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Communal post-breeding roost of Lesser Kestrels *Falco naumanni* and Common Kestrels *Falco tinnunculus* in southern Kosovo

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Abstract

Raptors display a variety of social behaviours. Species like the Lesser Kestrel *Falco naumanni* engage in social behaviour during both the breeding and post-breeding periods, forming communal roosts. Other species, such as the Common Kestrel *Falco tinnunculus*, exhibit a more solitary lifestyle, displaying territorial behaviour towards conspecifics throughout the year, rarely forming large aggregations. In this study, we present observational data from a communal roosting site of the two kestrel species in Kosovo. The aggregation was predominantly comprised of Lesser Kestrels with up to four Common Kestrels joining the roost. The kestrels gathered around sunset at the roosting site and emerged 15-20 minutes before sunrise in the mornings. Lesser Kestrels exhibited higher levels of aggression, frequently displacing their congenerics from the core roosting area. The site hosted over 50 birds and represents the first documented occurrence of the Lesser Kestrel in Kosovo and the first description of a communal post-breeding roost of the two kestrel species.

Keywords: interspecific interactions, Balkans, raptor ecology, pre-migratory roosts, intermittent migration

INTRODUCTION

Communal roosting is a well-documented phenomenon among some kestrel species. For instance, Lesser Kestrels *Falco naumanni* are known for forming large aggregations throughout the breeding and non-breeding season. They are colonial breeders (Minias et al. 2009) and migratory birds, breeding in southern Europe and wintering in sub-Saharan Africa (Sarà et al. 2019, Orta & Kirwan 2020). Their migration takes place from early August to early October, peaking in mid-September (Bounas et al. 2016a). Before migrating to their wintering grounds in Africa, Lesser Kestrels undertake staging movements to specific areas that may also be located in the opposite direction of the primary migration route. This behaviour is called intermittent or intermediate migration (Sarà et al. 2014). At the pre-migration roosts, the Kestrels engage in communal roosting and foraging (Newton 2008). Such pre-migratory roosts are known for many countries of the Balkan, including Greece, Macedonia and Albania (Bounas et al. 2016b). Albania harbours one of the most important roosting sites for this species in south-eastern Europe. In the Drino Valley, 4,000 to 6,000 individuals roost together on power lines each year (Minias et al. 2009), although the breeding population in Albania has declined to just 0-20 breeding pairs (Burfield & Bommel 2004). During the pre-migration period, Lesser Kestrels mainly feed on large species of Orthoptera and Coleoptera (Krištín et al. 2020). It is commonly stated that the abundance of invertebrates is the main factor in selecting communal roosting sites, as it allows individuals to meet energy requirements for moulting and building up fat reserves for long-distance migration (Olea et al. 2004, Sarà et al. 2014). As pre-migration roosts attract massive aggregations of Kestrels on a small space, these pre-migratory areas are of great importance for conservation (Krištín et al. 2020).

The European Lesser Kestrel population underwent severe decline in the 20th century (Minias et al. 2009, Iñigo & Barov 2010) and the species even became extinct in Austria, Slovenia and Slovakia (BirdLife International 2024). The population decline was mainly attributed to the transformation of herbaceous and cereal crops into intensively used, irrigated land (Donázar et al. 1993, Catry et al. 2013). Together with pesticide use, this led to a reduction in food availability, particularly of large orthopterans (Aparicio et al. 2023). As a result of rigorous conservation efforts, the population has increased since the year 2000 and the Lesser Kestrel was downlisted from “vulnerable” to “least concern” in 2011 (BirdLife International 2011). However, since 2012, the population trend has reversed again, with numbers decreasing, particularly in Spain (Aparicio et al. 2023). In Kosovo, there is insufficient data on the breeding status and occurrence of the Lesser Kestrel. The few observations of the Lesser Kestrel are limited to occasional, random sightings, predominantly in August during the pre-migratory period, which are

not sufficiently supported by evidence (https://observation.org, accessed on 17/11/2024). In other databases, such as eBird and GBIF, the Lesser Kestrel is not listed for Kosovo (http://www.ebird.org, accessed on 12/12/2024; (*GBIF.org (12 December 2024) GBIF Occurrence Download https://doi.org/10.15468/dl.mqkd8k*)). Despite the lack of documented breeding attempts, it is plausible that undocumented breeding colonies exist within the country, particularly as the species is common across several areas of the Republic of North Macedonia bordering Kosovo to the south (Birdlife International 2011).

