

DISTRIBUTION OF WOODPECKER SPECIES (AVES: PICIDAE) IN THE MAGAS-BAKONY LANDSCAPE PROTECTION AREA

Bruckner Attila¹, Ónodi Gábor² & Winkler Dániel¹

¹Soproni Egyetem, Vadgazdálkodási és Vadbiológiai Intézet,

University of Sopron, Institute of Wildlife Biology and Management

H-9400 Sopron, Bajcsy-Zs. u. 4, Hungary; e-mail: brucknera@t-online.hu, winkler.daniel@uni-sopron.hu

²HUN-REN Balatoni Limnológiai Kutatóintézet, Víz tudományi és Vízbiztonsági Nemzeti Laboratórium
HUN-REN Balaton Limnological Research Institute, National Laboratory for Water Science and Water Security,
H-8237 Tihany, Klebelsberg Kuno u. 3, Hungary. e-mail: onodi.gabor@blki.hu

ABSTRACT

BRUCKNER, A., ÓNODI, G. & WINKLER, D. (2023): DISTRIBUTION OF WOODPECKER SPECIES (AVES: PICIDAE) IN THE MAGAS-BAKONY LANDSCAPE PROTECTION AREA. *Hungarian Small Game Bulletin* 15: 171–180. <http://dx.doi.org/10.17243/mavk.2023.171>

The several thousand hectares of nearly contiguous forests of the Bakony Hills, located in the middle of Transdanubia, are suitable habitats for all nine species of woodpeckers found in Hungary. In addition to literature work, field surveys were carried out to investigate the distribution of the species and the habitat types of the occurrences. During the research, it has been proven that the Great Spotted Woodpecker (*Dendrocopos major*) is the most common woodpecker species in Bakony Hills, followed by the Black Woodpecker (*Dryocopus martius*), the Grey-faced Woodpecker (*Picus canus*) and the Middle Spotted Woodpecker (*Leiopicus medius*). The density of White-backed Woodpeckers (*Dendrocopos leucotos*) in the study area was surprisingly high.

KEYWORDS: Bakony Hills, mid-mountain forests, Piciformes, *Dendrocopos leucotos*, deadwood

1. INTRODUCTION

Research on birds, the most abundant terrestrial group among vertebrates (CHEN *et al.* 2019), started relatively late in the Bakony Mountains. The existing gaps, especially in the field of ornithology, were pointed out by the Benedictine teacher-monk RÓMER (1860) already in the middle of the 19th century. In his work, he also expressed the opinion that these gaps will soon be filled by Hungarian naturalists "and the exceptional fauna of the Bakony will also be enriching natural science". For a long time his hopes for vertebrate research were not realised. JAKAB SCHENK, one of the most renowned ornithologists of his time, still stated in the 1920s that Zala and Veszprém counties, in which most of the Bakony lies, were still "terra incognita" in terms of birdlife (BARTA 2003). A major turn in the exploration of bird fauna occurred in 1930, when Géza Entz organized the research of the fauna of Lake Balaton and its surroundings, and obviously birds were not neglected. The studies were carried out by renowned researchers such as NÁNDOR HOMONNAY, ANDRÁS KEVE, IMRE PÁTKAI, and ALBERT VERTSE, among others.

Knowledge of the bird fauna of the Bakony region was scarce until the 1960s. Research specifically targeting the Bakony area began in 1962, when the Bakony Museum in Veszprém, following the path of the Balaton research at the beginning of the century, organised the "Natural Landscape of the Bakony" research programme, aimed at the natural scientific exploration of the Bakony Mountain's area (BARTA 2003).

1971 was a significant year in the history of ornithological research in the Bakony, as BANKOVICS (1973a) was the first to find the White-backed Woodpecker near the highest point

of the Bakony, the summit of the 709 m high Kőrös Hill. This was followed by evidence of the breeding of the species in the spring of the following year.

Further ornithological research in the Bakony was organised by the Bakony Museum and several papers were published (BANKOVICS 1973a, 1973b, BARTA 1992, 1997, 2003, KEVE 1981, SZOLNOKY 1973). From the period 2003–2016, observation data of more than 140 bird species were presented by TRIEBL (2010a, 2010b, 2017) from Bakonyszentlászló and its surroundings. Our research, which started in autumn 2020, aims to assess the occurrence of woodpecker species in the Magas-Bakony Landscape Protection Area and to investigate their habitat selection.

2. MATERIALS AND METHODS

The study area was the 8732 ha Magas-Bakony Landscape Protection Area. 84% (almost 7,300 hectares) of the Landscape Protection Area under study is covered by forests, mostly semi-natural or good natural condition (HARMAT 2000). The majority (70%) of the forests in the protected area are mid-mountain hornbeam-beech forests (*Melitti-fagetum*), the preservation of which is one of the conservation objectives in the Landscape Protection Area.

The individual woodpecker species of the study area were surveyed along existing trails in an approximately 100 m buffer, modified after KUMAR *et al.* (2014).

