

Unusual frequent occurrence of Ural owls (*Strix uralensis*) in urban and rural habitats in the lowlands of southern Slovakia during the winter 2017/2018

Nezvyčajne častý výskyt sov dlhochvostých (*Strix uralensis*) v urbánnych a rurálnych biotopoch nížin juhu Slovenska počas zimy 2017/2018

Michal BALÁŽ, Matej REPEL & Roman SLOBODNÍK

Abstract: The Ural owl (*Strix uralensis*) is considered to be a habitat specialist preferring structurally heterogeneous old montane forests in Central Europe. Unlike the sympatric tawny owl (*Strix aluco*), the Ural owl is negatively affected by human activities in its forest habitats and usually avoids human settlements. Although the young birds and wintering adults show no strong dependence on the size of forest patches and their structure, there are only a few studies on the occurrence of this owl species in non-forest and urban habitats. Here we describe several observations of wintering Ural owls in south-eastern and south-western Slovakia outside the forests during the winter 2017/2018. The Ural owls were recorded in agricultural country, but not infrequently also in human settlements.

Abstrakt: Sova dlhochvostá (*Strix uralensis*) je považovaná za druh, ktorý je v strednej Európe špecializovaný na štruktúrne bohaté, staré horské lesy. Na rozdiel od sympatrickej sovy obyčajnej (*Strix aluco*), sa sova dlhochvostá vyznačuje negatívnymi reakciami na ľudské aktivity v lesných habitatoch a obvykle sa vyhýba ľudským sídlam. Napriek tomu, že mladé vtáky a zimujúce jedince nie sú až tak závislé od veľkosti lesných porastov, či ich štruktúry, je len pomerne málo publikovaných údajov týkajúcich sa ich výskytu v otvorenej krajine či urbánnom prostredí. V tomto príspevku popisujeme viacero pozorovaní zimujúcich sov dlhochvostých mimo lesných habitatov na juhu východného a západného Slovenska počas zimy 2017/2018. Sovy dlhochvosté boli pozorované v poľnohospodárskej krajine, ale nezriedka aj v ľudských sídlach.

Key words: wintering, synanthropy, lowland, Central Europe, Carpathians

Michal Baláž, Department of Biology and Ecology, Faculty of Education, Catholic University in Ružomberok, Hrabovská cesta 1, SK-03401 Ružomberok, Slovakia. E-mail: miso.balaz@gmail.com.

Matej Repel, SOS/BirdLife Slovakia, Námestie osloboditeľov 1, SK-07101 Michalovce, Slovakia.

Roman Slobodník, Raptor Protection of Slovakia, Trhová 54, SK-841 01 Bratislava, Slovakia.

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Introduction

The Ural owl (*Strix uralensis*) is an owl species distributed in Eurasia from Scandinavia to Japan (Snow & Perrins 1998, del Hoyo et al. 1999). It occupies various forests, preferring large, old and often marshy deciduous (mainly beech) or mixed (mainly beech-fir) forests with natural (e.g. mires) or artificial (clear-cut) open spaces, where it reaches the highest breeding densities (Cramp 1985, Mihelič et al. 2000, Löhmus 2003). However, it can also be found as a breeding species in oak forests (Tutiš et al. 2009) and in spruce forests, mainly in Fenoscandinavia (Lunberg 1980, Solheim et al. 2009) and more rarely in Central Europe (Karaska et al. 1997).

The area of Central Europe is inhabited by the subspecies (*S. u. macroura*). Unlike the birds from the core breeding zone in Northern and Eastern Europe which mostly breed in flat-lying forests at low altitudes, Ural owls in Central Europe can be characterized as montane birds (Danko et al. 2002, Krištín et al. 2007) showing a preference for old-growth forests (Lundberg 1980, Vrezec & Tome 2004). Their breeding territories can usually be characterized as older and larger patches of forest (at least 100 ha) which are situated far from human settlements, roads and buildings (Bylicka et al. 2010, Kajtoch et al. 2015, Bolboacă et al. 2018). However, breeding of this subspecies is also known in fragmented forests (Kajtoch et al. 2015), floodplain

forest (Balla 2010) or the agroforestry mosaic of the Central European foothills and uplands (Bylicka et al. 2010).