Unlike the Lesser Kestrel, the Common Kestrel *Falco tinnunculus* is more frequent and widespread. It is distributed across the entire West Palearctic (Orta et al. 2020). Common Kestrels are partial migrants, with long- and medium-distance migration occurring in northern European populations, while southern and western European birds are sedentary (Costantini & Dell'Omo 2020, Morganti, M. 2021). In northern populations, migration begins in September and October, while juvenile dispersal begins earlier in August. Southern populations of the Common Kestrel prey on large insects but consume a substantially higher amount of vertebrates in contrast to Lesser Kestrels (Van Zyl 1994, Orihuela-Torres et al. 2017). During the breading season, both sexes of Common Kestrels show aggression towards conspecifics, defending their territories This aggressive intraspecific behaviour is maintained during the non-breeding season, when family associations break up and the Kestrels become solitary (Wiklund & Village 1992).

During a summer school programme focused on the fauna of Kosovo, conducted by the University of Konstanz (Germany) in late summer 2024, we discovered and observed a mixed roost of Lesser and Common Kestrels in the country's southern region. This represents the first documented report of Lesser Kestrels in Kosovo. The presence of both species provided the opportunity to gather new information about the intra- and interspecific roosting behaviour.

MATERIALS AND METHODS

Over a period of two weeks (22.08.2024-03.09.2024), we observed the kestrels emerging from the roosting site in the morning and arriving in the evening. Observations were conducted every 1-3 days. Emergence was observed from 5:30 to 6:30 am and arrival from 6:30 to 7:30 pm. Kestrels were counted during emergence, while species, sex and age ratios were determined in the evening. Observations were carried out from a distance of 60 m using binoculars and a Kowa TSN-773 scope combined with TE-11WZII lens and TSN-EX16 1.6x extender. Photos of the birds were taken from an elevated position, i.e. the 3rd floor of a former barrack building with a Nikon D500 and Tamron 150-600 mm g2 telephoto lens.

After the emergence counts, the ground underneath the roost trees was examined

for shed feathers. They were collected and subsequently identified by comparison with comprehensive feather collections on FEATHERBASE (https://www.featherbase.info/de/home, accessed on 11/09/2024).

RESULTS

The roosting site is located in southern Kosovo at the Prizren Innovation and Training Park (ITP) (42.218249, 20.754337) (Fig. 1A). It comprises 52 buildings, including 23 former barracks, on the 39-hectare former military site. Between the scattered buildings and paved surfaces are green areas, groups of trees and scrubland. The site is enclosed by a fence and, due to the restricted access, it is not frequented by many people and therefore human disturbance of local fauna is minimal. The ITP is surrounded by residential and commercial areas to the north, east and south. To the west, there is open terrain, comprising the lower slopes of the Sharr Mountains. This area is characterised by low deciduous forests (mainly *Quercus*), scrubland, extensive pastures and fallow land (Fig. 1A). The open sub-Mediterranean grassland and herbaceous areas inside and outside the ITP are rich in insects and harbour numerous species of large orthopterans (e.g. *Calliptamus italicus*, *Oedipoda caerulescens*, *Decticus albifrons* and *Pachytrachis gracilis*), including suitable prey for the Lesser Kestrel.