The woodpeckers were surveyed on 74 field days between August 2020 and October 2022. For data recording we used a Garmin eTrex 22 GPS device. The data were processed in GoogleEarth for handling digital satellite images.

3. RESULTS AND DISCUSSION

All of the nine woodpecker species of the six genera found in Hungary (HADARICS & ZALAI 2008) occur in the Bakony area, which are the following: the White-backed Woodpecker (*Dendrocopos leucotos*), the Great Spotted Woodpecker (*D. major*), the Syrian Woodpecker (*D. syriacus*), the Lesser Spotted Woodpecker (*Dryobates minor*), the Black Woodpecker (*Dryocopus martius*), the Eurasian Wryneck (*Jynx torquilla*), the Middle Spotted Woodpecker (*Leiopicus medius*), the Grey-faced Woodpecker (*Picus canus*), and the Green Woodpecker (*P. viridis*), respectively.

The population data are presented according to the most recent survey data results (SZÉP *et al.* 2021), supplemented by our own estimates for the study area (**Table 1**).

The White-backed Woodpecker is a strictly protected species and the rarest woodpecker in Hungary (**Figure 1**). It has a Palaearctic distribution, with 12 subspecies ranging from the Pyrenees to the Japanese islands. The European population is estimated at 232,000–586,000 pairs (BIRDLIFE INTERNATIONAL 2023), of which 260–760 pairs nest in Hungary in several isolated, isolated populations (GORMAN *et al.* 2021b). Its population and distribution in the Mátra Mts. and Börzsöny Mt. are well documented (SCHMIDT 2004, SELMECZI KOVÁCS 2017), but apart from sporadic observations from Bakonyszentlászló and its surroundings (TRIEBL 2017), almost no information on its population size and habitat preference in Bakony has been provided since the publication of BANKOVICS (1973b). It is a specialist species of woodpecker in terms of both habitat and foraging. It prefers old-growth stands of beech, beech-hornbeam, oak-hornbeam and alder forests, with large amount of standing or lying deadwood (GORMAN 2004, CZESZCZEWIK & WALANKIEWICZ 2006, HARASZTHY 2019). It maintains large territory of up to several hundred hectares (CAMPION *et al.* 2020).

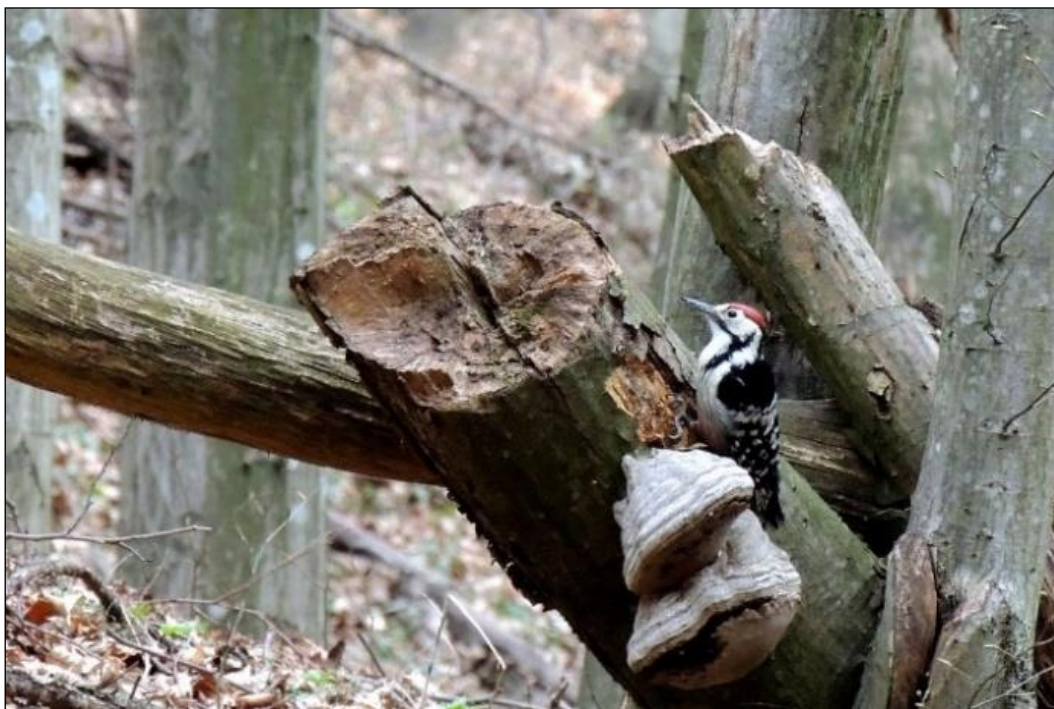


Figure 1. Male White-backed Woodpecker (*Dendrocopos leucotos*) feeding on dead wood near tinder mushrooms in the Gella stream valley in Szentgál (Photo: BRUCKNER A.)