The Ural owl inhabits mainly the eastern and central parts of Slovakia and prefers submontane and montane habitats from 160 to 1300 m a. s. l. (Danko et al. 2002, Krištín et al. 2007). Most of the Ural owl territories registered in Slovakia have been in beech and mixed fir-beech forests, but spruce and oak forests are also inhabited by this owl (Krištín et al. 2007), and it also rarely breeds in lowland woodlands (Dravecký & Obuch 2009, Balla 2010). Generally, the central European subspecies of the Ural owl has expanded in the west in the last few decades (Danko et al. 2002, Krištín et al. 2007, Bashta 2009). The number of breeding pairs has increased, and the Ural owl has appeared in new areas and new habitats. Especially in the non-breeding season there seems to be less preference for particular forest structures, and Ural owls (mainly the young) may be observed in different habitats (Vrezec 2007, Bylicka et al. 2010). Moreover, the presence of these owls in non-wooded habitats can also be caused by the lack of small ground mammals in forests and their higher density in grasslands, fields or urban habitats. These habitats offer greater and different food supply, and some owls may hunt for alternative prey (Dravecký & Obuch 2009).

The aim of this short note is to describe the unusually high number of observations of Ural owls in urban as well as rural habitats in some parts of southern Slovakia during the winter season of 2017/2018. This winter can be characterized as one with unusually high frequency of occurrence of this owl species in human settlements.

Material and methods

Study area

Observations of wintering Ural owls reported in this contribution come from the south-eastern and south-western parts of Slovakia. These regions can be characterised as open, mainly agricultural country with low or very low density of larger forests. South-western Slovakia is typical for intensive managed arable land. The land structure of south-eastern Slovakia consists of a higher proportion of meadows and pastures. The locations of observed wintering Ural owls in south-eastern Slovakia were much closer to their breeding localities than those in south-western Slovakia (Krištín et al. 2007).

Observations

Most of the recordings of wintering Ural owls in south-eastern Slovakia were obtained during regular and detailed monitoring of wintering birds performed by several professional ornithologists and birdwatchers. The monitoring was not aimed specifically at the Ural owl occurrence, and most of the observations were random. Data from the south-western part of Slovakia can all be characterised as random observations. However, almost all localities with positive occurrence of wintering Ural owls in 2017/2018 were also regularly monitored in previous years.

Results and discussion

Altogether 54 observations (41 localities) of Ural owls outside their usual forest habitats were recorded during the non-breeding season (from November 7, 2017 to March 24, 2018) in southern Slovakia. Most of the owls (87.7%) were recorded in south-eastern Slovakia (Východoslovenská rovina/East Slovakian Plain), and in western Slovakia this species was found in four non-forest localities. The Ural owls were mostly seen hunting over fields and meadows or resting in tree lines in agricultural country, but 19 birds were registered within human settlements (Tab. 1). Half of the sites were situated in the centre of villages, and two of them (10.5%) were in the centre of a larger town (more than 20,000 inhabitants; Fig. 1.). The rest of the owls were registered in the village or town peripheries, 31.6% and 10.5% of cases respectively (Tab. 1). The resting Ural owls were found in various coniferous and deciduous trees, but some of them were spotted sitting on roadside poles (Fig. 2) or on chimneys. In three cases, dead owls were found. More than half of the resting owls (53.8%) were observed in deciduous trees (poplars, apple trees, walnut trees, birch, ash), and the others were seen in pines (23.1%), spruces (7.7%) and thujas (15.4%) (Tab. 1).

Several European owl species show some tendency to synanthropy. The little owl (*Athene noctua*) and the barn owl (*Tyto alba*) are considered as typical synanthropic birds, and breeding of these species outside (sub)urban or (sub)rural habitats is relatively rare today (Cramp 1985, del Hoyo et al. 1999, Mebs & Scherzinger 2008). The Scops owl (*Otus scops*) prefers extensively managed grassland around small human settlements, but it is also known as a breeding species in large parks in the town centres (Marchesi & Sergio 2005, Bavoux et al. 2012). Similarly, the long-eared owl

Tab. 1. Records of wintering Ural owls (*Strix uralensis*) with their observation characteristics. The gray lines represent probably the same specimen of the owl.