As a roost site, the Kestrels chose a row of black pines *Pinus nigra* adjacent to the former barracks (Fig. 1B). The roost size increased from 33 Kestrels on the 23rd of August to a maximum of 53 individuals by the 3rd of September (Fig. 2A). Most of the individuals were Lesser Kestrels. Additionally, an average of two (maximum four) Common Kestrels joined the roost almost every day, likely originating

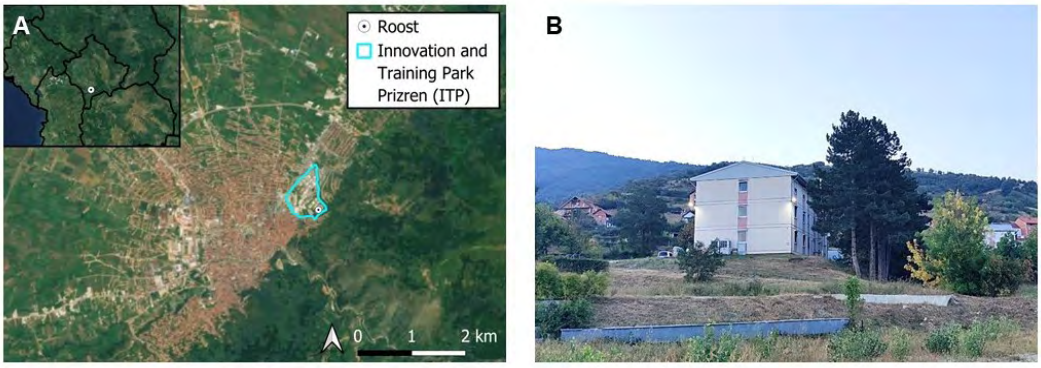

Figure 1: (A) The mixed communal roost of Lesser and Common Kestrels is located in Southern Kosovo on the premises of the Innovation and Training Park (ITP) in Prizren (42.218249, 20.754337). Background image: Sentinel-2 satellite data (© ESA, 2024). (B) The Kestrels used a row of black pines (*Pinus nigra*) adjacent to a former barracks as sleeping trees.

from a local family group. In the morning, the Kestrels began to emerge from the trees 15 to 20 minutes before sunrise. The Common Kestrels were among the first individuals to leave the roost. They were consistently observed leaving the site with vocalisation, which facilitated field identification. They immediately left the vicinity of the roost and different individuals flew off in different directions. The emergence pattern of Lesser Kestrels was highly dependent on whether there were any disturbances in and around the roost at the time of emergence. Corvids, such as Eurasian Jays *Garrulus glandarius* or Eurasian Magpies *Pica pica*, actively chased away the Lesser Kestrels, whereas other species, such as Eurasian Collared Doves *Streptopelia decaocto,* primarily caused disturbance within the roost, both resulting in a sudden simultaneous departure of numerous Kestrels. Without any apparent disturbance, the Lesser Kestrels left in groups ranging from single individuals to flocks of approximately 30 birds. Following emergence, the Lesser Kestrels gathered on nearby power lines to the east, adjacent to the ITP grounds. They continued as a cohesive group for several hours after sunrise before leaving the vicinity of the roost site.

In the evening, arrival peaked around sunset. However, some single individuals and smaller groups of both species were already present in the vicinity of the roost a few hours before sunset. Subsequently, larger flocks of up to 15 birds continued to arrive at the site, until 30 minutes after sunset. Arriving birds lingered in the surrounding area of the roost site, circling above the site and perching on the roost trees as well as surrounding structures. Within the roost, we observed frequent competition for perching sites, with interspecific conflicts often resulting in the displacement of Common Kestrels, which subsequently settled down on the shutters of nearby barracks.