In the last two years, 75 White-backed Woodpecker sightings have been recorded (**Map 1a**), more than that of the Lesser Spotted Woodpecker and Green Woodpecker. Above its typical habitat types, it also occurred in beech forests mixed with Turkey oak or European larch. On one occasion we detected an individual feeding in a patch of unmixed European larch. A male individual searching for food on a mossy rock in the Bécsi ditch in Bakonyszűcs was also observed. In the Magas-Bakony, apart from its typical habitats (forests with a high proportion of deadwood), the White-backed Woodpecker is often observed also in stands with a medium or with a very low amount of deadwood.

Table 1: Summary table of woodpecker species recorded in the Magas-Bakony Landscape Protection Area with estimated population data

Species	Scientific name	Number of observations	Proportion of the observations
White-backed Woodpecker	<i>Dendrocopos leucotos</i>	75	6,27%
Great Spotted Woodpecker	<i>Dendrocopos major</i>	577	48,20%
Syrian Woodpecker	<i>Dendrocopos syriacus</i>	1	0,08%
Lesser Spotted Woodpecker	<i>Dryobates minor</i>	43	3,59%
Black Woodpecker	<i>Dryocopus martius</i>	191	15,96%
Eurasian Wryneck	<i>Jynx torquilla</i>	3	0,25%
Middle Spotted Woodpecker	<i>Leiopicus medius</i>	130	10,86%
Grey-faced Woodpecker	<i>Picus canus</i>	129	10,78%
Green Woodpecker	<i>Picus viridis</i>	48	4,01%
	Total:	1197	100,00%

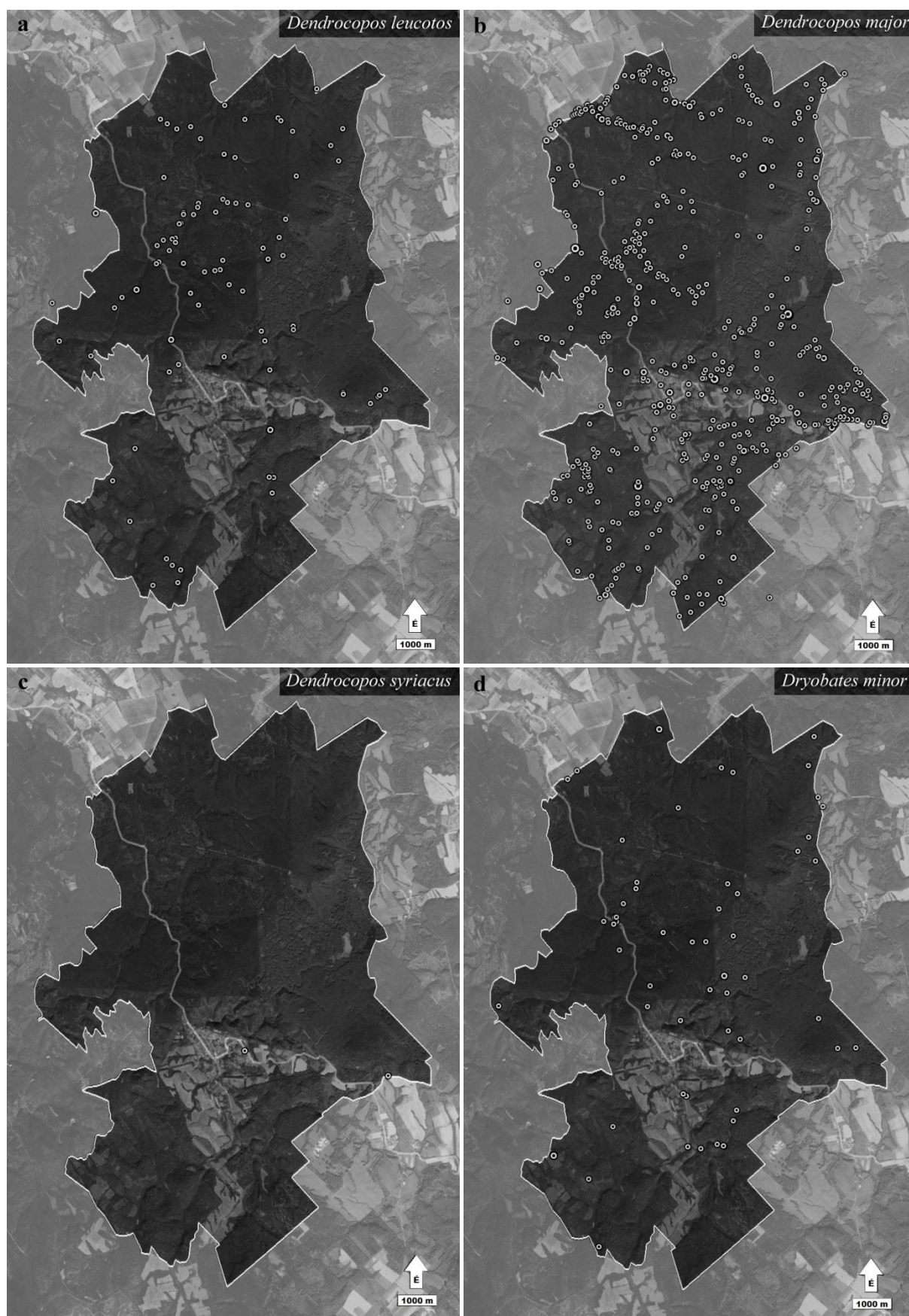
The Great Spotted Woodpecker is the most common woodpecker species in Europe and thus in our country. Its global population is estimated at between 37 and 56 million pairs,

