

# Breeding biology of the Woodcock (*Scolopax rusticola* L.) in the Carpathian Basin

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**Abstract** Based on 356 observations of Woodcock nestings published in the Hungarian hunting and ornithological literature between 1846 and 2019, which also includes published and unpublished personal observations, it can be stated that the nesting dates of Woodcock in Hungary are scattered over a large interval. 47.3% of all nestings registered with exact dates (n=93) happen in April. The second peak of breeding in June does not stand out significantly. Based on the data of the clutches (n=65) reported with known number of eggs, as well as the clutches (n=14) – probably with full number of eggs – found in the Hungarian egg collections, the average number of eggs per clutch was 3.8. Based on the observational data of the Woodcock families (n=36) observed during the study period, the number of chicks per hen was 3.6, of which the hens were able to raise an average of 2.8 chicks up to a flying age.

**Keywords:** Woodcock, *Scolopax rusticola* L., breeding biology, nesting, raising of chicks, habitat, number of chicks, breeding losses

**Összefoglalás** A magyar vadászati és ornitológiai szakirodalomban az 1846–2019 között közölt és nem publikált személyes közlések erdei szalonka fészkelésre vonatkozó, 356 megfigyelési adata alapján megállapítható, hogy az erdei szalonkák magyarországi fészkelési időpontjai nagy intervallumon belül szóródnak. Az összes pontos dátummal regisztrált fészkelés (n=93) 47,3%-a április hónapra esik. A második, júniusi költési csúcs nem rajzolódik ki markánsan. Az ismert tojásszámmal közölt fészkeljének (n=65) adatai, továbbá a magyarországi tojásgyűjteményekben lévő – valószínűsíthetően teljes tojásszámú – fészkeljének (n=14) alapján az átlagos fészkeljankénti tojásszám 3,8 volt. A vizsgált időszakban megfigyelt szalonkacsaládok (n=36) adatai alapján az egy tojóra jutó csibék száma 3,6 példány volt, amiből a tojók átlagosan 2,8 csibét tudtak felnevelni röpképes korig.

**Kulcsszavak:** erdei szalonka, *Scolopax rusticola* L., költésbiológia, fészkelés, csibenevelés, habitat, csibeszám, költési veszteség

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## Introduction

The European nesting population of the Woodcock (*Scolopax rusticola* L.) is estimated to have 6.89 to 8.71 million females. According to population estimation data, a significant proportion of the nesting population (84%) is located in Russia, representing around 6–7 million females (BirdLife International 2016). In Hungary, a larger number of specimens can typically be observed only during the spring (March–April) and autumn (September–October) migration. At the southern edge of their breeding area, the number of hens nesting sporadically is about 10–60 specimens per year (Hadarics & Zalai 2008).

In Hungary, only two comprehensive domestic studies have been published so far (Vönöczky Schenk 1944, Bende & László 2020) to summarize the knowledge related to the size of the nesting population and to the nesting areas, but no detailed publication analysing the breeding biology and nesting characteristics of the species has been prepared. In our study, we attempted to form a more complete picture of the breeding biology of the Woodcock by processing 174 years of literature data between 1846 and 2019.

## **Material and Method**

The basis of our study was the observations ( $n=356$ ) on the Hungarian Woodcock breeding known from the Hungarian hunting and ornithological literature, together with the unpublished personal observations, and the database compiled on the basis of clutches found in the Hungarian egg collections. During the processing, we determined the time distribution of nestings between March and August on a decade basis, based on the data of nests ( $n=93$ ) reported with a known time of discovery. By processing the data of known nests ( $n=79$ ) from Hungary, probably with full number of eggs, we analysed the distribution of clutches based on the number of eggs and the average number of eggs per hen. Based on the complete or partial mortality data of 38 nests of these known-sized clutches, we determined the distribution of the known factors causing nest losses. From the data on 98 Woodcock families and Woodcock chicks ( $n=239$ ) published over the last 174 years, we determined the average number of flightless chicks ( $n=57$ ) per hen, based on the reports ( $n=36$ ) on the development and estimated age of the birds. The number of chicks raised by a single hen could be determined using the available information of observations of flying, immature birds ( $n = 56$ ). We also determined the factors causing the death of Woodcock chicks ( $n=25$ ). We compared the results of breeding biology from the synthesis of the collected data on the Carpathian Basin with the data in the international literature. We processed the basic data using Microsoft Excel 2016.

