osebek, ki sicer ni bil opazovan na Dravskem polju, pa je bil 8.12.2001 zabeležen v Ormoških lagunah.

Dejan Bordjan, Ulica 8. februarja 50, SI-2204 Miklavž, Slovenija, e-mail: dejanonih@email.si

RUMENI VRTNIK *Hippolais icterina*

Icterine Warbler – 2 individuals observed and caught in mist net on 7 Sep 2006 at Šijec bog (UTM WM13, Pokljuka, NW Slovenia) at an altitude of 1200 m a.s.l.

Dne 7.9.2006 sva s Stanetom Kosom obročkala priče na barju Šijec (okoli 1200 m n.v.) na Pokljuki, v Triglavskem narodnem parku. Glavni namen obročkanja je bil pregledati stanje speljanih meniščkov *Parus ater* na osnovi kontrolnega ulova. Na Pokljuki mlade meniščke obročkamo že od leta 1997, in to v 80 umetnih gnezdilnicah. Ves čas lova sva v rušju *Pinus mugo* opazovala manjše sivkaste ptice, ki so med redkimi vejami ali celo na prostem lovile leteče insekte. Z daljnogledom sva si jih občasno malo ogledovala, ugotovila pa le to, da so različnih velikosti in da so nekateri spredaj rumenkasto obarvani. Ta zanimiva uganka se je rešila šele takrat, ko so se ti ptiči znašli v bližnji mreži. Presenečenje je bilo popolno, ko sva imela v roki kar tri različne vrste ptičev: dva (2) severna kovačka *Phylloscopus trochilus*, dve (2) vrtni penici *Sylvia borin* in dva (2) rumena vrtnika. Oba osebka sta bila prvoletna (1y / Euring koda 3). Po podatkih Slovenskega centra za obročkanje ptičev so bili na tej nadmorski višini (okoli 1200 m) v času selitve že enkrat ugotovljeni kovački in vrtni penice, medtem ko rumeni vrtnik, značilni predstavnik nižinskih predelov, še ni bil zabeležen. To najverjetneje pomeni, da na tej nadmorski višini ravno tako poteka selitev in da zatorej lahko pričakujemo tudi katere druge vrste zanimivih ptičev.

Dare Šere, Slovenski center za obročkanje ptičev, Prirodoslovni muzej Slovenije, Prešernova 20, SI-1000 Ljubljana, Slovenija, e-mail: dsere@pms-lj.si

ROŽNATI ŠKOREC *Sturnus roseus*

Rose-coloured Starling – three individuals spotted on 26 May 2005 flying off an active pasture near the Tolmin – Kobarid road (UTM UM92, Soča Valley, W Slovenia)

Dne 26.5.2005 sva se avtorja peljala na štetje selečih se ujed na Breginjski stol. Ob cesti med Tolminom in Kobaridom sva z aktivnega pašnika videla zleteti tri ptice. Vse tri so bile škorčaste oblike. Takoj sva opazila, da so ptice imele črno glavo, peruti in rep. Hrbet in trebuh sta bila svetle barve, kar je ustvarjalo opazen kontrast v barvi na telesu. Takoj sva se ustavila in prečesala pašnik za vsakim mestom, kamor bi se lahko škorci usedli, vendar jih nisva več našla.

Dejan Bordjan, Ulica 8. februarja 50, SI-2204 Miklavž, Slovenija, e-mail: dejanonih@email.si
Miha Krofel, Zavrh pri Borovnici 2, SI-1353 Borovnica, Slovenija, e-mail: mk_lynx@yahoo.co.uk

BREZOVČEK *Carduelis flammea*

Redpoll – rare winter observation of twelve individuals on 27 Dec 2005 feeding on Common Evening Primrose *Oenothera biennis* seeds in abandoned gravel-pit between Rače and Dravski Dvor (UTM WM54, NE Slovenia)

Dne 27.12.2005 sem opazoval dvanajst osebkov v opuščeni gramoznici med Račami in Dravskim Dvorom v SV Sloveniji. Aktivno so se prehranjevali s semeni dvoletnega svetlina *Oenothera biennis*. Ves čas so se spreletavali med mladovjem vrb *Salix* sp. in steblikami svetlina. Bili so precej neplašni, saj sem se jim približal na razdaljo petih metrov. S semeni svetlina se je v času opazovanja prišel hraniti tudi plavček *Parus caeruleus*. Gre za redke podatke za nižine SV Slovenije, še posebej redke pa je za Dravsko polje [SOVINC, A. (1994): Zimski ornitološki atlas Slovenije. – Tehniška založba Slovenije, Ljubljana].

Dejan Bordjan, Ulica 8. februarja 50, SI-2204 Miklavž, Slovenija, e-mail: dejanonih@email.si

ŠKRLATEC *Carpodacus erythrinus*

Common Rosefinch – one individual observed on 29 Jun 2006 during its regular feeding on Great Burnet *Sanguisorba officinalis* at Lake Cerknica (UTM WL56, Central Slovenia)

Dne 29.6.2006 sem bil z Dejanom Groharjem ob Obrhu na Cerkniškem jezeru. Že pred časom mi je izrazil željo, da bi rad videl škrlatca v naravi, in zato sva se odločila, da ga skupaj poiščeva. Čisto po naključju sem skozi teleskop na bližnji vrbi zagledal karminasto rdečega škrlatca, nepremično sedečega na veji. Toda nenadoma se je spustil proti meni in se usedel na manjši grmiček. Od tam pa je zletel na zdravilno strašnico *Sanguisorba officinalis*, ki je je bilo na tem mestu v obilju. Nekaj časa se je prehranjeval



na tej rastlini, nato pa odletel neznano kam. Zanimivo je to, da se je kar kmalu vrnil in se začel vnovič prehranjevati. Potem je spet odletel, pa se vnovič vrnil, in po tem vedenju sem sklepal, da je povsem mogoče, da hrani svoje mladiče. Dne 10.8.2006 mi je v bližini tega mesta uspelo obročkati kar štiri mlade škrlatce. Ta zapis je prispevek k podatkom o prehrani škrlatca (glej sliko).

Dare Šere, Slovenski center za obročkanje ptičev, Prirodoslovni muzej Slovenije, Prešernova 20, SI-1000 Ljubljana, Slovenija, e-mail: dsere@pms-lj.si

HRVAŠKA / CROATIA

ČRNA ŠTORKLJA *Ciconia nigra*

Black Stork – rare sighting on 25 Aug 2006 at Lun on Pag Island (UTM VK74, Dalmatia, W Croatia)

Dne 25.8.2006 sem opazoval različne vrste ptičev za cesto, ki pelje proti Lunu na severnem delu otoka Paga (Hrvaška, Dalmacija). Nenadoma sem opazil, da se proti meni v nizkem letu spušča večja ptica, toda ko me je opazila, se je strmo dvignila in nad mano začela krožiti. Ne vem, zakaj sem takrat za trenutek pomislil na kakšno ujedo, ko pa mi kasneje ni bilo težko ugotoviti, da gre za odraslo črno štokljo. Lepo je bilo namreč videti tudi rdeči kljun in rdeči nogi. Črna štoklja me tudi v fotografskem smislu ni presenetila, saj mi je uspelo narediti sedem digitalnih posnetkov štoklje v zraku. To je moje prvo opazovanje te vrste na otoku Pagu. Po meni znanih podatkih je črna štoklja ob Jadranski obali izredno redka vrsta.

Dare Šere, Langusova 10, SI-1000 Ljubljana, Slovenija, e-mail: dsere@pms-lj.si

WOOD DUCK *Aix sponsa*

Nevestica – samec opazovan enajstkrat med 14.10.2005 in 9.1.2006 na jezeru Sakadaš, Naravni park Kopački rit (UTM CR25, V Hrvaška)



At the beginning of October 2005, we were notified by the "Kopački rit" Nature Park rangers about the observation of a non-familiar duck species near Lake Sakadaš. On 14 Oct 2005, we observed one male individual of Wood Duck. He was rather tame, swimming, feeding or resting on a tree branch in the water. As a curiosity, at the same place and on the same date we observed, swimming together with Wood Duck, a Black-throated Loon *Gavia arctica*. Wood Duck male is a beautifully coloured bird, easy to determinate and

hard to confuse with other ducks species. As the first record for Kopački rit Nature Park, the duck was photographed by Mr Mario Romulić (see photo). We observed the same individual at this site on six occasions during October (14 Oct, 19 Oct, 21 Oct, 24 Oct, 25 Oct & 26 Oct), two in November (11 Nov and 19 Nov), three during December 2005 (3 Dec, 16 Dec and 22 Dec), and finally on 9 Jan 2006. On several other occasions the bird was not present, and we do not know its whereabouts. Based on its behaviour, we are quite certain that the bird had escaped from captivity, considering that we can observe American Wood Ducks in the Osijek ZOO and know that several private owners keep them in captivity.