Tab. 1. Záznamy zimujúcich sov dlhochvostých (*Strix uralensis*) s charakteristikami pozorovaní. Sivé riadky predstavujú pravdepodobne tie isté jedince.

date / dátum	locality / lokalita	locality char. / char. lokality	note / poznámka	observer / pozorovateľ
24.1.2018	Kristy (48°41'N; 22°11'E)	village periphery / okraj dediny	sitting on a pole / sediaca na stĺpe	M. Repel
24.1.2018	Pinkovce (48°36'N; 22°11'E)	village centre / stred dediny	sitting in a pine, later in a walnut tree / sediaca na borovici neskôr na orechu	M. Repel
24.12.2017	Bežovce (48°37'N; 22°09'E)	village periphery / okraj dediny	sleeping in an apple tree / spiaca na jabloni	V. Marušic
26.12.2017		village periphery / okraj dediny	sleeping in an apple tree / spiaca na jabloni	V. Marušic
26.12.2017		village centre / stred dediny	sitting on a chimney / sediaca na komíne	V. Marušic
3.1.2018		village periphery / okraj dediny	sleeping in a pine / spiaca na borovici	P. Chrašč
26.12.2017	Lekárovce (48°36'N; 22°09'E)	village centre / stred dediny	sitting in a northern white-cedar / sediaca na tuji	V. Marušic
3.1.2018	Blatná Polianka (48°41'N; 22°06'E)	village centre / stred dediny	sitting on a pole / sediaca na stĺpe	P. Chrašč
3.1.2018	Bajany (48°36'N; 22°06'E)	village centre / stred dediny	sleeping in a pine / spiaca na borovici	P. Chrašč
6.2.2018	Hnojné (48°46'N; 22°04'E)	village centre / stred dediny	hunting in a garden / loviaca v záhrade	M. Repel
15.4.2018	Iňačovce (48°41'N; 22°02'E)	village centre / stred dediny	found dead / nájdená uhynutá	M.j Repel
8.12.2017	Senné (48°39'N; 22°01'E)	village centre / stred dediny	sitting in an ash / sediaca na jaseni	P. Chrašč
15.12.2017	Zemplínska Široká (48°41'N; 21°58'E)	village periphery / okraj dediny	hunting / loviaca	P. Chrašč
10.1.2018	Sliepkovce (48°40'N; 21°56'E)	village periphery / okraj dediny	sitting in riparian vegetation / sediaca v pobrežnej vegetácii	M. Repel
10.1.2018	Michalovce (48°45'N; 21°55'E)	village periphery / okraj dediny	sitting in riparian vegetation / sediaca v pobrežnej vegetácii	M. Harčár
16.3.2018	Hrušov (48°26'N; 21°51'E)	village periphery / okraj dediny	sitting on a traffic sign / sediaca na dopravnej značke	P. Chrašč
10.12.2017	Vranov nad Topľou (48°53'N; 21°41'E)	village periphery / okraj dediny		P. Pjenčák
14.1.2018		town centre / stred mesta		P. Pjenčák
2.3.2018		town centre / stred mesta	dead in the road / nájdená uhytnutá na ceste	M. Repel
23.3.2018	Hradište (48°34'N; 18°34'E)	village centre / stred dediny	found dead in a garden / nájdená uhytnutá v záhrade	V. Slobodník
30.12.2017	Leopoldov (48°26'N; 17°45'E)	town centre / stred mesta	sitting in a birch / sediaca na breze	I. Šipkovský
30.12.2017	Tomášikovo (48°05'N; 17°41'E)	village centre / stred dediny	sitting in a poplar / sediaca na topoli	K. Basca
26.12.2017	Lehnice (48°03'N; 17°27'E)	village centre / stred dediny	sleeping in a spruce / spiaca na smreku	Z. Riflik
29.12.2017		village centre / stred dediny	sleeping in a spruce / spiaca na smreku	K. Basca
6.1.2018		village centre / stred dediny	sitting in a spruce, later in a poplar / sediaca na smreku, neskôr na topoli	Z. Riflik



Fig. 1. Ural owl (*Strix uralensis*) sitting in a birch near an industrial building in the town of Hlohovec (western Slovakia).