## **Results and Discussion**

### **Nesting time**

According to the observations on the island of Saaremaa in Estonia between 1886 and 1915, the breeding season occurred between 1 April and the end of July, breeding was irregularly long-continued, and second breeding of the species was rare (Steinfatt 1938). Based on a breeding biology study conducted in Whitwell (North Yorkshire, UK) from 1977 to 1981, the nesting period began as early as the second week of March (11 March), but the main breeding period started in April and typically lasted until the end of May. The frequency of nesting in late May to June depended on the extent of the summer drought. Woodcock nests could be found only during the rainy summer seasons. If the nest is destroyed, renesting is common after 10–14 days (Hirons 1982). According to the studies

in Great Britain (n=218) from Hoodless (1994), the nesting period occurred from 8 March to 21 July. Examining each region, he demonstrated differences in the dates of laying the first eggs (Central and Southern England (14 April; n=86), Northern England (18 April; n=67), Scotland (25 April; n=65)). The dominant laying period nationwide was between 26 March and 25 April. Woodcocks nest in Central Europe later, typically from the second week of April until the end of July (Szabolcs 1971, Shorten 1974). Nesting dates from Russia (Kiev region – Charlemagne 1933, Novgorod region – Gementiev & Gladkov 1951) were recorded between 16 April and 15 July.

Based on the time difference – which is just enough for the first generation of Woodcocks to become independent – between normal nesting seasons in spring and nests found on a specific summer, and because of the different nesting sites, Ertl (1902) found that some of the Woodcocks breed up to twice a year. This finding was also confirmed by the observations made in July and early August, which is similar to the spring roding of the Woodcocks. The possibility of Woodcocks breeding twice a year was accepted by the Helsinki Hunting Congress in 1924 and the Stockholm Hunting Congress in 1930. According to Panka (1938), the Woodcock normally breeds only once, but if the first nest is destroyed, it might lay eggs again. Based on the observations of the mating Woodcocks in the pine forests along the Garam River (Hron, Slovakia) and in the mountains around Tiszolc (now Tisovec, Slovakia) in July and August during the evening and dawn roding and on the data on breeding hens found during this period, Lokcsánszky (1935) concluded that the second breeding of the Woodcock was possible. His conclusion was supported by the fact that he found two Woodcocks examined between 3 and 7 August with swollen, active genitals. Zsilinszky (1943) reported the possibility of the second breeding as a fact: „*The hen guides the chicks from the first breeding until mid-June, and then, when they become capable of flight, they fledge and scatter. This is when the second mating, in June, begins, which takes place just as in April. The rooster searches for the hen with the same raspy hissing as in early spring...*” Observations of summer rodings can be evidences of second breeding or even breeding, and the events of Woodcock mating in the summer can indeed support Woodcock nesting nearby (Anonymous 1902, Unger-Ullmann 1934, Farkas 1935, Zsilinszky 1943, Anonymous 1950, Horváth 1989, Fenyősi & Stix 1993). Lönnberg (1921), Witherby *et al.* (1941), Niethammer (1942), Zsilinszky (1943), Agárdi (1968) and Makatsch (1974) also suggested that two breeding attempts per year are possible, but so far this has not been credibly proven. Agárdi (1968) reported a clutch containing eggs found on July 2, 1966, however, the fact of the second breeding cannot be justified in this case either. In May 1967, Varga (1970) assumed post-breeding, based on the late dates of two feathered chicks reported to him, whilst he considered the clutch found on June 30, 1971, to be of first breeding despite the late date (Varga 1977). The latest hatching time of a clutch reported by Varga (1975) was July 20. In these cases, Varga (1975) maintains the possibility of a second breeding. So far, the latest known nesting data in the territory of the Kingdom of Hungary is August 19, 1902 – Liptóújvár Region (Gemér and Kis-Hont County, today Liptovský Hrádok, Slovakia) (Ertl 1902). Haraszthy (2019) classifies the clutches found in May and early June as renestings, while the nests at the end of June, July and August are certainly considered to be from second breeding. At the edge of the nesting area, it is difficult to take a clear position on