Tomik Adrian, Department of Biology, University of Osijek, Lj. Gaja 6, HR-31000 Osijek, Croatia, e-mail: adrian.tomik1@os.htnet.hr
József Mikuska, Department of Biology, University of Osijek, Lj. Gaja 6, HR-31000 Osijek, Croatia, e-mail: amikuska@ffos.hr
Alma Mikuska, Department of Biology, University of Osijek, Lj. Gaja 6, HR-31000 Osijek, Croatia, e-mail: amikuska@ffos.hr
Tibor Mikuska, Kopački rit Nature Park Management Office, Ul. Petefi Šandora 33, HR-31327 Bilje, Croatia, e-mail: tmikuska@kopacki-rit.com
Mario Romulić, Orlov put 1, HR-31327 Bilje, Croatia, e-mail: info@romulic.com

EIDER *Somateria mollissima*

Gaga – 3 osebkii opazovani 3.1.2006 v zalivu Gruž (UTM BN62, J Dalmacija, Hrvatska); naslednji dan sta bila opazovana 2 osebkii, ki sta se tam zadrževala še do 15.1.2006

I was in Dubrovnik from 2 to 15 Jan 2006. On the second day of my stay I walked around Gruž Bay, where the city harbour is located. While walking around I noticed, in the very centre of the bay, three Eiders – one male and two females. I continued to observe the two females until 15 Jan 2006, but could not spot the male any more. Throughout the entire period, the birds continued to spend most of the time inside the bay, so it was easy to find them again each day. They were feeding along the boats and buoys overgrown by seaweed, and I saw them close to the coast mostly early in the morning when there were fewer people on the shore. In the area of Croatian coast, Eiders are rare and irregularly occurring birds [RUCNER, D. (1998): Ptice hrvatske obale Jadrana. – Hrvatski prirodoslovni muzej, Ministarstvo razvitka i obnove, Zagreb].

Dubravko Dender, Od Škara 4, HR-20000 Dubrovnik, Croatia, e-mail: dubravko_dender@yahoo.com

JUŽNA POSTOVKA *Falco naumanni*

Lesser Kestrel – several interesting birds seen on 30 Apr 2005 near Knin (UTM WJ97) in the marshes below the road: Marsh Harrier *Circus aeruginosus*, Osprey *Pandion haliaetus*, Purple Heron *Ardea purpurea* and Cetti's Warbler *Cettia cetti*. On the rockwall above the road, the Raven's *Corvus corax* nest and a singing male Blue Rock Thrush *Monticola solitarius* were also observed and, eventually, a Hobby *Falco subbuteo* with lowered right leg, Red-footed Falcon *Falco vespertinus*, Lesser Kestrel *Falco naumanni* and Kestrel *Falco tinnunculus*.

Dne 30.4.2005 smo se peljali po cesti nad vlažnimi travniki in jezerci pri Kninu. Kmalu smo opazili nad jezerci letečega rjavega lunja *Circus aeruginosus* in v daljavi sedečega ribjega orla *Pandion haliaetus*. Ko smo prišli bliže prvemu jezercu, smo iz obrežnega rastja splašili javo čapljo *Ardea purpurea* in malega ponirka *Tachybaptus ruficollis*. Iz grmovja smo lahko slišali petje svilnice *Cettia cetti*, v skalni steni nad cesto pa smo opazili gnezdo krokarja *Corvus corax*. Nedaleč proč od tega gnezda smo opazili še pojočega samca puščavca *Monticola solitarius*. Za zabavo je poskrbel škranjar *Falco subbuteo*, ki je ves čas opazovanja imel spuščeno desno nogo, verjetno zaradi kakšne poškodbe. Pridružila se mu je še samica rdečenoge postovke *Falco vespertinus*. Po nekajminutnem zatišju je prišlo največje presenečenje; opazili smo samca južne postovke, ki je letel zelo nizko nad nami. Potrdilo o pravilni določitvi smo dobili kasneje, ko se je na enakem mestu prikazala samica postovke *Falco tinnunculus*, ki je bila znatno večja in nasploh drugačna. Zanimivo je, da je to že drugi podatek o južni postovki s konca aprila za Dalmacijo v dveh letih [BORDJAN, D. (2004): Južna postovka *Falco naumanni*. *Acrocephalus* 25 (123): 223–238].

Dejan Bordjan, Ulica 8. februarja 50, SI-2204 Miklavž, Slovenija, e-mail: dejanonih@email.si

MALA TUKALICA *Porzana parva*

Little Crane – one individual seen on 7 Apr 2006 at Velo blato on Pag Island (UTM WK00, Dalmatia, W Croatia)

Dne 7.4.2006 sem bil skupaj z Dejanom Groharjem na Velem blatu na otoku Pagu. Opazovala in slikala sva za ta čas zanimive vrste ptic: žličarke *Platalea leucorodia* (9 os.), čopasto čapljo *Ardeola ralloides* (1 os.) in črnorepe ključače *Limosa limosa* (12 os.). Nenadoma se je pred šopom trave za hip prikazala manjša temna kepica in smuknila nazaj v šop.



Pomislil sem na kakšnega malega glodalca in veled Dejanu, ki je stal v bližini šopa, naj bo pri miru. Čez nekaj časa je temna kepica vnovič pokukala iz šopa in ugotovil sem, da gre za eno izmed manjših tukanic. Seveda sem imel pripravljeno digiskopijo in uspelo mi je narediti enajst posnetkov te ptice. Kljun je bil zelene barve, baza pa rdeča, kar je bil zanesljivo znamenje, da gre za malo tukanico. Pritlikava tukanica *Porzana pusilla*, ki je izredno redka in mali podobna, ima v spomladanskem času kljun zelene barve in brez rdeče baze (glej sliko).

Dare Šerc, Langusova 10, SI-1000 Ljubljana, Slovenija, e-mail: dsere@pms-lj.si

KNOT *Calidris canutus*

Veliki prodnik – en osebek opažen 3.9.2005 v območju Stonskih solin (UTM BN62, J Dalmacija, Hrvaška) med hranjenjem v družbi dveh srpkljunih prodnikov *Calidris ferruginea*

During my visit to the Ston salt pans (UTM BN62, S Dalmacija, Croatia) on 3 Sep 2005, a specimen of Knot was noticed. The bird was feeding on the wet, muddy surface together with two Curlew Sandpipers *Calidris ferruginea*. This is a rare visitor to the coastal region of Croatia during the autumn [RUCNER, D. (1998): Ptice hrvatske obale Jadrana. – Hrvatski prirodoslovni muzej, Ministarstvo razvitka i obnove, Zagreb]. During that day, the following birds were noticed in addition to the mentioned species whilst feeding: three Greenshanks *Tringa nebularia*, three Ringed Plovers *Charadrius hiaticula*, one Little Ringed Plover *Charadrius dubius*, one Little Stint *Calidris minuta*, two Little Egrets *Egretta garzetta*, six Grey Herons *Ardea cinerea* and one Pygmy Cormorant *Phalacrocorax pygmeus*.

Dubravko Dender, Od Škara 4, HR-20000 Dubrovnik, Croatia, e-mail: dubravko_dender@yahoo.com

ZLATOVHRANKA *Coracias garrulus*

Roller – an adult spotted on 1 Aug 2005 sitting on a *Tamarix* *Tamarix* sp. bush in the southern part of Kolansko blato on the island of Pag (UTM VK92, Dalmatia, W Croatia).