of which between 13 and 19 million pairs are likely to occur in Europe (BIRDLIFE INTERNATIONAL 2023). The estimated domestic population is almost 304,000–324,000 pairs (GORMAN *et al.* 2021g). It has a Palearctic distribution with 24 subspecies. It is evenly distributed in large numbers across much of Europe, but its largest populations are in central Europe. As a generalist species, it is found in all wooded forest habitats where it can find trees of suitable size for nesting (ÓNODI & WINKLER 2016). It occurs in almost all types of wooded habitats, from mid-mountain beech forests to urban gardens and parks, and is well adapted to urban landscapes (ÓNODI & CSÖRGŐ 2013, GORMAN 2014, ÓNODI & WINKLER 2014, GORMAN *et al.* 2021g). Due to its large population size and frequent hole-excavating, it provides breeding habitat for secondary hole-nesting birds (ÓNODI & WINKLER 2014). It is clearly the most common species of woodpecker in the Bakony, with nearly half of the observed individuals being Great Spotted Woodpeckers (**Map 1b**).

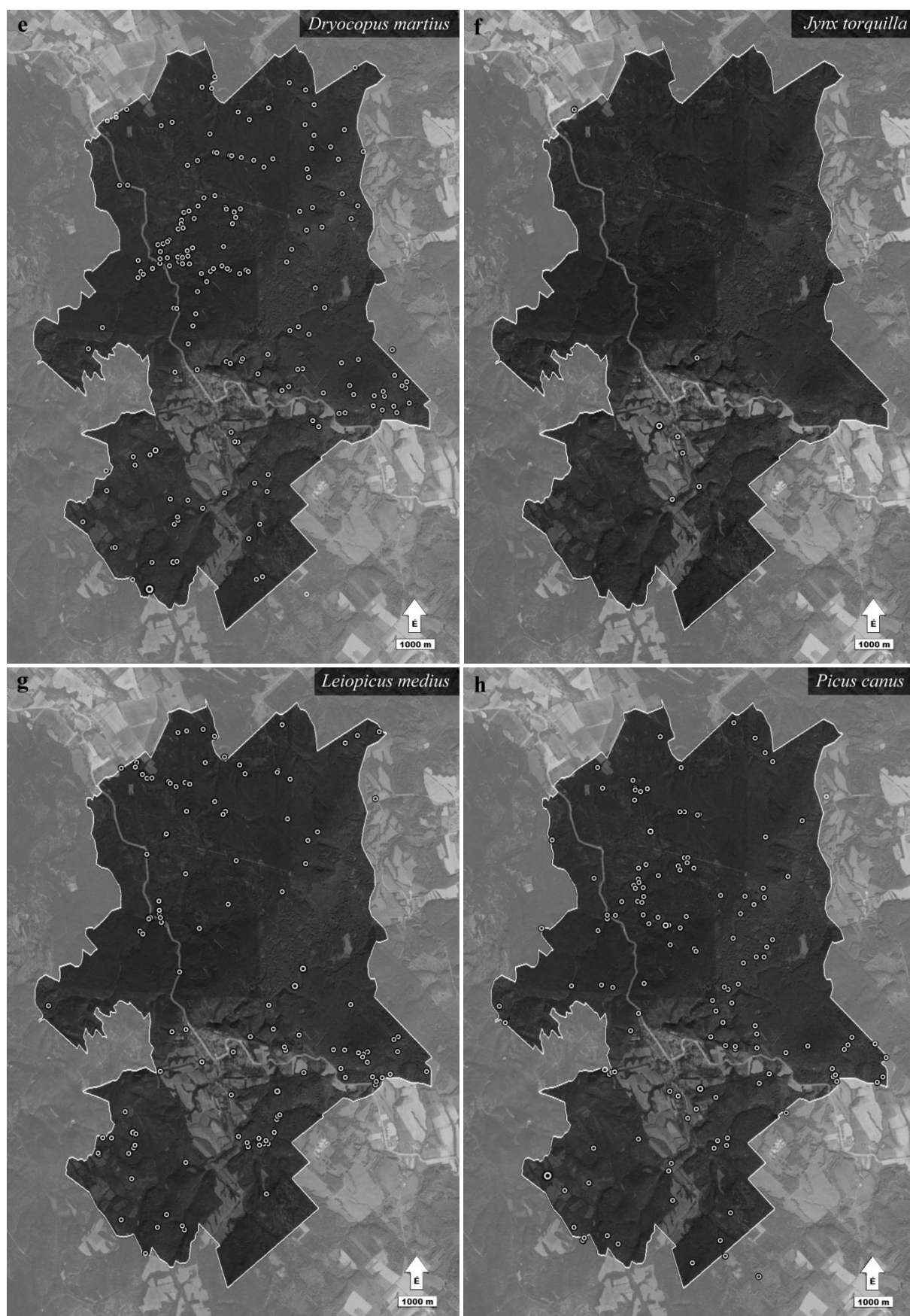
The Syrian Woodpecker appeared in our country in the 1930s (BERETZK 1942), and in nearly 30 years it has spread all over the country ever since (GORMAN *et al.* 2021a). Its expansion is well documented in the national literature (*e.g.*, KEVE 1955, AGÁRDI 1959). It is mainly a breeding bird of south-eastern and central Europe, with an estimated European population of about 281,000–653,000 pairs (BIRDLIFE INTERNATIONAL 2023). In Hungary, based on recent surveys, its breeding population is estimated between 44,000 and 65,000 pairs (GORMAN *et al.* 2021a), mainly in urban and agricultural habitats (WINKLER 2012, GORMAN 2014, HARASZTHY 2019, GORMAN *et al.* 2021a). They avoid dense, closed forests. It has been observed nesting in the eastern Bakony since the early 1950s (BARTA 2003). The species occurs in open, mosaic areas of the mountains, affected by urban land use, but is not common (GORMAN *et al.* 2021a). Its distribution map shows a low density in the Bakony (GORMAN *et al.* 2021a). In the study area, only one male individual was recorded so far, in the southeastern foothills of Som Hill, in a beech-sessile-oak-Turkey oak stand towards Pénzesgyőr (**Map 1c**). Its occurrence and population in the inhabited areas of the Landscape Protection Area (Bakonybél and the associated Som Hill) need further investigation.