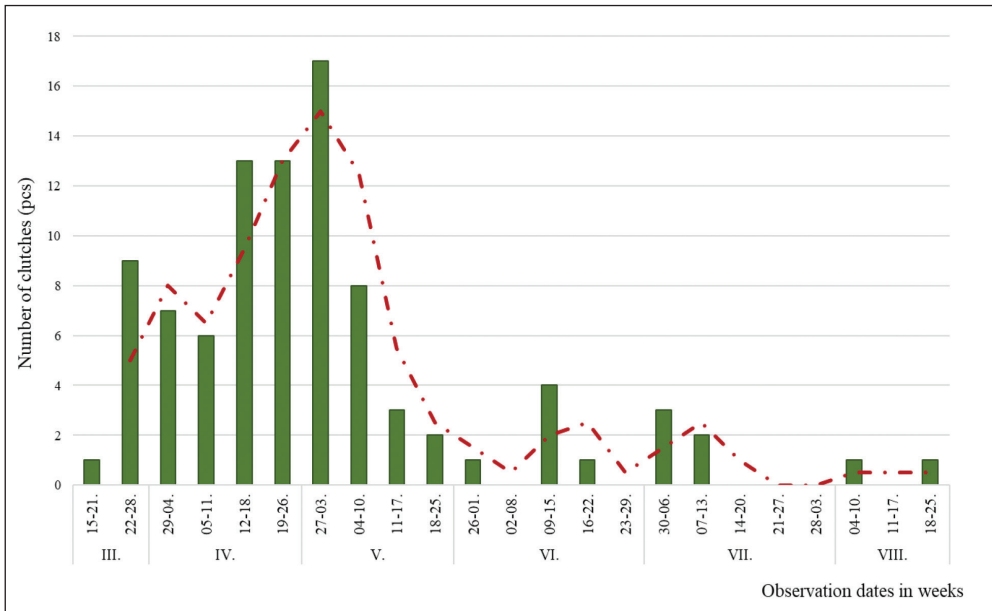


Figure 1. Distribution of dates of Woodcock (*Scolopax rusticola* L.) nests' discovery (n=93) between 1846–2019 during the breeding period

1. ábra Az 1846–2019 között megtalált erdei szalonka fészkek (n=93) időbeli eloszlása

second breeding, as there are very few breeding observations and we do not know of any proven data on second breeding.

Based on the time distribution of nestings (n=87) with exact dates observed in Hungary between 1846 and 2019, including the number of clutches with known collection times (n=6) in Hungarian egg collections, the main breeding period is between April and May (Figure 1), 86% of the observations come from this period (Lakatos 1886, Anonymous 1893, Teschler 1893, Ertl 1897, Gy. Takách 1901, Lintia 1907, Sugár 1916, Veress 1916, Preuszler 1917, Károlyi 1921, Mérey 1928, Dorner 1930, Réz 1930, Steiner 1930, Szurmay 1933, Kiskárpáti 1935, Boroviczeny 1936, Say 1937, Berényi 1938, Csiba 1959, 1968, Varga 1966, 1977, 1979, 1980, Juhász 1970, Szabolcs 1971, Csaba 1974, Bársony 1985, Faragó 1987, Haraszthy & Viszló 2010, Fuisz *et al.* 2015a, 2015b, Pereszélyi *et al.* 2015, Rác 2015, Kozma & Vadász 2018). Observational data on summer renestings and possible second breedings are only 14% (Lovassy 1884, Orlovsky 1889, Ertl 1897, 1902, Agárdi 1968, Varga 1975, 1977, 1979).

Based on data from the Carpathian Basin, the distribution within the breeding period fits well with the results of studies in Germany (Steinfatt 1938), England (Morgan & Shorten 1974, Hirons 1982), and Great Britain (Hoodless 1994). According to these, the timing of Woodcock breeding is independent from specific geographical features, although its beginning differs based on British results. Given the hectic nature of renestings, the second breeding of the species in our area cannot be ruled out either, despite the fact that the second nesting peak in June is not clear. In case of a successful early first breeding, we consider

a second breeding possible. Kalchreuter (1983) concluded that the number of clutches per year was likely to vary from year to year and from region to region.

### The size of the clutch

The Woodcock lays eggs every 1–2 days (Cramp & Simmons 1983), sometimes every 3 days (Makatsch 1974). In the case of Woodcock nests studied in Great Britain (n=12), the average laying interval was 1.25 days, which means an average egg-laying period of 5 days in a clutch with four eggs (Hoodless & Coulson 1998). According to the observation of Román (2019 pers. comm. not published), the hen laid one egg every 2 days.