Dne 1.8.2005 sva med vožnjo po južnem delu Kolanskega blata na otoku Pagu opazila odrasel osebek zlatovranke. Posedala je na vrhu tamariske *Tamarix* sp. Večkrat se je spreletela, nato pa odletela proti skrajnemu jugu Kolanskega blata. Kljub primernemu datumu se ni vedla teritorialno. Zlatovranka je redka selivka obalnega območja, ki na otoku Pagu še ni bila opažena. Prav tako gre za zgoden jesenski podatek [RUCNER, D. (1998): Ptice hrvatske obale Jadrana. – Hrvatski prirodoslovni muzej, Ministrstvo razvitka i obnove, Zagreb.]

Dejan Bordjan, Ulica 8. februarja 50, SI-2204 Miklavž, Slovenija, e-mail: dejanonih@email.si

Ana Vidmar, Polanškova 8, SI-1000 Ljubljana, Slovenija, e-mail: ana_vidmar@email.si

ROLLER *Coracias garrulus*

Zlatovranka – dne 15.6.2006 je bil opažen en osebek v bližini vasi Hreljin (UTM VL61, blizu Kraljevice, Z Hrvaška) na hrvaški obali; na tem območju je bila zlatovranka zadnjič opažena pred 45 leti

One of the authors, Boris Ende, recorded the Roller on 15 Jun 2006 in the area not far from the village of Hreljin some 5 km northeast of Kraljevica in the Croatian Littoral (UTM VL61). The bird was sitting on electric wires above the railway, from where it occasionally alighted on the ground and low surrounding vegetation to catch grasshoppers. The observation took about two hours, from 11.30 to 13.30 h. During that time, the bird was foraging for food, but did not move away, which indicates that it did not feed the young. Several visits to the same area were paid in the coming days aiming at taking photographs of the bird, but the bird could not be found any longer. RUCNER (1998) reported on the flock of Rollers dwelling in Soline Bay on the island of Krk in August 1950 [RUCNER, D. (1998): Birds of the Croatian coast of Adriatic. Croatian Natural History Museum, Zagreb]. The specimen from this flock was shot for the *Scientific collection of bird skins* of the Institute of Ornithology where it is kept today, and the flock is most likely the same as the one described in more detail including the closest location and date: Klimno (the island of Krk, UTM VL70), 29 Aug 1950. Catalogue form of the bird species from the mentioned collection was published in *Ornithology in Croatia* [SUŠIĆ, G., RADOVIĆ, D. & BARTOVSKY, B. (1988): Scientific collection of bird skins of the Institute of Ornithology of the Yugoslavian Academy

of Sciences and Arts. pp. 37–89 In: MESTROV, M. & SUŠIĆ, G. (eds.): Ornithology in Croatia. – Jazu, Zagreb.]. RUCNER (1998) also reported on the species observed in coastal part of Croatia, in Grižane near Crikvenica (UTM VL70) on 18 Apr 1961. Both observations, recorded in different periods, took place about 15 km from the Hreljin village, this year's observation site. The Roller observed at Hreljin near Kraljevica is the third record of this species in the northern part of the Littoral after 45 years.

Jasmina Mužinić, Institute of Ornithology at the Croatian Academy of Sciences and Arts (HAZU), Gundulićeva 24, HR-10000 Zagreb, Croatia, e-mail: jasmina@hazu.hr
Boris Ende, Hreljin, Ružić selo 61, Croatia

BOSNA IN HERCEGOVINA / BOSNIA AND HERZEGOVINA

PURPLE HERON *Ardea purpurea*

Rjava čaplja – en osebek opažen dne 16.4.2006 na mrtvem rokavu reke Bosne (UTM BP78, osrednja Bosna)

Sunday, 16 Apr 2006, was reserved for bird spotting. First of all, Ilhan Dervović and I went to TE (thermal power plant) Kakanj (UTM BP78, Central Bosnia) to check whether two young Cormorants *Phalacrocorax carbo* were still in the place where during the last winter the biggest Cormorant roosting place was found. From there we proceeded to the village of Mulići near Visoko (UTM BP77, Central Bosnia), where a large meander has been formed by the river Bosna. We spotted a Great Egret *Egretta alba*, two Grey Herons *Ardea cinerea*, over 40 Ravens *Corvus corax* and one Whitethroat *Sylvia communis*. In the end we finished our day out at a puddle near Visoko (UTM BP77, Central Bosnia), which is actually an old meander of the river Bosna that remained after the course of the river was altered to make way for the highway. Here we spotted two Moorhen *Gallinula chloropus* and one Purple Heron, which was due to its colours a real reward for us at the end of the day. From a polite distance we were able to observe it for quite a long time, so that Ilhan was able to make some very nice shots of this bird. In the last ten years, we have never seen this bird in the area of the river Bosna.

Jasminko Mulaomerović, B. Zenuni 6, 71000 Sarajevo, Bosnia and Herzegovina
e-mail: jasminko.mulaomerovic@bhtelecom.ba

GOLDEN EAGLE *Aquila chrysaetos* & WHEATEAR *Oenanthe oenanthe*

Planinski orel & kupčar – gnezdenje kupčarja v vasi Lukomir na Bjelašnici (UTM BP73, S Hercegovina), 1340 m n.v., dne 18.7.2006 najdeno gnezdo z mladičem, ki je to gnezdo zapustil 21.7.2006; na isti lokaciji opažen planinski orel dne 27.7.2006

In the last two weeks of July, a group of speleologists from Sarajevo and Zavidovići held the traditional yearly speleological camp, which this year took place in the village of Lukomir (UTM BP73, North Herzegovina) on the Bjelašnica Mt, 1340 m a.s.l. A couple of meters from the tents, in a stone wall (no cement, just rough stones piled on each other), there was a nesting place of the Wheatear. On 18 Jul 2006, Davor Dautbegović and I found a nest that contained one mature young bird. On 21 Jul 2006, this young fled the nest. Three days before the end of the camp, i.e. on 27 Jul 2006, while we were discussing the plans for the day, a Golden Eagle flew slowly high above us, moving from Radobolje in the direction of Dugo polje (the southern side of Bjelasnica, UTM BP73, North Herzegovina). A light-coloured head was clearly visible through the binoculars. Although Reiser saw this bird about a hundred years ago in many places in Bosnia and Herzegovina [OBRATIL, S. (1971): Pregled istraživanja ornitofaune Bosne i Hercegovine III dio. – Glasnik Zemaljskog muzeja u Bosni i Hercegovini, Prirodne nauke, N. s., X: 139–155], it is a real rarity these days.

Jasminko Mulaomerović, B. Zenuni 6, 71000 Sarajevo, Bosnia and Herzegovina, e-mail: jasminko.mulaomerovic@bhtelecom.ba

RED-FOOTED FALCON *Falco vespertinus*

Rdečenoga postovka – med 7.5.2006 in 9.5.2006 posamezni osebki in večja jata zabeleženi v Donji Orahovici pri Gračanici (UTM BQ86), na Ilidži pri Sarajevu (UTM BP85) in Očazih pri Visokem (UTM BP77)

On 7 May 2006, the team (Ilhan Dervović, Dražen Kotrošan, Dubravko Dender and Asad Bajraktarević) went for Brčko to survey the nests of White Stork *Ciconia ciconia*. On that occasion, we stopped in Donja Orahovica near Gračanica (UTM BQ86), where we noticed one White Stork nest on the Karić family house. Hoping to find the male, we went to the nearby field. There we noticed a female Red-footed Falcon circling above the field. Two days later (on 9 May 2006), while observing Fieldfare's *Turdus pilaris* nesting in a park near the Hotel Bosna in Ilidža near Sarajevo (UTM BP85), Dubravko Dender and Dražen Kotrošan registered 20 individuals of Red-footed Falcon circling above the park.

On the same day, Ilhan Dervović registered a flock of 35 individuals in Očazi near Visoko (UTM BP77).

