

## NUMBERS AND DISTRIBUTION OF RED-FOOTED FALCON (*FALCO VESPERTINUS*) NESTS IN VOIVODINA (NORTHERN SERBIA)

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The breeding range of red-footed falcon (*Falco vespertinus*) in the Palearctic extends across the broad band of steppe, foreststeppe and cultivated lands in the north temperate zone (Cade 1982). The western limit of this species extends to the western border of Hungary in Central Europe (Keve and Szijj 1957, Lohmann 1962, Glutz et al. 1971, Cramp and Simmons 1980). Although a relatively large red-footed falcon population occurs in the Carpathian Basin (Keve and Szijj 1957, Glutz et al. 1971, Cramp and Simmons 1980), very little is known about their number and breeding distribution in the northern province of Serbia, Voivodina (Antal et al. 1971, Pelle et al. 1977).

Based on limited information, Vasić et al. (1985) made a preliminary estimate of 80 pairs of red-footed falcons in Voivodina. However, this preliminary work did not provide a clear picture of the distribution of nesting areas. Herein, I provide the results of a recent survey of the numbers and distribution of red-footed falcon nests in the area.

Voivodina is a mostly flat region in northern Serbia that lies in the southeastern part of the Carpathian Basin. It is divided by the Danube, Tisa, and Sava Rivers into three areas: Bachka, Banat, and Srem (Fig. 1). The Bachka region (8956 km<sup>2</sup>) lies between the Tisa and Danube Rivers and borders with Hungary in the north. The Banat region (8886 km<sup>2</sup>) is north of the Danube River and east of the Tisa River and borders with Hungary and Romania. The Srem region (3838 km<sup>2</sup>) lies between the Danube and Sava Rivers and borders with Croatia. The area ranges from 70–200 m above sea level and two mountains, the Fruška Gora (539 m) in Srem and the Vršac Mountains (641 m) in southeastern Banat rise above the large plain. They support deciduous forests dominated by oak (*Quercus* spp.), linden (*Tilia* spp.), and hornbeam (*Carpinus* spp.). The lower slopes have mostly been cleared and are used for pastures, vineyards and orchards. Voivodina is largely agricultural and only 5.4% is forested. The most common soil type is chernozem, a black soil, covering 60% of the arable land. It is extremely fertile and mainly used for cultivation of crops such as wheat, maize, sugar beets, sunflowers, and soya. Industrial crops, fodder crops and vegetables are also cultivated on the black marsh soil. Alluvial soils occur in river valleys

and support willows (*Salix* spp.) and poplar (*Populus* spp.) forests and meadows. Approximately 10% of Voivodina has saline soils which are used for pastures and, in some places, fishponds.

The red-footed falcon census was performed from 28 April–14 July in 1990, and from 27 April–22 July in 1991. In 1990, surveys were conducted for 28 d, while in the second year the survey took 33 d. Srem, Bachka, and Banat were surveyed on 7, 18 and 36 d, respectively. In both years, an observer and I drove all the main roads in Voivodina, usually 200–400 km per day, for a total of >20 000 km. Over a 3-d period at the end of April, and over 16 d in May in both survey years, I also searched for rook colonies and recorded any red-footed falcons observed.

Horváth (1955) observed red-footed falcons laying eggs in the second half of May and concluded that nests became occupied 2–3 weeks before egg laying. To determine clutch and brood sizes of red-footed falcons, nest trees were climbed twice in June and July. Only those nests containing at least one egg during the first nest visit were included in nest size estimates. When nests were impossible to climb, they were checked twice from the ground to make certain that the female was in the same nest and to count nestlings standing on the edge of the nest.

To make the census more complete, information on rook colonies and locations of red-footed falcon nests was obtained from the Association for Protection and Study of Birds of Voivodina. This was originally reported by A. Zsulyevits, M. Dević and J. Rašajski (Table 1).

I found 308 pairs and 124 pairs of red-footed falcons in Voivodina in 1990 and 1991, respectively (Table 1). Breeding pairs were found only in Bachka and in Banat (Fig. 1). In 1990 four, while in 1991, five pairs nested in northwestern and southeastern Bachka between the Danube and Tisa Rivers. In all cases, red-footed falcons nested in isolated magpie (*Pica pica*) or hooded crow (*Corvus corone cornix*) nests.