The size of the clutch can vary from 2 to 5 eggs; the clutches usually have 4 eggs (Makatsch 1974, Cramp & Simmons 1983, Glutz *et al.* 1986, Hoodless 1994). Regarding the size of reneesting, Makatsch (1974) also gives 4 eggs as the most common clutch size. According to the British data from Hoodless and Coulson (1998), clutches (n=277) can be 2–5 eggs in size. 88.8% of the nests they examined contained 4 eggs, while 9.0% contained 3 eggs; the average number of eggs was 3.9. Based on his studies in England (n=330), Alexander (1946) gave an average of 3.8 eggs per nest, which is almost the same value (3.9) as the later study of Morgan and Shorten (1974) suggests. They found no difference between the average size of clutches (n=168) from different areas of Great Britain: Scotland (n=60) the average was 3.9; Northern England (n=64) the average was 3.8; Southern England (n=44); the average was 3.8. Based on a study by Hirons (1982) in England, the average clutch size was 3.9 eggs (n=20). Knefely (1987) found an average of 3.7 eggs per nest (n=77) in Germany.

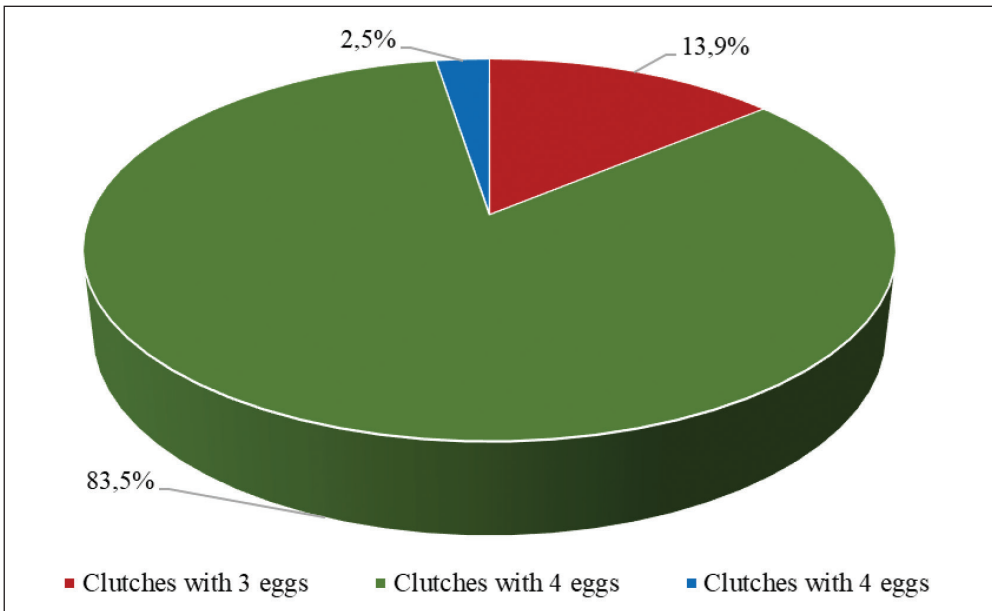


Figure 2. Distribution of Woodcock (*Scolopax rusticola* L.) clutches (n=79) based on the number of eggs between 1846–2019

2. ábra Az erdei szalonka 1846–2019 között megtalált fészekalj (n=79) méretek eloszlása

The data of clutches (n=65) found in Hungary with known number of eggs, as well as the nests (n=14) in the Hungarian egg collections – probably complete – include two 1-egg nests (Maltotai 1906, Réz 1935). Nests with three eggs (n=11) were found by (Széchenyi 1879, Lovassy 1891, Mérey 1928, Kiskárpáti 1935, Vásárhelyi 1936, Agárdi 1939, 1968, Faragó 1987, Haraszthy & Viszló 2010), four eggs (n=66) (Lovassy 1883, Chernel 1885, Orlovsky 1889, Gy. Takách 1901, Ertl 1902, Anonymous 1907, Lintia 1907, Sugár 1916, Chernel 1918, Dorner 1930, Réz 1930, Szurmay 1933, Kiskárpáti 1935, Réz 1935, Anonymous 1936, Vásárhelyi 1936, Say 1937, Berényi 1938, Agárdi 1939, Csiba 1959, Varga 1966, 1968, 1977, 1979, 1980, Juhász 1970, Csaba 1974, Faragó 1987, Haraszthy & Viszló 2010, Haraszthy 2012, 2015a, 2015c, Fuisz *et al.* 2015a, 2015b, Rác 2015, Solti *et al.* 2015, Kozma & Vadász 2018, Pukánszki 2018) and five eggs (n=2) (Veress 1916, Réz 1928) (Figure 2). The average clutch size was 3.8 eggs (n=79), which fits well with the European data known from the literature. There is no geographical difference in the size of the clutches, neither in Europe, nor in Hungary.