The Lesser Spotted Woodpecker is our smallest woodpecker species. It has a Palaearctic distribution with 13 subspecies (GORMAN 2014). Of the 491,000–1,050,000 pairs in Europe (BIRDLIFE INTERNATIONAL 2023), about 12,500–16,500 pairs nest in our country (GORMAN *et al.* 2021e). According to the Hungarian distribution map, it occurs at relatively low densities in the Bakony, and our observations confirm this (**Map 1d**). It is most abundant in our mid-mountain and hilly forests and in floodplain forests of rivers and streams, with ample amount of standing, decayed dead trees are appropriate (ÓNODI & CSÖRGŐ 2014), thus this species can find enough food (bark arthropods) and excavate cavities. It is a common member of mixed species foraging flocks in winter alongside tits (WIKTANDER *et al.* 2001). Its small size is also reflected in its habitat, because it occurs and often forages in dense beech thickets or reeds, and can cling to twigs and also to reeds.

The Black Woodpecker is the largest of our woodpecker species. In the middle of the 20th century, its population began to expand throughout Europe. Out of a world population of nearly five million, between 1,110,000 and 1,820,000 pairs nest in Europe (BIRDLIFE INTERNATIONAL 2023). According to recent surveys, the domestic population is estimated at 13,500–15,500 pairs (GORMAN *et al.* 2021c). Previously known only from beech forests in higher mid-mountain ranges, this rare nesting species is now found in almost all wooded habitats and breeds regularly in floodplain forests, urban parks and also in poplar plantations (HARASZTHY 2019). According to GORMAN (2014), the species has its highest population density in mid-mountain beech forests. In the Bakony, it is the second most common woodpecker species after the Great Spotted Woodpecker.



Map 1. Distribution of the surveyed woodpecker species in the Magas-Bakony Landscape Protection Area. a. White-backed Woodpecker; b. Great Spotted Woodpecker; c. Syrian Woodpecker; d. Lesser Spotted Woodpecker (Source map: GoogleEarth)



Map 1 (cont.). Distribution of the surveyed woodpecker species in the Magas-Bakony Landscape Protection Area. a. Black Woodpecker; b. Eurasian Wryneck; c. Middle Spotted Woodpecker; d. Grey-faced Woodpecker (Source map: GoogleEarth)



Map 1 (cont.). Distribution of the surveyed woodpecker species in the Magas-Bakony Landscape Protection Area. i. Green Woodpecker (Source map: GoogleEarth)

A Eurasian Wryneck is a Palearctic polytypic species with six subspecies (GORMAN 2014), of which the nominotypical form occurs in our country. Of the European population, estimated at 674,000–1,600,000 pairs (BIRDLIFE INTERNATIONAL 2023), almost 15,700–16,400 pairs nest in Hungary (GORMAN *et al.* 2021h). The Eurasian Wryneck is the only migratory woodpecker species among the nine species nesting in Hungary. It is different from other woodpeckers in that it only rarely excavates (VARGA 1978) its own nesting cavity, usually uses the cavities of other woodpecker species, artificial nest-boxes or natural holes and cracks for breeding. Unlike most European woodpecker species, it is less attached to closed forests and is found in more open areas, forest edges, orchards, wooded pastures, urban gardens and parks (GORMAN 2014, HARASZTHY 2019, GORMAN *et al.* 2021h). It breeds regularly in the Bakony, but due to its large, often closed forests, it is not the most important nesting area for this species in Hungary. In the area of the surveyed Landscape Protection Area, it is mainly observed in forest edges, forest regenerations after cuttings and in large clearings (**Map 1f**).