In Banat, 304 pairs of red-footed falcons were found in 1990, while only 119 pairs were recorded in 1991. Most nests were either along the Tisa River or in the foothills of the Vršac Mountains (Fig. 1). In 1990, red-footed falcons nested in 15 separate locations. With the exception of three isolated pairs found in old magpie nests (in the vicinity of the villages of Bočar, Dobrica and Konak), red-footed falcons nested in rook (*Corvus frugilegus*) colonies.

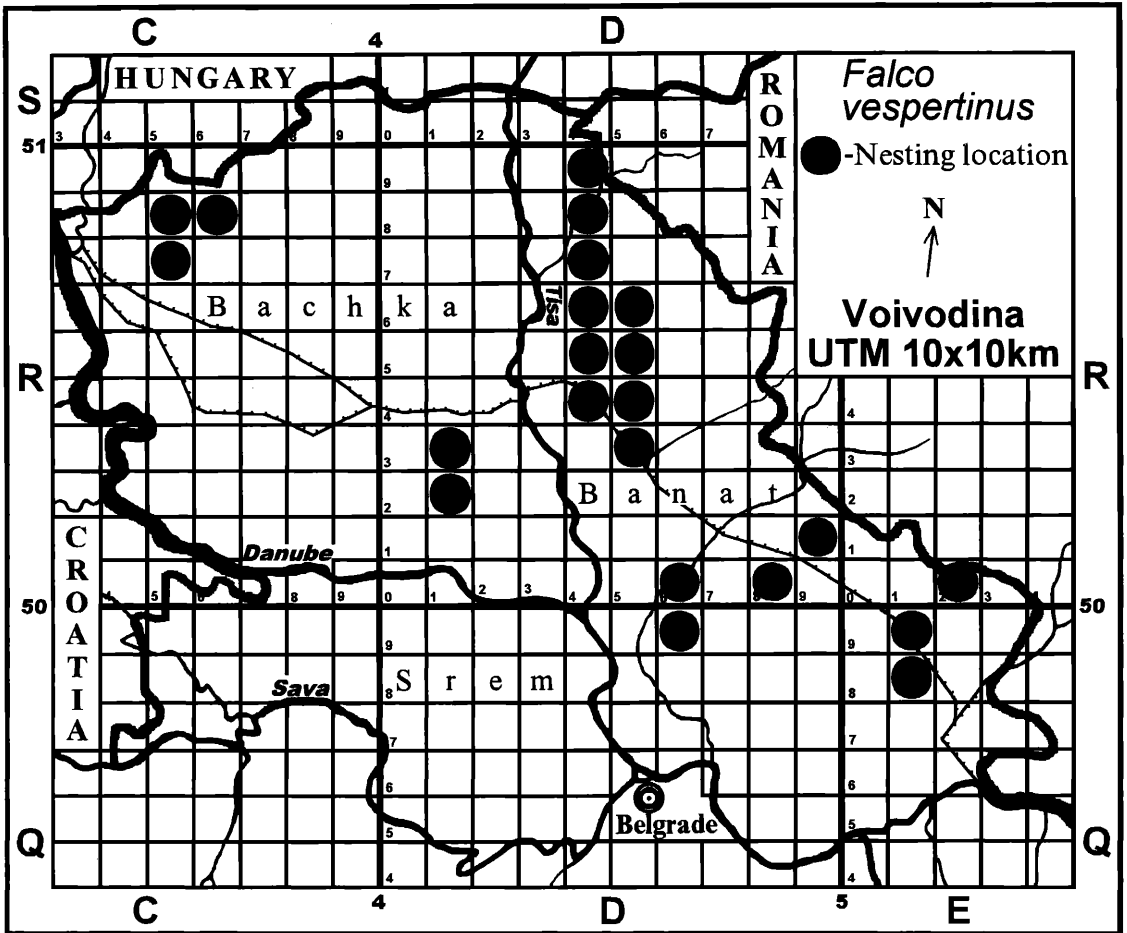


Figure 1. Breeding distribution of red-footed falcon in Voivodina during 1990 and 1991 based on the bird census data.

Five large colonies were used including one near the village of Jazovo where 147 pairs of red-footed falcons nested. In 1991, 19 sites were used in Banat. At 9 sites, 11 pairs nested in abandoned magpie or hooded crow nests. At the other 10 sites, 108 pairs nested in rook colonies. The four largest colonies were near Jazovo (29 pairs), Melenci (27 pairs), Vljakovac (16 pairs), and Torđa (14 pairs) (Table 1).