Obr. 1. Sova dlhochvostá (*Strix uralensis*) sediaca na breze v blízkosti budov priemyselného objektu v meste Hlohovec (západné Slovensko).

(*Asio otus*) as a species preferably hunting voles (*Microtus arvalis*) primarily inhabits open (agricultural) country, but some pairs tend to breed in urban habitats as well (Lövy & Riegert 2012, Göcer 2016). However, this species is also much more numerous in urban and rural habitats during the winter (Tryjanowski et al. 2015, Szép et al. 2018). Of the typical forest owls only the tawny owl (*Strix aluco*) shows some preference for urban habitats. This owl can be found as a breeding species in parks or cemeteries featuring old trees with holes suitable for its breeding. There are several studies comparing the habitat requirements of the sympatric forest owls (mainly the tawny and the Ural owl). These studies show that the tawny owl can utilize a wider variety of forest habitats, while the Ural owl is more associated with old-growth forests (Vrezec 2003, Vrezec



M Repel

Fig. 2. Ural owl (*Strix uralensis*) sitting on a metal pole in the periphery of the village Kristy (eastern Slovakia).

Obr. 2. Sova dlhochvostá (*Strix uralensis*) sediaca na kovovom stĺpiku na okraji obce Kristy (východné Slovensko).

& Tome 2004, Kajtoch 2015, Bolboacă et al. 2018) and it avoids artificial landscapes, which have a significant negative impact on its distribution (Lunberg 1980, Oja et al. 2005). Furthermore, several authors have confirmed that the Ural owl has much more negative reaction to human presence and it strictly avoids human settlements (Vrezec & Tome 2004, Kajtoch 2015) with urban areas tending to be unacceptable for this species (Oja et al. 2005). However, the preference for old-growth forest habitats by juvenile Ural owls is not so strong, especially during the non-breeding period (Bylicka et al. 2010). There are some published records of this species in non-forested areas during the winter (Cramp 1985, Vrezec 2007, Vazhov et al. 2016), but only a few from urban or rural environments. According to our best knowledge, the only known area with regular/repeated occurrence of the Ural owl in urban and suburban habitats is south-eastern Slovakia (Mošanský 1991, Dravecký & Obuch 2009, Balla 2010, Danko et al. 2017, our unpublished data). The Slovak population of the Ural owl has been estimated at 1400-2500 breeding pairs, with most of them (70-75%) breeding in the eastern parts of the country (Krištín et al. 2007). The East Slovakian lowlands with frequent winter occurrence of this species are surrounded by nearby hills with hundreds of breeding pairs (Fig. 3). Moreover, several pairs have been found breeding in lowland forest patches in this area (Danko et al. 2002, Dravecký & Obuch 2009, Balla 2010). Wintering Ural owls can thus be more easily seen outside their forest habitats mainly during the late winter months. The most important