Dražen Kotrošan, Ornitološko društvo "Naše ptice", Semira Frašte 6, 71000 Sarajevo, Bosnia and Herzegovina, e-mail: naseptice@hotmail.com
Dubravko Dender, Ornitološko društvo "Naše ptice", Semira Frašte 6, 71000 Sarajevo, Bosnia and Herzegovina, e-mail: e-mail: naseptice@hotmail.com
Ilhan Dervović, Ornitološko društvo "Naše ptice", Semira Frašte 6, 71000 Sarajevo, Bosnia and Herzegovina, e-mail: naseptice@hotmail.com

SEDGE WARBLER *Acrocephalus schoenobaenus*
Bičja trstnica – en osebek opažen v Sarajevu (UTM BP95) dne 29.4.2006

The Cotoneaster at the foot of the apartment building on Alpašino polje where I live (the western part of Sarajevo, UTM BP95) is mostly favoured by the House Sparrow *Passer domesticus*, but now and then in spring other birds come and pay it a visit. And so on 29 Apr 2006 I spotted a Sedge Warbler, which stayed for a whole hour. The next morning the bird did not return. Sedge Warblers were spotted in Sarajevsko polje by Reiser [OBRATIL, S. (1971): Pregled istraživanja ornitofaune Bosne i Hercegovine (I dio). – Glasnik Zemaljskog muzeja u Bosni i Hercegovini, Prirodne nauke, N. s., V: 191–268] about a hundred years ago, but in those days this area was suitable for this bird. Nowadays there is hardly a tree or a bush in this area of the city that houses nearly 100,000 people.

Jasminko Mulaomerović, B. Zenuni 6, 71000 Sarajevo, Bosnia and Herzegovina, e-mail:jasminko.mulaomerovic@bhtelecom.ba

WAXWING *Bombycilla garrulus*
Pegam – dne 26.04.2006 zabeleženih sedem osebkov na poti od Baric proti Crepoljskemu (UTM CP06, jugozahodni obronki gore Ozren pri Sarajevu)

During the one-day trip to Barice near Sarajevo on 26 Apr 2006, birds were being observed along the direction from Barice to Crepoljsko (UTM CP06). Along with the species usual in this area, a group of seven Waxwings was registered. The birds were seen by the edge of a spruce forest. They stayed in trees, and from time to time their song could be heard. Waxwing has not been registered so far in the area of the central Bosnian mountain of Ozren [KOTROŠAN, D., 2005: Pilot Project "Biodiversity monitoring on higher plants (Cormophyta), mushrooms (Macromycetes), and birds (Aves) at Ozren mountain". Final Report].

Dubravko Dender, Ornitološko društvo "Naše ptice", Semira Frašte 6, 71000 Sarajevo, Bosnia and Herzegovina, e-mail: naseptice@hotmail.com

SRBIA / SERBIA

GOLDEN EAGLE *Aquila chrysaetos*
Planinski orel – opazovanje odraslega osebkov planinskega orla dne 18.7.2003 na gori Maljen (UTM DP28) ter skupine dveh odraslih in enega mladostnega osebkov dne 19.7.2003 na isti lokaciji

On 18 Jul 2003, during our excursion to the river Manastirica (village Krčmar valley, northern part of Maljen Mt (UTM DP28)), Boris Radak, Milorad Vujičić and the authors of this note saw a huge bird of prey flying above a fissure of Mt Orlovica. It was an adult Golden Eagle. Few minutes later we also saw an adult Peregrine Falcon *Falco peregrinus* flying high from Orlovica towards the west, following the majestic eagle's trail. On the following day we again visited this locality, looking for birds around Mt Orlovica's slopes. This time we observed 3 Golden Eagles (2 adults and one juvenile) flying at a height less than 100 m next to the cliffs. Orlovica peak is the only hill in the area with open rocky cliffs, and it is quite possible that this Golden Eagle pair breeds here. This observation suggests a possible breeding of the Golden Eagle on Maljen Mt. If this is confirmed, this would be the first breeding record on the mountain [NOVAKOVIĆ, B. & RAKOVIĆ, M. (2004): Situation and analyse of the bird fauna of Mt Maljen. – Ciconia 13: 99–104.].

Marko Đurakić, Milana Miloševića 14, 32000 Čačak, Serbia, e-mail: marko_djurakic@yahoo.com
Marko Šćiban, Bate Brkića 18, 21000 Novi Sad, Serbia, e-mail: sciban@eunet.yu

BOOTED EAGLE *Hieraetus pennatus*
Mali orel – trije osebkovi opaženi pri vasi Dolovo (UTM DQ97, J Banat, Vojvodina, Srbija) dne 9.5.2006 in en osebek pri vasi Gaj (UTM EQ05, J Banat, Vojvodina, Srbija)

On 9 May 2006, I went on a short excursion to Deliblato Sands, driving via village Deliblato. Before reaching the village of Dolovo (S Banat, Vojvodina, UTM DQ97), my attention had been attracted by two raptors circling near the road. When I took a closer look at them through the telescope, I spotted two and then three smaller raptors of approximately Common Buzzard *Buteo buteo* size. However, their silhouettes gave me an impression of eagle-like birds. Their size and the pattern on the upper side of their wings left me no doubts – I was observing Booted Eagles. Among other characteristics I saw pale lines on their wings and, even more evident, pale patches on the bases of wings – the so called "landing lights". The ventral side was darker with blackish greater underwing coverts. There were visible brighter spots on the primaries. I also spotted warmer colours

on the tails of two individuals, while the third lacked almost all tail feathers. All three birds belonged to the "rufous" morph. In order to study the birds more precisely, I climbed a small hill, from which I was then observing their mating flights for a whole hour. My second observation of Booted Eagles took place on 13 May 2006. During my drive from the village of Dubovac, I stopped near the steppe pastures close to the village of Gaj (S Banat, Vojvodina, UTM EQ05) in order to take a closer look at the local Bee-eater *Merops apister* colony, and the very numerous and noisy European Souselik *Spermophilus citellus*. Suddenly, they became very disturbed. Their attention, as well as mine, was caught by a raptor coming from the south, which started circling above the pasture. I easily identified it as the Booted Eagle (pale morph). After some circling, it headed towards the village of Šumarak. These data fits well with the recent observations of Booted Eagle pairs in Deliblato Sands [TUČAKOV, M., PROBST, R., PUZOVIĆ, S. & VUČANOVIĆ, M. (2005): Probable new breeding sites of Booted Eagle *Hieraaetus pennatus* in Vojvodina (N Serbia). – *Acrocephalus* 126: 147–149.] and confirm the possibility that breeding by one or even two pairs may be taking place in Deliblato Sands in 2006 as well.

Maciej Szymański, ul. Bernardyńska 1a/67, 02–904 Warsaw, Poland, e-mail: macszym@yahoo.com

RED-FOOTED FALCON *Falco vespertinus*

Rdečenoga postovka – jata približno 40 osebkov opažena dne 30.4.2005 pri jezeru Gruža (osrednja Srbija, UTM DP76)

On 30 Apr 2005, we counted birds on Lake Gruža (C Serbia, UTM DP76). We stopped by the road on the southern edge of the lake. This part of the lake is surrounded by arable land, crop fields, and extensively managed meadows with rare bushes. We observed 4 breeding pairs of Crested Grebes *Podiceps cristatus*, male Wigeon *Anas penelope*, male Garganey *Anas querquedula*, a pair of Coots *Fulica atra*, a pair of Lapwings *Vanellus vanellus*, 5 pairs of Black-headed Yellow Wagtails *Motacilla flava feldegg*, about 10 pairs of Whinchats *Saxicola rubetra*, Garden Warbler *Sylvia borin* and Great Reed Warbler *Acrocephalus arundinaceus* in bushes, 10 – 15 pairs of Ortolan Buntings *Emberiza hortulana*, and numerous pairs of Corn Buntings *Miliaria calandra*. At 17.15 h, we spotted a flock of about 40 Red-footed Falcons above the clay pit and fields on the north side of the lake. Birds were hunting flying insects in a group, hovering and stooping for prey. They remained there for around 20 minutes and flew up north. A similar size and behaviour of migrating social Red-footed Falcons' flock was also registered in the adjacent Čačak valley on 23 Apr 2003 [RUŽIĆ, M. (2003):

Some aspects of the 2002/2003 spring migration of birds in the Čačak area. – *Ciconia* 12: 163–166]. Considering the fact that Red-footed Falcon doesn't breed in Central Serbia [PUZOVIĆ, S., SIMIĆ, D., SAVELJIĆ, D., GERGELJ, J., TUČAKOV, M., STOJNIC, N., HULO, I., HAM, I., VIZI, O., ŠĆIBAN, M., RUŽIĆ, M., VUČANOVIĆ, M. & JOVANOVIĆ, T. (2003): Birds of Serbia and Montenegro – breeding population estimates and trends: 1990 – 2002. – *Ciconia* 12: 35–120], and in view of the time of observation it is clear that we observed a migrating flock.