Birds of prey that breed in colonies tend to nest in the same location year after year (Newton 1979). In this study, red-footed falcons also reused colonies but the numbers of breeding pairs decreased from 308 pairs in 1990 to only 124 pairs in 1991. There are several possible reasons for the difference between the results of the two census years. The census in Voivodina was conducted near the periphery of the species distribution. Peripheral populations tend to react more sensitively to environmental changes than do more central populations

(Udvardy 1969). The spring of 1991 was cooler and wetter than 1990, which delayed nesting of rooks. Thus, when red-footed falcons arrived at the end of April to breed, rooks were still occupying nests and they were forced to find alternative nest sites. It is possible that some of the falcons may have gone further north, but the rest may have used abandoned magpie and hooded crow nests or tried to occupy empty nests inside rook colonies that were still active. Usually, red-footed falcons that nest in colonies are more reproductively successful than solitary nesters (Haraszthy and Bagyura 1993). Unfavorable weather conditions may, therefore, lower reproductive success of red-footed falcons by forcing them to nest in less suitable, isolated magpie and hooded crow nests.

Raptors may also become concentrated in the breeding season in areas with abundant food (Newton 1979). Voivodina is predominantly agricultural and grasslands

Table 1. Number of breeding pairs of red-footed falcon found in Voivodina during 1990 and 1991.

UTM	LOCALITY	1990	1991
Bachka			
CR57	Lenija, 6 km northeast of Sombor (A. Zsulyevits)	1	2
	Milčić, 8 km northeast of Sombor (A. Zsulyevits)	1	—
CR58	Rančevo, 14 km north of Sombor (A. Zsulyevits)	—	2
CR68	5 km southwest of Aleksa Šantić	—	1
DR12	2 km west of Gospodjinci	1	—
DR13	8 km northeast of Temerin	1	—
Banat			
DR44	7 km north of Melenci	3	—
	5 km northeast of Melenci	46	27
DR45	Slano kopovo, 9 km east of Novi Bečej	—	1
	6 km southwest of Bašaid	—	2
DR46	5 km west of Bočar	1	—
	6 km southwest of Novo Miloševo	6	—
DR47	1 km east of Idjoš	—	2
DR48	2 km southeast of Jazovo	147	29
DR49	2 km southwest of Vrbica	—	1
	2 km west of Banatski Monoštor	—	1
	1 km west of Banatski Monoštor	—	1
DR53	3 km northwest of Jankov Most	1	2
DR54	2 km south of Torda	20	14
	4 km southwest of Torda	12	3
	6 km southwest of Torda	4	2
DR55	1 km southeast of Bašaid	—	7
DR56	9 km south of Kikinda	—	1
	10 km south of Kikinda	—	1
	6–7 km northeast of Bašaid	6	—
DR60	Idvor (M. Dević)	—	1
DR80	2 km southeast of Dobrica	1	—
DR91	2 km southeast of Konak	1	—
DQ69	Sakule (M. Dević)	—	7
ER20	3 km east of Vatin	7	1
EQ18	Potporanj (J. Rašajski)	7	—
EQ19	3 km northwest of Vljakovac	42	16
	Total	308	124

and pastures provide necessary foraging areas for falcons during the nesting season. Red-footed falcons are probably more abundant and widely dispersed in Banat due to this reason. Conversely, Bachka supports few falcons because it is dominated by intensive row-crop agriculture.

RESUMEN.—Registré 308 y 124 parejas reproductivas de *Falco vespertinus* en Voivodina, entre 1990 y 1991, respectivamente. La mayoría de los halcones nidificaron en la

región este de Banat, mientras que sólo 4–5 parejas nidificaron en Bachka, ninguna nidificó en Srem. *Falco vespertinus* ocupó nidos de colonias de *Corvus frugilegus* (>90% de las veces), *Pica pica* y *Corvus corone cornix*. En 1990, las tres colonias más grandes estaban en las vecindades de las villas de Jazovo, Melenci y Vljakovac, las que tenían 147, 46 y 42 parejas reproductivas, respectivamente. Las mismas colonias soportaron solamente 29, 27 y 16 parejas en 1991. He atribuido esta diferencia al frío y lluvia primaveral ocurridas en 1991, las que provocaron un retardo en la nidificación de *C. frugilegus*, lo que previno la ocupación de los nidos por parte de los halcones. La falta de insectos-presa probablemente también contribuyó a la declinación en el número de parejas nidificantes de halcones.

[Traducción de Ivan Lazo]

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