The Middle Spotted Woodpecker is, unlike the previous species, a European faunal species, with a European population of 301,000–678,000 pairs (BIRDLIFE INTERNATIONAL 2023). About 23,500–25,500 pairs nest in our country, where its typical habitat is oak or mixed oak forests, but it also occurs in old floodplain forests (GORMAN *et al.* 2021f). Nevertheless, we have observed it several times in the Bakony in unmixed beech forests, where there was no oak or mixed oak stands within several hundred metres (**Map 1g**). In winter it also regularly visits urban bird feeders. The population of the Magas-Bakony is as numerous as that of the Grey-faced Woodpecker.

The Grey-faced Woodpecker also has a Palearctic distribution, occurring from Western Europe to the Far East, with 11 subspecies (GORMAN 2014). The European population is estimated at 187,000–360,000 pairs (BIRDLIFE INTERNATIONAL 2023), while its domestic population at 1800–2300 pairs (GORMAN *et al.* 2021d). It is found in almost all hilly and mountain forests, but can also be found in floodplain forests on the Danube and the Drava, rarely the Tisza (VARGA 1998, GORMAN *et al.* 2021d). In the mid-mountain areas it has a relatively high population density, but in winter it can show vertical migration and so can be found in urban gardens and parks (HARASZTHY 2019). In the Bakony, the population size is close to that of the Black Woodpecker, which is the third most common species of woodpecker, although its winter population density is lower (**Map 1h**).

The Green Woodpecker is our largest woodpecker after the Black Woodpecker. Three subspecies occur from Western Europe to Iran (GORMAN 2014). The European population is estimated at 587,000–1,050,000 pairs (BIRDLIFE INTERNATIONAL 2023), of which approximately 15,000–17,000 pairs nest in our country (GORMAN *et al.* 2021i). It is mainly a lowland species, but also occurs at higher altitudes, *e.g.*, in the Bakony (GORMAN 2004). It prefers open, deciduous forest stands and forest edges, and also inhabits habitats under anthropogenic influence and is often found in urban parks, cemeteries and roadside tree rows (VARGA 1998, HARASZTHY 2019). It is feeding on ants, which is why it often forages on the ground (GORMAN *et al.* 2021i). In the Landscape Protection Area, it prefers stream valleys and forest margins rich in softwoods (**Map 1i**), but in winter it is also often found in beech regenerations with remnant trees after cutting, which it prefers to forage on.

CONCLUSIONS

Our research has shown that, similarly to its condition in Hungary, the Great Spotted Woodpecker is the most common woodpecker species in the Magas-Bakony, with a population several times larger than the other eight woodpecker species. The Black Woodpecker, the Middle Spotted Woodpecker and the Grey-faced Woodpecker occur in similar proportions. Although the present study did not aim to provide an accurate population estimate for each woodpecker species, we conservatively estimate that the White-backed Woodpecker population in the Magas-Bakony may consist of at least 25 pairs. The other four species (the Syrian Woodpecker, the Lesser Spotted Woodpecker, the Eurasian Wryneck, and the Green Woodpecker) were more scarce comparing to White-headed Woodpeckers.

ACKNOWLEDGEMENT

We would like to thank the colleagues of the Bakonyerdő Zrt. and the Balaton-felvidéki National Park for their help and support in our research.

REFERENCES

- AGÁRDI E. (1959): Megfigyeléseim a balkáni gerle és balkáni fakopáncs délkelet-dunántúli és északkelet-magyarországi előfordulásáról. *Aquila* **65**: 286–287.
- BANKOVICS A. (1973a): Adatok a Kőris-hegy madárvilágához. *Veszprém Megyei Múzeumok Közleményei* **12**: 517–524.
- BANKOVICS A. (1973b): Fehérhátú fakopács (*Dendrocopos leucotos*) a Bakonyban. *Veszprém Megyei Múzeumok Közleményei* **12**: 533–538.