## Breeding

According to studies by Hirons (1982) in England, the fertility of the Woodcock eggs is 96.4%. Similarly, McKelvie (in Asbót *et al.* 1987) found this to be 90% in his studies. We know about only three reports on rotten eggs from Hungary (Bóta 1943 Varga 1966, 1968), so the fertility value in Hungary cannot be determined, but we assume that this ratio is similar to international levels. The hen begins to incubate after the last egg laid, so the hatching of the chicks is synchronized. According to observations in England, the incubation period was 21 days (McKelvie in Asbót *et al.* 1987), while in Great Britain, based on more detailed observation data, the average incubation period was 21.9 days (n=15, min. 17, max. 24) (Hoodless & Coulson 1998), which corresponds to the data from Makatsch (1974), Glutz *et al.* (1986) and Cramp and Simmons (1983). The breeding time observed in Hungary was 23 days (Román 2019 pers. comm. not published).

## Breeding losses

During the studies conducted by Hirons (1982) in Whitwell, North Yorkshire, 47% of nests (n=19) were destroyed; in two cases, due to predation by Red Foxes (*Vulpes vulpes*) when the hen was also killed. During a study conducted in Great Britain, 933 eggs in 277 nests were examined, 74.1% of which hatched (Hoodless 1994, Hoodless & Coulson 1994). During the studies of Morgan and Shorten (1974), 288 of the 453 eggs hatched (63.8%); the main factor causing the loss was nest predation. In the study of Hoodless and Coulson (1994), 44 hens left the nests during the breeding period, of which 31 were abandoned due to human disturbance (scaring away the hen from the nest), in four cases due to forestry activities, three times due to extreme weather, and in six cases the Woodcocks left their eggs for unknown reasons. In the latter cases, it is probable that the feeding hen fell prey and therefore did not return to the nest. 55 clutches were destroyed by various predators, in four cases not only the clutches but also the breeding hens were killed. The most common

winged predators of the eggs are the Eurasian Jay (*Garrulus glandarius*) and the Carrion Crow (*Corvus corone corone*). Among the mammals, the nest predation of the Wood Mouse (*Apodemus sylvaticus*), the European Hedgehog (*Erinaceus europaeus*), the Stoat (*Mustela erminea*), the Red Fox, and the Wild Boar (*Sus scrofa*) is known (Nyenhuis 1991, 2007, Isaksson *et al.* 2007, Pedersen *et al.* 2009).

Based on nesting data from Hungary, we have information on the complete or partial destruction of 38 of the 79 clutches with known size. Of the 307 eggs, 100 perished. One report is known when the hen died along with her clutch (Varga 1977). Details of nest destruction due to the winter weather during the nesting period are reported in one case. (Berényi 1938). Based on data on nests destroyed by predation, three nests were destroyed by Red Squirrel (*Sciurus vulgaris*) (Juhász 1970), while one nest was destroyed by Hedgehogs (Varga 1980). In one case, Varga (1968) presumed predation by a Red Fox or Wildcat (*Felis silvestris*). Numerous data are known on the nest-destroying effects of human activity. In one case, children destroyed a clutch (Kiskárpáti 1935), and in two cases the clutches fell victim to forestry work (Csete 1936, Faragó 1987). The clutches were placed in egg collections in 17 cases (n=57 eggs) (Lovassy 1891, Haraszthy & Viszló 2010, Haraszthy 2012, 2015a, 2015b, 2015c, Fuisz *et al.* 2015a, 2015b, Haraszthy *et al.* 2015, Rác 2015, Solti *et al.* 2015). The egg collection has been ended, so this loss is no longer a factor. In three cases, the hen left the nest permanently, presumably due to other human disturbance (Dorner 1930, Varga 1979, Haraszthy 2019), and three more nests were destroyed for unknown reasons (Varga 1980, Román 2019 pers. comm. not reported).