Milan Ružić, ul. 8/8 N. N. Atenica, 32000 Čačak, Serbia, e-mail: milruzic@yahoo.com
Uroš Pantović, Takovska 5, 32000 Čačak, Serbia, e-mail: pantovic_uros@yahoo.co.uk
Miloš Radaković, Drakčići, 36000 Kraljevo, Serbia, maxkv@ptt.yu

MARSH SANDPIPER *Tringa stagnatilis*

Jezerški martinec – en osebek opažen dne 11.4.2004 na majhnem ribniku pri mestu Kula (UTM CR85, Vojvodina)

On 11 Apr 2004, I visited a small fishpond near town Kula (UTM CR85). Calls of Marsh Sandpiper flying above the lake were heard on 12.26 h. Between 12.25 and 12.50 h, during a detailed observation of the lake, probably the same specimen was observed feeding on the bank of the small pool which remained after the fishpond was drained. Soon afterwards the bird flew away. This is so far the first and only observation of this species in central parts of Bačka region, which is mainly covered by agricultural fields. This region is also without large lakes, which are common in Banat and eastern Bačka and are favourite habitats for the species in northern Serbia [LUKAČ, Š. & TERNOVAC, T. (1990): Beleške o ornitofauni Slanog Kopova od 1987 do 1989 godine. – *Ciconia* 2: 50–63; LUKAČ, Š. & LUKAČ, A. (1992): Ornitofauna ribnjaka Bečeje. – *Ciconia* 4: 4–17; AGOŠTON, A. (2004): Invertarizacija ptica na ribnjaku kod Novog Kneževca sa procenom brojnosti gnezdarica. – *Ciconia* 13: 88–93].

Marko Šćiban, Bate Brkića 18, 21000 Novi Sad, Serbia, e-mail: sciban@eunet.yu

COMMON GULL *Larus canus*

Sivi galeb – en osebek opažen na zahodni Moravi pri Trnavski Bari (UTM DP55, JZ Srbija), dne 11.11.2004

On Nov 11 2004, I counted birds on 2 km long transect along the Zapadna Morava River from Prelića Polje to Trnavska Bara (SW Serbia, UTM DP55). On that mild winter day, I registered 12 Little Grebes *Tachybaptus ruficollis*, 7 Pygmy Cormorants *Phalacrocorax pygmeus* flying

upstream to roost, 1 Great Egret *Egretta alba*, 18 Grey Herons *Ardea cinerea*, 3 Kingfishers *Alcedo atthis*, 3 Water Pipits *Anthus spinoletta*, 2 Grey Wagtails *Motacilla cinerea*, 6 Dunnocks *Prunella modularis*, around 160 Fieldfares *Turdus pilaris* and 5 Reed Buntings *Emberiza schoeniculus*. I paid my attention to a Black-headed Gull *Larus ridibundus* that flew upstream Trnavska Bara. Just several minutes after it, another obviously bigger gull showed up circling and foraging over the river. It had yellow bill, large white mirror on wings and clear white head and tail. There was no doubt that I had just twitched my first Common Gull. Considering the time of year, I was confused by its full breeding plumage. Gulls are not frequent and numerous wintering birds in the upper Zapadna Morava. Until this observation, only a Black-headed Gull and Yellow-legged Gull *Larus michabellis* had been registered in the winter months. They are most often seen foraging on and around rubbish dumps.

Milan Ružić, ul. 8/8 N. N. Atenica, 32000 Čačak, Serbia, e-mail: milruzic@yahoo.com

LESSER BLACK-BACKED GULL *Larus fuscus*
Rjavi galeb – en osebek opažen dne 15.12.2005 na Donavi pri Novem Sadu

On 15 Dec 2005, we paid a short visit to the river Danube in Novi Sad. Downstream the Varadinska Duga bridge, an adult Lesser Black-backed Gull was observed among about 150 Yellow-legged Gulls *Larus michabellis*. It was easy to spot the bird since it was often driven off by other gulls. The bird finally flew upstream, where all the gulls usually spend their night. During that time, about 5 Common Gulls *Larus canus* were also present. This is the first observation of Lesser Black-backed Gull in the town of Novi Sad and its surroundings [NEMETH, G. (1989): Ptice Ribarskog ostrva kod Novog Sada. Ciconia 1: 18–21.; ŠĆIBAN, M., RADIŠIĆ, D. (2004): Posmatranje zanimljivih selica i zimovalica u Novom Sadu. Ciconia 13: 172–174].

Marko Šćiban, Bate Brkića 18, 21000 Novi Sad, Serbia, e-mail: sciban@eunet.yu
 Nemanja Ristić, Balzakova 67, 21000 Novi Sad, Serbia, e-mail: rile_87@yahoo.com

STOCK DOVE *Columba oenas*
Golob duplar – oglašanje goloba duplarja zabeleženo dne 17.7.2005 na gori Čemerno (1400 m n.v., UTM DP52) in 21.7.2005 na gori Stolovi (1200 m n.v., UTM DP62, osrednja Srbija) v starem bukovem gozdu

On 17 Jul 2005, we visited Mt Čemerno (UTM DP52) and its peak Smrdljuč. At around 16.30 h, when reaching

the southern slopes of the mountain at about 1400 m a.s.l. in an old beech forest, we heard a Stock Dove calling from the forest. It was quite old, containing trees no less than 30 m high, mainly European Beech *Fagus sylvatica* and Balkan Beech *F. moesiaca*. In the vicinity of the forest surrounded by extensive pastures was a small pond dug for livestock near a large farm (600 – 700 m away). On 21 Jul 2005, during our visit to Mt Stolovi (UTM DP62) at an altitude of about 1200 m, we heard a Stock Dove calling on the northern slopes, from the European Beech *Fagus sylvatica* forest. Just some 100 m from this locality, there was a small farm with numerous water supplies for livestock. This is the first evidence for the summer presence of this species for both mountains. Both findings have several similarities. There are old beech forest with hollow tree trunks, extensive farming, stable water supplies and presence of humans.

Miloš Radaković, Drakčići, 36000 Kraljevo, Serbia, e-mail: maxkv@ptt.yu
 Marko Šćiban, Bate Brkića 18, 21000 Novi Sad, Serbia, e-mail: sciban@eunet.yu
 Milan Ružić, Ulica 8/8 N.N., Atenica, 32000 Čačak, Serbia, e-mail: milruzic@yahoo.com
 Robert MacCurrach, Vinogradska 31, 21131 Petrovaradin, Serbia, e-mail: rob@eunet.yu
 Uroš Pantović, Takovska 5, 32000 Čačak, Serbia, e-mail: pantovic_uros@yahoo.co.uk

TAWNY PIPIT *Anthus campestris*
Rjava cipa – dne 4.9.2004 opaženih približno 41 osebkov vzdolž reke Tise pri Bisernem ostrvu (UTM DR24)

On 4 Sep 2004, during the regular visit to the embankments around the river Tisa on Biserno ostrvo (UTM DR24), the author researched the area between the river's 56th and 61st kilometres. At 15.30 h, the first group of approx. 7 Tawny Pipits was observed feeding in low vegetation near the 58th km. Among them were at least 2 juveniles. About 1 km upstream, approx. 9 individuals were spotted. While continuing upstream to the 61st km, I counted additional approx. 25 Tawny Pipits, which means that on that day approximately 41 individuals were observed on the right side of the embankment. All birds were scattered in low vegetation and in small groups (2 – 7 individuals each). For the local conditions, this seems quite a major concentration of this species in such a small area [GERGELJ, J., TOT, L., FRANK, Z. (2000): Ptice Potisja od Kanjiže do Novog Bečaja. – Ciconia 9: 121–158.], which suggests intensive migration.