- BARTA Z. (1992): Újabb adatok a zirci arborétum madárvilágának ismeretéhez. *Folia Musei Historico-naturalis Bakonyiensis* **11**: 255–266.
- BARTA Z. (1997): A Bakony-hegység új madárfaja: a holló (*Corvus corax* L.). *Folia Musei Historico-naturalis Bakonyiensis* **12**: 199–212.
- BARTA Z. (2003): *Madarak a Bakonyban I.* Bakonyi Természettudományi Múzeum, Zirc.
- BERETZK P. (1942): A balkáni fakopáncs Szegeden is fészkel. *Aquila* **46–49**: 455.
- BIRDLIFE INTERNATIONAL (2023): IUCN Red List for Birds. [http:// datazone.birdlife.org/](http://datazone.birdlife.org/)
- CAMPION D., PARDO I., ELÓSEGUI M. & VILLANUA D. (2020): GPS telemetry and home range of the White-backed Woodpecker *Dendrocopos leucotos*: results of the first experience. *Acta Ornithologica* **55**: 77–87. <https://doi.org/10.3161/00016454AO2020.55.1.008>
- CHEN, C.K., CHUANG, H.F., WU, S.M. & LI, W.H. (2019): Feather Evolution from Precocial to Altricial Birds. *Zoological Studies* **58**: 24. <https://doi.org/10.6620/ZS.2019>
- GORMAN, G. (2004): *Woodpeckers of Europe. A study of the European Picidae.* Bruce Coleman. Chalfont St. Peter
- GORMAN, G. (2014): *Woodpeckers of the World: The Complete Guide.* Christopher Helm, London
- GORMAN G., KOMLÓS M., ÓNODI G. & SCHMIDT A. (2021a): Balkáni fakopáncs. In: SZÉP T., CSÖRGŐ T., HALMOS G., LOVÁSZI P., NAGY K. & SCHMIDT A. (szerk.): *Magyarország madáratlasza.* Agrárminisztérium, Magyar Madártani és Természetvédelmi Egyesület, Budapest, 423–425.
- GORMAN G., KOMLÓS M., ÓNODI G. & SCHMIDT A. (2021b): Fehérhátú fakopáncs. In: SZÉP T., CSÖRGŐ T., HALMOS G., LOVÁSZI P., NAGY K. & SCHMIDT A. (szerk.): *Magyarország madáratlasza.* Agrárminisztérium, Magyar Madártani és Természetvédelmi Egyesület, Budapest, 428–429.
- GORMAN G., KOMLÓS M., ÓNODI G. & SCHMIDT A. (2021c): Fekete harkály. In: SZÉP T., CSÖRGŐ T., HALMOS G., LOVÁSZI P., NAGY K. & SCHMIDT A. (szerk.): *Magyarország madáratlasza.* Agrárminisztérium, Magyar Madártani és Természetvédelmi Egyesület, Budapest, 430–432.
- GORMAN G., KOMLÓS M., ÓNODI G. & SCHMIDT A. (2021d): Hamvas küllő. In: SZÉP T., CSÖRGŐ T., HALMOS G., LOVÁSZI P., NAGY K. & SCHMIDT A. (szerk.): *Magyarország madáratlasza.* Agrárminisztérium, Magyar Madártani és Természetvédelmi Egyesület, Budapest, 436–437.
- GORMAN G., KOMLÓS M., ÓNODI G. & SCHMIDT A. (2021e): Kis fakopáncs. In: SZÉP T., CSÖRGŐ T., HALMOS G., LOVÁSZI P., NAGY K. & SCHMIDT A. (szerk.): *Magyarország madáratlasza.* Agrárminisztérium, Magyar Madártani és Természetvédelmi Egyesület, Budapest, 420–422.
- GORMAN G., KOMLÓS M., ÓNODI G. & SCHMIDT A. (2021f): Közép fakopáncs. In: SZÉP T., CSÖRGŐ T., HALMOS G., LOVÁSZI P., NAGY K. & SCHMIDT A. (szerk.): *Magyarország madáratlasza.* Agrárminisztérium, Magyar Madártani és Természetvédelmi Egyesület, Budapest, 418–420.
- GORMAN G., KOMLÓS M., ÓNODI G. & SCHMIDT A. (2021g): Nagy fakopáncs. In: SZÉP T., CSÖRGŐ T., HALMOS G., LOVÁSZI P., NAGY K. & SCHMIDT A. (szerk.): *Magyarország madáratlasza.* Agrárminisztérium, Magyar Madártani és Természetvédelmi Egyesület, Budapest, 425–428.
- GORMAN G., KOMLÓS M., ÓNODI G. & SCHMIDT A. (2021h): Nyaktekercs. In: SZÉP T., CSÖRGŐ T., HALMOS G., LOVÁSZI P., NAGY K. & SCHMIDT A. (szerk.): *Magyarország madáratlasza.* Agrárminisztérium, Magyar Madártani és Természetvédelmi Egyesület, Budapest, 416–418.
- GORMAN G., KOMLÓS M., ÓNODI G. & SCHMIDT A. (2021i): Zöld küllő. In: SZÉP T., CSÖRGŐ T., HALMOS G., LOVÁSZI P., NAGY K. & SCHMIDT A. (szerk.): *Magyarország madáratlasza.* Agrárminisztérium, Magyar Madártani és Természetvédelmi Egyesület, Budapest, 433–435.
- HARASZTHY L. (2019): *Magyarország fészkelő madarainak költésbiológiája.* I-II. kötet. Pro Vértes Nonprofit Zrt., Csákvár
- HARMAT B. (szerk.) (2000): *A Bakony – A természet kincsestára.* A Bakonyi Természettudományi Múzeum Baráti Köre, Zirc.
- KEVE A. (1981): Madártani adatok a Déli-Bakonyból, valamint a Bakonyaljáról. *A Veszprém Megyei Múzeumok Közleményei* **16**: 233–243.
- KUMAR, R., SHAHABUDDIN, G. & KUMAR, A. (2014): Habitat determinants of woodpecker abundance and species richness in sub-Himalayan dipterocarp forests of north-west India. *Acta ornithologica* **49**(2): 243–256. <https://doi.org/10.3161/173484714X687136>
- HADARICS T. & ZALAI T. (2008): Magyarország madarainak névjegyzéke – Nomenclator Avium Hungariae. MME, BirdLife International, Budapest.