### **Raising of chicks, the number of chicks per hen**

According to observations from Russia, chicks weight 17–20 g hatch in 5–6 hours (Gementiev & Gladkov 1951). Only the hen takes care of the chicks. After drying, hatched chicks leave the nest under the guidance of their mother. On the first day, they are only 20–30 meters away from the nest (Varga 1977). Chicks develop rapidly, being able to fly after 20 days of age (Hirons 1982), while from day 35–42, they become completely independent (Hirons 1982, Cramp & Simmons 1983). Hens usually guide their chicks alone, but a publication is also known in which two Woodcock families wandering together are reported (Deák 1885, Faragó 1987).

According to a study in Great Britain (McCabe & Brackbill 1974), the survival rate in the first month after hatching is 78%. In England, the number of flying chicks per hen was 2.3 (n=20) (Hirons 1982). During the study of clutches in Germany (n=77), an average of 2.9 chicks per nest (n=49) were registered (Knefely 1987).

From the data on 98 Woodcock families and Woodcock chicks published in Hungary over the last 174 years, the number of chicks was known in 76 cases, which means the data of a total of 239 chicks. Data on the development and estimated age of the birds were reported in 51 cases, of which the number of chicks was given in 36 cases. Of the reports of more downy or more advanced but still flightless birds (n=29), in the cases published with a known number of chicks (n=16), observational data are published for a total of 57 chicks (Chernel 1885, Anonymous 1898, Anonymous 1910, Polgár 1922, Janisch 1924, Breuer

1929, Réz 1928, 1930, Várady 1932, Kiskárpáti 1935, Réz 1935, Bóta 1943, Hoffmann 1950, Varga 1966, 1968, 1970, Faragó 1987). Based on the above, the hens guided an average of 3.6 chicks. Based on the reports of domestic observations of young birds ( $n=20$ ) that have already fledged (Széchenyi 1871, Anonymous 1889, Anonymous 1891, Janisch 1924, Réz 1930, Kozarits 1935, Varga 1966, 1968, 1970, Faragó 1987, Kuslits 2019 pers. comm. not published, Mogyorósi & Kuslits 2019 pers. comm. not published), the data of 56 specimens are known; based on this, the average number of chicks per hen was 2.8, which means a survival rate of 78.7%. This value fits well with the data on the number of chicks per hen (2.3–2.9 chicks/hen) reported in the international literature (Hirons 1982, Knefely 1987). We can conclude that the nesting success at the edge of the nesting area is similar to that in the central area of the nesting distribution.

## Summary

According to international literature (Gementiev & Gladkov 1951, Morgan & Shorten 1974, Hirons 1982, Hoodless 1994), the main breeding season of Woodcock is in April-May, but breeding in March is not uncommon in Great Britain (Hirons 1982, Hoodless 1994). According to our research, the main breeding period in Hungary is also in April-May; we know more than two-thirds of the nestings from this period. Based on the international literature data and our own results, it is not possible to determine a clear trend-like time shift in the nesting period although the climatic conditions of this widespread breeding distribution, and presumably the altitude as well, affect the timing of the beginning of nesting, e.g. Hoodless (1994). In connection with second breeding, neither the international (Lönnerberg 1921, Witherby *et al.* 1941, Niethammer 1942, Makatsch 1974) nor the Hungarian (Anonymous 1902, Ertl 1902, Unger-Ullmann 1934, Farkas 1935, Panka 1938, Zsilinszky 1943, Anonymous 1950, Agárdi 1968, Varga 1970, Varga 1975, Horváth 1989, Fenyősi & Stix 1993, Haraszthy 2019) literature is uniform. Knowing the nesting data from Hungary, in the case of successful early first breeding, we consider the second breeding of the species possible in Hungary as well, considering the nesting data from July and early August. This may not be significant, as the second summer nesting peak does not stand out clearly. Based on the data on nest mortality from Hungary, compared to the British data (32.6%) from Hoodless and Coulson (1998), the rate of loss caused by human factors is very high, which can be attributed to the data of egg collections, which is now outdated. Furthermore, the share of predation (50%) is lower than in Great Britain (57.9%). Few data on natural nest predators are reported in the Hungarian literature, but based on international data, it can be assumed that the loss attributable to this is greater than the domestic data, so the actual rate of human destruction determined by the results of this study might be lower. Comparing the data of scattered nesting in Hungary with the data of the countries with a significant nesting population published in the international literature, it can be stated that there is no significant difference in terms of clutch sizes (3.9 eggs/nest) and the number of chicks raised per hen (2.8 specimens/hen), which refers to the uniform breeding biology of Woodcocks throughout Europe.



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