Marko Šćiban, Bate Brkića 18, 21000 Novi Sad, Serbia, e-mail: sciban@eunet.yu

WHEATEAR *Oenanthe oenanthe*

Kupčar – verjetna gnezditelj v rezervatu Slano Kopovo (UTM DR45, Vojvodina) v letu 2004

On 15 Apr 2004, the surroundings of Slano Kopovo (UTM DR45) were researched together with Robert MacCurrach. Beside a road between the villages Novi Bečej and Bašaid, there are several elevated groves. In one of them there is a small bunker from the First World War with one small window in it. An adult Wheatear male was sitting on top of the bunker and singing occasionally. In the same place, probably the same bird was observed again during our next visit on 15 May 2004. Later in the year, we visited the bunker and found an old nest in it and therefore concluded that one pair actually bred there during the summer of 2004. Considering that Wheatear had not been observed earlier in the breeding period in the Slano Kopovo reserve [TERNOVAC, T., LUKAČ, Š. (1989): Notes on ornithofauna of Slano Kopovo in 1986. *Ciconia* 1: 26–30.; LUKAČ, Š., TERNOVAC, T. (1990): Notes on ornithofauna of Slano Kopovo from 1987 to 1989. *Ciconia* 2: 50–63.], this is the first probable breeding data for this area.

Marko Ščiban, Bate Brkića 18, 21000 Novi Sad, Serbia, e-mail: sciban@eunet.yu

STONECHAT *Saxicola torquata*

Prosnik – na jezeru Okanj (UTM DR43, Vojvodina) dne 19.3.2005 opažena jata 31 osebkov na selitvi

On 19 Mar 2005, while visiting Lake Okanj (UTM DR43), the authors of this note and Robert MacCurrach observed 31 Stonechats flying together in a flock towards the north. Birds appeared at 11.05 h, after which they started to circle and flew to a greater altitude. After reaching more than 100 m above the ground, the birds continued to fly towards the north. This manner of Stonechat migration has never been documented or recorded in Serbia so far [PUZOVIC, S. (1989 – 1990): Whinchat, *Saxicola rubetra* (L.) and Stonechat, *Saxicola torquata* (L.) in the East Srem Area. – *Larus* 41–42: 93–100]. Birds always appear solitary or in small packs in early March, while small numbers of birds can be observed in winter months.

Marko Ščiban, Bate Brkića 18, 21000 Novi Sad, Serbia, e-mail: sciban@eunet.yu
Vladimir Rakić, Preradovićeve 125, 21132 Petrovaradin, Serbia, e-mail: pandion@neobee.net

RING OUZEL *Turdus torquatus*

Komatar – pojoč samec podvrste *alpestris* opažen dne 26.3.2005 na macesnu *Larix decidua* v Petrovaradinski trdnjavi v Novem Sadu (UTM DR11, Vojvodina)

During a short visit to Petrovaradin Fortress near Novi Sad (UTM DR11) on 26 Mar 2005, accompanied by Tanja Bjelanović, I paid attention to birds. We walked through the park around the Academy of Arts in the SW part of the fortress. Around 15.35 I heard an unfamiliar song coming from the top of a large larch *Larix* sp. It was an adult male Ring Ouzel. Both of us clearly saw the white patch on its breast, dark body with paler wings and yellowish bill. The abdomen was barred and typical for the race *alpestris*. After few minutes it flew some 50 m to another tall tree, from where it sang short notes and disappeared from our sight. There are 9 previous records from Vojvodina, where single birds were observed during the spring migration [GERGELJ, J., TOT, L. & FRANK, Z. (2000): Ptice Potisja od Kanjiže do Novog Bečaja. – *Ciconia* 9: 121–158.; SEKEREŠ, O. & MARTON, F. (1998): Drozd ogrličar (*Turdus torquatus*) pored Tise kod Kanjiže. – *Ciconia* 7: 141.; ŽULJEVIĆ, A. (1997): Podaci o nekim ptičjim vrstama u okolini Sombora. – *Ciconia* 6: 112.; ŽULJEVIĆ, A. & TUCAKOV, M. (1998): Novi podaci o prolećnoj migraciji drozda ogrličara (*Turdus torquatus*) na području severozapadne Bačke. – *Ciconia* 7: 141.] and just one record from autumn migration [HULO, I. (1990): Podaci o nekim ptičjim vrstama u Vojvodini. – *Ciconia* 2: 88–90.]. Late March and the first half of April are therefore considered to be the main period for spring migration by Ring Ouzel through the Vojvodina lowlands.

Milan Ružić, ul. 8/8 N. N. Atenica, 32000 Čačak, Serbia, e-mail: milrucic@yahoo.com

TURČIJA / TURKEY

ČRNA ŠTORKLJA *Ciconia nigra*

Black Stork – 1 individual observed on 17 Sep 2004 in the Ihlara valley in Central Turkey; in Sultan sazliği, 5 individuals on 21 Sep 2004, and on 22 Sep 2004 100 ind. that flew from the Sultan sazliği marshes and started to soar to high altitudes; on 24 Sep 2004 1 individual observed feeding in the Kizilirmak river near Avanos in Central Turkey; 11 individuals using thermal winds in Ala dağlari mountains near Nidže on 27 Sep 2004; more were spotted on 2 Oct 2004 near Karataş south of Adana, and additional 20 were seen foraging along with White Storks *Ciconia ciconia* and Grey Herons *Ardea cinerea* in a roadside pool on 14 Oct 2004 near Afyon.

Med potovanjem po Turčiji sva imela priložnost opazovati selitev črnih štorkelej. En osebek sva opazila v dolini Ihlara 17.9.2004. V območju močvirja Sultan sazliĝija sva preplašila pet osebkov med hranjenjem v plitvi mlaki 21.9.2004. Naslednji dan sva opazovala sto osebkov črnih štorkelej, ki so se dvigale iz močvirja. En osebek sva opazovala med hranjenjem na reki Kizilirmak pri mestu Avanos 24.9.2004. Dne 27.9.2004 sva videla enajst osebkov, ki so izkoriščali termalne vetrove v pogorju Ala daĝlari blizu mesta Nidĝe. Dva osebkva sva opazovala pri mestu Karataş južno od Adane in še dvajset osebkov pri mestu Afyon 14.10.2004.

Dejan Bordjan, Ulica 8. februarja 50, SI-2204 Miklavž, Slovenija, e-mail: dejanonih@email.si
Ana Vidmar, Polanškova 8, SI-1000 Ljubljana, Slovenija, e-mail: ana_vidmar@email.si

IZMIRSKI GOZDOMEK *Halcyon smyrnensis*

White-throated Kingfisher – one observed flying amongst fields far away from any suitable tree for it to sit on; observation was made on 6 Oct 2004 in the area of Yumurtalic lagoon in S Turkey

Dne 6.10.2004 sva križarila po območju lagune Yumurtalic v J Turčiji. Tam sva v daljavi opazila srednje veliko ptico v letu. Kmalu je bliže priletel izmirski gozdomec. Čeprav je zanj znano, da se ne zadržuje blizu voda, je bil daleč od vsega. Pokrajina, po kateri je letel, je bila brez dreves, in najbližja voda je bila na zemljevidu oddaljena več kilometrov. Vse skupaj ne bi bilo presenetljivo, če ne bi imela možnosti opazovati, kako gozdomec leti. Odkrito lahko rečem, da je to najpočasneje leteča ptica, kar sem jih imel priložnost videti doslej. Letel je z globokimi in počasnimi zamahi kril, ki so ga počasi potiskale naprej. Je pravo nasprotje našemu vodomcu *Alcedo atthis*.