- ÓNODI G. & CSÖRGŐ T. (2013): Relationship between vegetation structure and abundance of Great-spotted Woodpeckers (*Dendrocopos major*) in a mosaic habitat. *Ornis Hungarica* **21**(1): 1–11. <https://doi.org/10.2478/orhu-2013-0011>
- ÓNODI G. & CSÖRGŐ T. (2014): Habitat preference of Great-spotted Woodpecker (*Dendrocopos major* Linnaeus, 1758) and Lesser-spotted Woodpecker (*Dendrocopos minor* Linnaeus, 1758) in the presence of invasive plant species – preliminary study. *Ornis Hungarica* **22**(2): 50–64. <https://doi.org/10.2478/orhu-2014-0018>
- ÓNODI G. & WINKLER D. (2014): A holtfa szerepe az odúlakó madárközösségek kialakulásában. In: CSÓKA GY. & LAKATOS F. (szerk.): A holtfa. *Silva Naturalis* **5**: 125–144.
- ÓNODI G. & WINKLER D. (2016): Nest site characteristics of the Great-spotted Woodpecker in a bottomland riparian forest in the presence of invasive tree species. *Ornis Hungarica* **24**(1): 81–95. <http://dx.doi.org/10.1515/orhu-2016-0005>
- RÓMER F. (1860): *A Bakony, természetrajzi és régészeti vázlat*. II. kiadás, Győr.
- SCHMIDT A. (2004): Fehérhátú fakopáncs (*Dendrocopos leucotos*) állományfelmérése a Börzsönyben. *Tűzok* **5**(3–4): 93–96.
- SELMECZI KOVÁCS Á. (2017): A legritkább hazai harkály. *Állatvilág* **4**(5): 26–27.
- SZÉP T., CSÖRGŐ T., HALMOS G., LOVÁSZI P., NAGY K. & SCHMIDT A. (szerk.) (2021): *Magyarország madáratlasza*. Agrárminisztérium, Magyar Madártani és Természetvédelmi Egyesület, Budapest.
- SZOLNOKY K. (1973): Adatok az Északi-Bakony és a Bakonyalja madárvilágának ismertetéséhez. *Veszprém Megyei Múzeumok Közleményei* **12**: 579–588.
- TRIEBL, R. (2010a): Vogelbeobachtung im Forstamt Bakonyszentlászló/Nordungarn 2003–2009 – Teil 1. *Ornithologischen Mitteilungen* **62**(11): 372–381.
- TRIEBL, R. (2010b): Vogelbeobachtung im Forstamt Bakonyszentlászló/Nordungarn 2003–2009 – Teil 2. *Ornithologischen Mitteilungen* **62**(12): 413–421.
- TRIEBL, R. (2017): Vogelbeobachtung im Forstbezirk Bakonyszentlászló 2003–2016. *Magyar Ápróvad Közlemények* **13**: 225–253. <http://dx.doi.org/10.17243/mavk.2017.225>
- VARGA F. (1978): Odúkészítő nyaktekercsek. Madártani Tájékoztató nov-dec.: 50–52.
- VARGA F. (1998): Hamvas küllő. In: HARASZTHY L. (szerk.): *Magyarország madarai*. Mezőgazda Kiadó, Budapest, 238.
- WINKLER D. (2012): Balkáni fakopáncs – *Dendrocopos syriacus*. In: FARAGÓ S. (szerk.): Nyugat-Magyarország fészkelő madarainak elterjedési atlasza. Nyugat-magyarországi Egyetem Kiadó, Sopron, 139.
- WIKTANDER, U., OLSSON, O. & NILSSON, S.G. (2001): Seasonal variation in home-range size, and habitat area requirement of the lesser spotted woodpecker (*Dendrocopos minor*) in southern Sweden. *Biological Conservation* **100**(3): 387–395. [https://doi.org/10.1016/S0006-3207\(01\)00045-3](https://doi.org/10.1016/S0006-3207(01)00045-3)