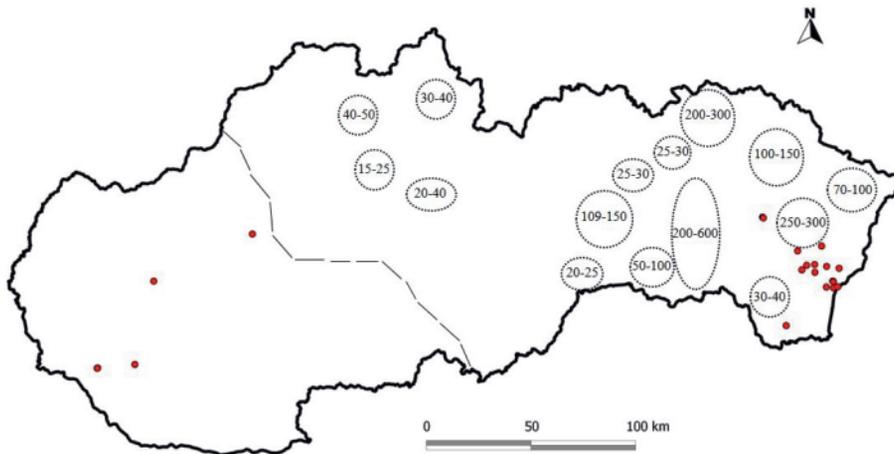


Fig. 3. Sites (red dots) of occurrence of wintering Ural owls (*Strix uralensis*) during the winter 2017/2018, showing the positions of mountains with estimates of the breeding pairs and the supposed western border of the breeding range in Slovakia. The estimates of breeding numbers and border of the breeding range were obtained from Krištín et al. (2007) and Ridzoň et al. (2015).

Obr. 3. Lokality (červené bodky) zimujúcich sov dlhochvostých (*Strix uralensis*) počas zimy 2017/2018, pozície pohorí s odhadom hniezdiacich párov a predpokladaná západná hranica hniezdného rozšírenia druhu na Slovensku. Odhady početnosti hniezdiacich párov a hranica hniezdného rozšírenia sú prevzaté od Krištín et al. (2007) a Ridzoň et al. (2015).

factor affecting the winter survival of this owl species is the abundance of small mammals. Ural owls foraging in forests usually do not hunt for alternative prey (Solheim et al. 2009, Obuch et al. 2013, Pavón-Jordán et al. 2013). During the winters due to the lack of voles they have to move to less snowy places or to habitats with greater food supply where it is easier to prey (Pietiäinen 1989, Vrezec 2007, Vazhov et al. 2016). That is why this species can be seen in areas where it does not occur during the breeding seasons (Mihelič et al. 2000). Owls foraging in urban complexes may profit from the broader food supply, and some of them may change their diet spectrum and hunt synanthropic birds. Ural owls investigated in the city of Košice (eastern Slovakia) for more than six months hunted mainly collared doves (*Streptopelia decaocto*) and feral pigeons (*Columba livia f. domestica*), which represented almost 90% of the owls' food (Dravecký & Obuch 2009). Hunting collared doves was also confirmed in this study (in the park at Lehnice village, south-western Slovakia 6.1.2018).

The unusually high number of wintering Ural owls in non-forested habitats during the winter 2017/2018 might most probably have been caused by the overall high number of Ural owls in 2017. The breeding season 2017 can be characterised as very successful for this owl species due to the population explosion of small,

wood-inhabiting mammals. Consequently, the breeding success and the survival of the fledged young owls was high (Karaska in litt., our unpublished data). These birds probably moved to the lowlands during the following winter season with worse feeding conditions.

Most of the juvenile owls were seen in urban and rural habitats in south-eastern Slovakia in agricultural country surrounded by hills with a relatively high density of breeding pairs of this species. However, we also have some observations from south-western Slovakia. This area is highly predominated by intensively-managed arable land, and the nearest known Ural owl breeding territories are more than 100 kilometres away (Krištín et al. 2007, Ridzoň et al. 2015). This fits well with the findings showing the movements of young Ural owls from their breeding sites to wintering habitats in some other parts of Europe (Saurola 2007, Vrezec 2007).

References

- Bolboacă LE, Iordache I & Ion C 2018: Factors related with the distribution of the Ural owl *Strix uralensis macroura* in Eastern Romania. North-Western Journal of Zoology 14: 193–198.
- Balla M 2010: Ural owl (*Strix uralensis*) nesting in floodplain forest in the Východoslovenská rovina Plain. Slovak Raptor Journal 4: 105–108. DOI:

- 10.2478/v10262-012-0052-0.
- Bashta AT 2009: Ural owl *Strix uralensis* population dynamics and range expansion in western Ukraine. *Ardea* 97: 483–487. DOI: 10.5253/078.097.0412.
- Bavoux C, Berneleau G, Berbraud C, Métivier JM & Roulin A 2012: Habitat used by an insular population of Eurasian scops owl *Otus scops* on Oleron Island (Western France). *Alauda* 80: 179–186.
- Bylicka M, Kajtoch Ł & Figarski T 2010: Habitat and landscape characteristics affecting the occurrence of Ural owls *Strix uralensis* in an Agroforestry Mosaic. *Acta Ornithologica* 45: 33–42. DOI: 10.3161/000164510X516065.
- Cramp S 1985: Birds of the Western Palearctic IV. Oxford University Press, Oxford.
- Danko Š, Karaska D & Krištín A 2002: Sova dlhochvostá (*Strix uralensis*) [The Ural owl (*Strix uralensis*)], 197–198. In: Danko Š, Darolová A & Krištín A (eds), Rozšírenie vtákov na Slovensku [Birds distribution in Slovakia]. Veda, Bratislava. [In Slovak with English summary].
- del Hoyo J, Elliott A & Sargatal J (eds) 1999: Handbook of the birds of the world, Vol. 5. Barn-owls to Hummingbirds. Lynx Edicions, Barcelona.
- Dravecký M & Obuch J 2009: Contribution to the knowledge on the synanthropization and dietary specialization of the Ural owl (*Strix uralensis*) in urban environment of Košice city (East Slovakia). *Slovak Raptor Journal* 3: 51–60. DOI: 10.2478/v10262-012-0033-3.
- Göcer E 2016: Diet of a nesting pair of long-eared owls, *Asio otus*, in an urban environment in southwestern Turkey (Aves: Strigidae). *Zoology in the Middle East* 62: 25–28. DOI: 10.1080/09397140.2015.1132561.
- Kajtoch Ł, Żmihorski M & Wiczorek P 2015: Habitat displacement effect between two competing owl species in fragmented forests. *Population ecology* 57: 517–527. DOI: 10.1007/s10144-015-0497-y.
- Karaska D, Michalec R & Holma J 1997: Nesting of the Ural owl (*Strix uralensis*) in the Orava region. *Buteo* 9: 85–92.
- Krištín A, Mihók J, Danko Š, Karaska D, Pačenovský S, Saniga M, Bod'ová M, Balázs C, Šotnár K, Korňan J & Olekšák M 2007: Distribution, abundance and conservation of the Ural owl *Strix uralensis* in Slovakia, 8–15. In: Müller J, Scherzinger W & Moning C (eds), European Ural owl workshop. Bavarian Forest National Park. Europäischer Habichtskauzworkshop [Tagungsbericht – Heft 8]. Nationalpark Bayerischer Wald, Grafenau.
- Löhmus A 2003: Do Ural owls (*Strix uralensis*) suffer from the lack of nest sites in managed forests? *Biological Conservation* 110: 1–9. DOI: 10.1016/S0006-3207(02)00167-2.
- Lövy M & Riegert J 2012: Home range and land use of urban long-eared owls. *Condor* 115: 551–557. DOI: 10.1525/cond.2013.120017.
- Lunberg A 1980: Why are the Ural owl *Strix uralensis* and the tawny owl *S. aluco* parapatric in Scandinavia? *Ornis Scandinavica* 11: 116–120.
- Marchesi L & Sergio F 2005: Distribution, density, diet and productivity of the scops owl *Otus scops* in the Italian Alps. *Ibis* 147: 176–187. DOI: 10.1111/j.1474-919x.2004.00388.x.
- Mebs T & Scherzinger W 2000: Die Eulen Europas. Franckh-Kosmos Verlags, Stuttgart.
- Mihelič T, Vrezec A, Perušek M & Svetličič J 2000: Kozača *Strix uralensis* v Sloveniji. *Acrocephalus* 21: 98–99.
- Mošanský A 1991: Avifauna Košic [Avifauna of the city Košice]. Zborník Východoslovenského múzea v Košiciach. *Prírodné vedy* 31: 49–158. [In Slovak with German summary].
- Obuch J, Danko Š, Mihók J, Karaska D & Šimák L 2013: Diet of the Ural owl (*Strix uralensis*) in Slovakia. *Slovak Raptor Journal* 7: 59–71. DOI: 10.2478/srj-2013-0003.
- Oja T, Alamets K & Pärnamets H 2005: Modelling bird habitat suitability based on landscape parameters at different scales. *Ecological Indicators* 5: 314–321. DOI: 10.1016/j.ecolind.2005.03.008.
- Pavón-Jordán D, Karell P, Ahola K, Kolunen H, Pietiäinen H, Karstinen T & Brommer JE 2013: Environmental correlates of annual survival differ between two ecologically similar and congeneric owls. *Ibis* 155: 823–834. DOI: 10.1111/ibi.12082.
- Pietiäinen H 1989: Seasonal and individual variation in the production of offspring in the Ural owl *Strix uralensis*. *Journal of Animal Ecology* 58: 905–920.
- Ridzoň J, Karaska D & Topercer J 2015: Aktuálny stav výberových druhov vtákov v Chránených vtáčích územiach na Slovensku [Current state of the selective species in Important bird areas in Slovakia]. Štátna ochrana prírody SR, Banská Bystrica. [In Slovak].
- Saurola 2007: Finish Ural owls (*Strix uralensis*): an overview on population parameters, 42–49. In:

- Müller J, Scherzinger W & Moning C (eds), European Ural owl workshop. Bavarian Forest National Park. Europäischer Habichtskauzworkshop [Tagungsbericht – Heft 8]. Nationalpark Bayerischer Wald, Grafenau, 92.
- Snow DW & Perrins CM 1998: The Birds of the Western Palearctic. Volume 1: Non-passerines. Oxford University Press, Oxford.
- Solheim R, Bekken J, Bjørnstad R, Bye FN, Hagen TK, Isaksen K & Strøm H 2009: Ural owls *Strix uralensis* at the border line: nesting places are not a limiting factor. *Ardea* 97: 515–518. DOI: doi.org/10.5253/078.097.0416.
- Szép D, Bock R & Purger JJ 2018: Weather-dependent variation in the winter diet of urban roosting long-eared owls (*Asio otus*) in Pécs (Hungary). *Avian Biology Research* 11: 1–6. DOI: 10.5253/078.097.0416.
- Tryjanowski P, Sparks TH, Biaduń W, Brauze T, Hetmański T, Martyka R, Skórka P, Indykiewicz P, Myczko L, Kunysz P, Kawa P, Czyz S, Czechowski P, Polakowski M, Zduniak P, Jerzak L, Janiszewski T, Golawski A, Dudu L, Nowakowski LL & Wuczynski A 2015: Winter bird assemblages in rural and urban environments: A national survey. *PLoS One* 10 (6): e0130299. DOI: 10.1371/journal.pone.0130299.
- Tutiš V, Radović D, Ciković D, Barišić S & Kralj J 2009: Distribution, density and habitat relationships of the Ural owl *Strix uralensis macroura* in Croatia. *Ardea* 97: 563–570. DOI: 10.5253/078.097.0423.
- Vazhov SV, Bahktin RF & Vazhov VM 2016: Ecology of some species of owls in agricultural landscapes of the Altai region. *Ecology, Environment and Conservation* 22: 1555–1563.
- Vrezec A 2003: Breeding density and altitudinal distribution of the Ural, tawny and boreal owls in North Dinaric Alps (central Slovenia). *Journal of Raptor Research* 37: 55–62.
- Vrezec A 2007: The Ural owl (*Strix uralensis macroura*) – Status and overview of studies in Slovenia, 16–31. In: Müller J, Scherzinger W & Moning C (eds), European Ural owl workshop. Bavarian Forest National Park. Europäischer Habichtskauzworkshop [Tagungsbericht – Heft 8]. Nationalpark Bayerischer Wald, Grafenau.
- Vrezec A & Tome D 2004: Altitudinal segregation between Ural owl *Strix uralensis* and tawny owl *S. aluco*: evidence for competitive exclusion in raptorial birds. *Bird Study* 51: 264–269. DOI: 10.1080/00063650409461362.

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