Dejan Bordjan, Ulica 8. februarja 50, SI-2204 Miklavž, Slovenija, e-mail: dejanonih@email.si
Ana Vidmar, Polanškova 8, SI-1000 Ljubljana, Slovenija, e-mail: ana_vidmar@email.si

SIVA PASTIRICA *Motacilla cinerea*

Grey Wagtail – one individual seen 1 Oct 2004 flying along a sewage channel by the sea in Karataş in S Turkey

Dne 1.10.2004 sva v obmorskem mestu Karataş šla na sprehod ob obali. Tam sva naletela na izpust iz kanalizacije. Ali je šlo za potok, v katerega so speljali kanalizacijo, ali pa je sama kanalizacija že naredila pol metra široko strugo. Voda tega "potoka" je bila siva. V njej so bile vidne bele nitke gliv in bakterij. Od izvira struge izpod betona in asfalta do morja je bilo pedeset metrov. Na tem odseku se je zadrževala

siva pastirica. Spreletavala se je gor in dol po strugi. Gre za zanimiv podatek, kjer se siva pastirica, ki je nam bolj znana iz čistih gorskih potokov, zadržuje ob morju in ob organsko zelo obremenjenem vodotoku.

Dejan Bordjan, Ulica 8. februarja 50, SI-2204 Miklavž, Slovenija, e-mail: dejanonih@email.si
Ana Vidmar, Polanškova 8, SI-1000 Ljubljana, Slovenija, e-mail: ana_vidmar@email.si

PLANINSKI VRABEC *Montifringilla nivalis*

Snow Finch – large flock seen in Ala daĝlar Mts in Central Turkey between 27 Sep 2004 and 30 Sep 2004, some flocks numbered several hundred individuals and were mostly mixed with Horned Larks *Eremophila alpestris*

V celotnem času trekinga po pogorju Ala daĝlar med 27. – 30.9.2004 sva imela priložnost opazovati več stoglave jate planinskih vrabcev. Največje jate so štele več kot petsto osebkov. Te jate so bile na celotnem območju obiska. Tako lahko zaključim, da se je na prehojenem območju zadrževalo več tisoč osebkov planinskih vrabcev. Prav zanimiv pogled za nekoga, ki je vajen, da je to redka ptica. Med njimi so bile tudi več desetglave jate uhatih škrjancev *Eremophila alpestris*. Ornitofavno tega območja so dopolnili rdečecheli grilčki *Serinus pusillus*, skalni strnadi *Emberiza cia*, skalni vrabci *Petronia petronia*, turške kotorne *Alectoris chukar*, planinske vrane *Pyrhocorax pyrrhocorax*, kavke *Pyrhocorax graculus* in planinski orli *Aquila chrysaetos*.

Dejan Bordjan, Ulica 8. februarja 50, SI-2204 Miklavž, Slovenija, e-mail: dejanonih@email.si
Ana Vidmar, Polanškova 8, SI-1000 Ljubljana, Slovenija, e-mail: ana_vidmar@email.si

Instructions to authors

V *Acrocephalus* so objavljeni izvorni prispevki iz vseh področij ornitologije. Geografsko ni omejitve, urednik pa spodbuja objavo člankov iz območja jugovzhodne Evrope in vzhodnega Sredozemlja. Prispevki ne smejo biti poslani v objavo v še kaki drugi reviji. *Acrocephalus* sprejema v objavo članke, kratke članke in notice za objavo v rubriki Iz ornitološke beležnice, poleg tega pa še strokovne in znanstvene komentarje (uvodnik, forum) in recenzije knjig (nove knjige). Jezik objave je slovenščina ali angleščina.

Struktura poslanega gradiva za objavo članka:

Naslovna stran vsebuje naslov članka, imena avtorjev, naslove institucij, ki jih zastopajo, ali domači naslov, ter e-mail naslove.

Izvleček naj ne obsega več kot 250 besed in naj predstavi cilje, metode, najpomembnejše rezultate in zaključke. V izvlečku se ne sklicujemo na glavni tekst in ne uporabljamo okrajšav.

Glavne besede izberite tako, da čimbolj opišejo vsebino članka.

Besedilo naj ima strukturo IMRAD (uvod, metode, rezultati in diskusija). Slovenska imena ptic naj bodo povzeta po imeniku ptic zahodne Palearktike [Jančar T. et al. (1999), *Acrocephalus* 20 (94-95): 97-162]; znanstveno latinsko ime v *kurzivi* naj bo navedeno v naslovu, pri prvem poimenovanju in izvlečku in pri prvem poimenovanju v glavnem besedilu.

Literatura: Dela v seznamu literature navedite po abecednem, pri istem avtorju pa v kronološkem vrstnem redu; če je avtor v istem letu objavil več del, dodamo za letnico male črke (npr. Tome 1990a). V besedilu citiramo kot Snow & Perrins (1998) ali (Snow & Perrins 1998). Pri tekstih z več kot dvema avtorjema navajamo kot (Zeiler et al. 2002). Pri imenih revij uporabimo uveljavljene okrajšave (glej <http://www.ueb.cas.cz/bp/notice-abbrev.htm>) ali celotno ime. Primeri citiranja slovstva:

članek v reviji: Sackl, P. (2000): Form and function of aerial courtship displays in Black Storks *Ciconia nigra*. – *Acrocephalus* 21 (102-103): 223-229.

knjiga: Handrinos, G. & Akriotis, T. (1997): The Birds of Greece. – Christopher Helm, A & C Black, London.

poljavje v knjigi: Diedrich, J., Flade, M. & Lipsbergs, J. (1997): Penduline Tit *Remiz pendulinus*. pp. 656-657 In: Hagemajjer, W.J.M. & Blair, M.J. (eds.): The EBCC Atlas of European Breeding Birds. – T & AD Poyser, London.

Tabele so brez navpičnih črt. Izogibajte se obsežnih legend. Naslov tabele naj bo napisan na istem listu. Vsaka tabela naj bo na svojem listu. V tekstu se sklicujete na tabelo kot (tabela 1).

Slike naj bodo izdelane kvalitetno in naj bodo najmanj za 1/3 večje od pričakovane velikosti odtisa, vendar ne večje od formata A4. Grafikoni naj bodo le črno-beli. Število fotografij naj bo čim manjše, s izborom le tistih, ki prispevajo k razumevanju članka. Izjemoma so lahko barvne, ki so natisnjene na zadnji strani revije. V tekstu se sklicujete na sliko kot (slika 1).

Kratke notice iz ornitološke beležnice: Besedilo notice je zvezno brez odstavkov. Naslov notice je ime vrste. Kratke izvleček v največ dveh stavkih naj vsebuje lokacijo opazovanja z geografsko koordinato (UTM, stopinjska, Gauß-Krüger) in datum ter povzame bistvo notice. Vire citiramo v tekstu kot [Mikkola, H. (1983): Owls of Europe. – T & AD Poyser, London], ob drugem citiranju pa kot (Mikkola 1983). Kratke notice pošljite v objavo le v elektronski obliki (disketa, CD ali e-mail).

Napotek: Pri oblikovanju besedil se zgledujte po zadnjih številkah revije *Acrocephalus*!

Postopek objave: Rokopis je treba poslati na urednikov naslov v treh izvodih. Urednik pošlje članek dvema recenzentoma. Avtorji članek ustrezno dopolnejo natančno po navodilih recenzentov oziroma obrazložijo neupoštevane pripombe ob vrnitvi članka. Popravljeni članek je treba dostaviti v elektronski obliki na disketi, CD-ju ali po e-mailu na urednikov naslov. Urednik se nato odloči glede objave, ponovne recenzije ali zavrnitve. Članek sprejme v objavo uredniški odbor. Notice iz ornitološke beležnice pregleda le urednik, ki lahko za mnenje prosi člane uredniškega odbora ali Komisijo za redkosti.

Original work from all fields of ornithology is published in *Acrocephalus* without any geographical limitation. However, articles covering the South-eastern European and Eastern Mediterranean regions are particularly encouraged. The contributions should not have been submitted to publication elsewhere. Long and short articles, short notes for publication in the section "From the ornithological notebook", specialist and scientific comments (Editorial, Forum), and book reviews (New books) are considered for publication. Contributions can be published in English or Slovene.

Format of articles submitted for publication:

Front page should contain the title, names of authors, Institution or home addresses as appropriate, and e-mail addresses.

Abstract should not be longer than 250 words, and should include aims, methods, main results, and conclusions. Do not refer to the main text in abstract, and do not use abbreviations.

Key words have to represent the text as much as possible.

Text should follow IMRAD structure (Introduction, Methods, Results, Discussion). English bird names should follow [Snow, D.W. & Perrins, C.M. (1998): The Birds of the Western Palearctic. Concise Edition. – Oxford University Press, Oxford, New York]. The scientific Latin name in *italic* should be referred to in the title (if necessary), in the first species mention in the abstract, and in the main text.

References: References should be cited in alphabetical order of first authors, and by chronological order by the same author. If the author has published more than one work in one year, a small letter is added to the year (e.g. Tome 1990a). In the text, references are cited as Snow & Perrins (1998) or (Snow & Perrins 1998) as appropriate. More than two authors are cited as (Zeiler et al. 2002).

Abbreviations commonly used for journals may be found at <http://www.ueb.cas.cz/bp/notice-abbrev.htm>. References should be in the following style:

journal paper: Sackl, P. (2000): Form and function of aerial courtship displays in Black Storks *Ciconia nigra*. – *Acrocephalus* 21 (102-103): 223-229.

book: Handrinos, G. & Akriotis, T. (1997): The Birds of Greece. – Christopher Helm, A & C Black, London.

chapter in book: Diedrich, J., Flade, M. & Lipsbergs, J. (1997): Penduline Tit *Remiz pendulinus*. pp. 656-657 In: Hagemajjer, W.J.M. & Blair, M.J. (eds.): The EBCC Atlas of European Breeding Birds. – T & AD Poyser, London.

Tables: Each Table should be headed by an informative heading and a brief explanatory legend which should make the general meaning comprehensible without reference to the text. Tables are drawn without vertical lines. Each table should be on a separate sheet. In the text, tables must be referred as (Table 1).

Figures: Figures should be prepared in high quality and should be at least 1/3 times larger than the expected size, but not larger than A4 format. Line drawings may be produced by computer graphics or drawn with black ink on white board. Only photographs that explain the article theme are allowed. Colour photos are exceptionally allowed and printed at the back of the journal. Figures must refer in the text as (Figure 1).

Short notes for From the ornithological notebook: The title is the name of the species. In the text do not use paragraphs. A very short abstract with at most two sentences must contain the location with geographic coordinate (UTM, degree, Gauß-Krüger) and the date of observation, and should summarize the essence of the note. Citations are in the text and must be referred as [Mikkola, H. (1983): Owls of Europe. – T & AD Poyser, London], and as (Mikkola 1983) by the second mention. Short notes must be submitted only in electronic version (diskette, CD or e-mail).

Advise: Please, check the last issues of *Acrocephalus* when preparing the text!

Editorial procedure: The manuscripts should be sending to the Editor's address in three hard copies. The Editor sends the manuscript to two referees. The authors should correct the paper strictly according to the referee's comments and explain non-accepted comments, when returning the manuscript. Corrected manuscript should be sent also in electronic version on a diskette, CD or by e-mail to the Editor. The Editor decides whether the manuscript should be accepted, rejected or the second review should made. Final acceptance is confirmed by the Editorial Board. Short notes from the ornithological notebook are checked only by the Editor, who may consult members of the Editorial Board or Rarities Committee.



Figure 1: Adult male Sichuan Wood Owl *Strix uralensis davidi*, exposed during daylight in a spruce tree – left photo; fledgling of Sichuan Wood Owl, near the nesting site in a steep rock, a few days after fledging – right photo (photo: Y. Fang) – see page 5

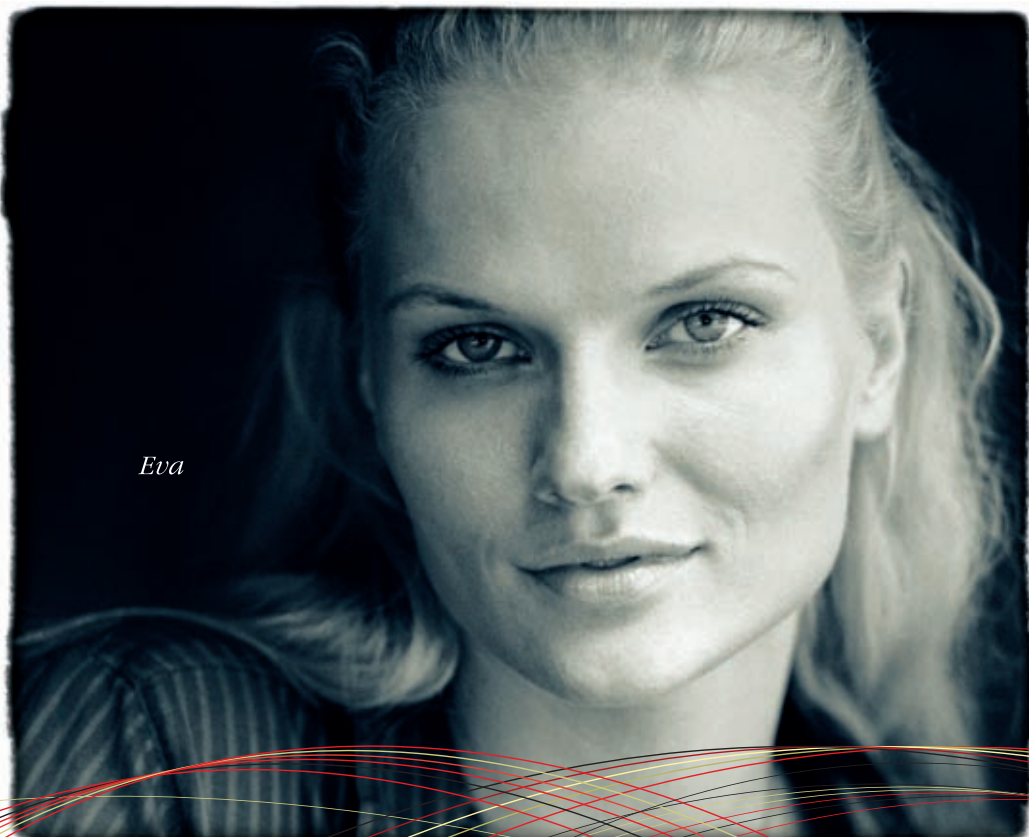
Slika 1: Odrasel samec sečuanske kozače *Strix uralensis davidi*, slikan podnevi v smreki – leva slika; speljan mladič sečuanske kozače, v bližini gnezdišča v strmi steni, nekaj dni po tem, ko se je speljal – desna slika (foto: Y. Fang) – glej stran 5



Figure 2: Female Sichuan Wood Owl *Strix uralensis davidi* brooding in nest box (photo: Y. Fang) – see page 5

Slika 2: Samica sečuanske kozače *Strix uralensis davidi* med valjenjem v gnezdilnici (foto: Y. Fang) – glej stran 5

S kom se videva Eva?



Eva

Mobitel d.o.o. - 1137 Ljubljana

Agencija 41 - design: UMIS Studio, foto: T. Gregorič, J. Puklic

UMTS generacija odslej tudi v Mobipaketih!

MobiUMTStelefon*



Samsung SGH-Z105U

29.900 SIT

- GPRS/UMTS • videotelefonija • odjemalec e-pošte • vrtljivi digitalni fotoaparati, ki omogoča snemanje videoposnetkov

Z Mobi UMTS vidiš, s kom govoriš in bliskovito pošiljaš posnete filmčke. S tabo so ves čas tvoji najbolj priljubljeni obrazi, novice, glasbeni spoti, igre, športi in filmski junaki – vse živo s Planeta.

Potrebuješ le nov MobiUMTStelefon in svojo SIM kartico. Za popolno delovanje pošlji SMS s ključno besedo **UMTS** na **1918**.

Z MobiUMTS aparatom si hitreje naložiš originalne melodije z mobilnega Planeta. Za Evino uspešnico Ti znaš pošlji SMS z vsebino **OM EVA** na **1919**.

Informacije na brezplačnih številkah: naročniki Mobitel GSM/UMTS: **031/041/051 700 700**, Mobiluporabniki: **031/041/051 121**, ostali: **080 70 70**.



mobi

ZA VSAK ŽEP

WWW.MOBITEL.SI

MobiUMTStelefon*



Motorola E1000

39.900 SIT

- GPRS/UMTS • videotelefonija • odjemalec e-pošte • fotoaparati, ki omogoča snemanje videoposnetkov • MP3 predvajalnik

* Naprodaj le za obstoječe Mobiluporabnike.