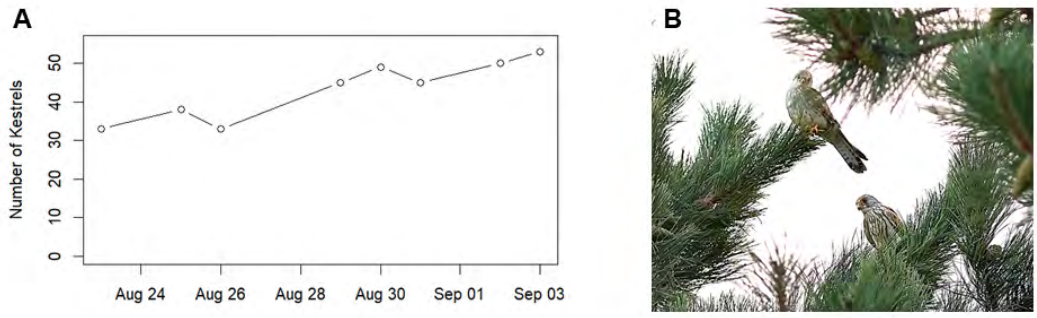

Figure 2: (A) Emergence counts for the communal roost. The kestrels were counted each morning between 5:30 and 6:30 am. The count data include both Lesser and Common Kestrels. (B) Juvenile and adult female Lesser Kestrel in the roost trees.

DISCUSSION

Our observations provide the first reliable evidence of Lesser Kestrels in the Republic of Kosovo, thereby extending the known distribution range of the species to a little-explored region of southeastern Europe. Additionally, it is the first documented case of a mixed roost of Lesser and Common Kestrels. The aggregation of both species at the roosting site allowed us to examine behavioural patterns and interspecific differences. The presence of Common and Lesser Kestrels highlights that larger flocks of kestrels require careful observation, as distinguishing between the two species can be difficult in the field, especially in poor light.

Lesser Kestrels are known to form large aggregations throughout the year (Olea et al. 2004, Bounas et al. 2016b). After the breeding season, they flock at pre-migratory roosts located in areas with abundant and accessible prey (De Frutos & Olea 2008, Sarà et al. 2014). Besides conspecific aggregations, mixed roosts with Amur Falcons *Falco amurensis* and Red-footed Falcons *Falco vespertinus* have also been reported (Kopij, 2012; Topić et al., 2019), likely coinciding with high local prey abundance. A higher dilution effect may also favour the formation of mixed roosts. In our study, the roost predominantly comprised Lesser Kestrels. A maximum of four Common Kestrels (one male, one female and two juveniles) suggests that the Common Kestrels belonged to one resident family group opportunistically joining the roost. Common Kestrel families remain cohesive for several weeks after the young have fledged. During that time, parental care continues, including the training of hunting skills. Even after the parents stop feeding the juveniles, they typically remain close to the nest, rarely dispersing more than one kilometre during the day (Boileau & Bretagnolle 2014). Beyond this family cohesion, little is known about the social behaviour of Common Kestrels, which are usually considered solitary and territorial (Village 2010). There are cases of colonial breeding Common Kestrels across Europe and North Africa (Ille et al. 2002, Dietzen 2016, Tulis et al. 2017), sometimes in association with Lesser Kestrels. However, most of the studies focus not on social interactions, but on different aspects of the breeding biology. Bustamante (1994) reported such a case, where both species bred together in a mixed colony. In that instance, aggressive interactions were either allospecific or among Lesser Kestrels, this being consistent with our observations. The departure of the Common Kestrels following a conflict over a perching site may reflect the generally more solitary behaviour of this species.

Communal roosts of Lesser Kestrels are well known and documented in many parts of southeastern Europe. Despite the breeding range being restricted to some countries, i.e. Greece, Albania, Croatia and Bulgaria (Culina et al. 2013, Gradev et al. 2015, BirdLife International 2024), Lesser Kestrels regularly appear in other countries during autumn migration (Saveljić & Jovićević 2015, Topić et al. 2019). Ring recoveries and data from tagged Lesser Kestrels

have shown that individuals travel long distances, even in the opposite direction of migration, in order to reach pre-migratory roosts (Olea et al. 2004). Given that intermittent migration mainly occurs between early August and early October with a peak in mid-September (Bounas et al. 2016a), and that the number of birds present at the roosting site increased over the course of the observation period, the aggregation of Kestrels can probably be explained as pre-migratory gathering. The area around the roost displays a high abundance of Orthopterans, which may be the reason for the choice of this roosting site. Some grasshopper species, such as the Common Pincer Grasshopper *Calliptamus italicus*, tend to form high population densities (as evidenced by observations made in 2023 in Krivenik, near Hani I Elezit, in southern Kosovo). The Lesser Kestrels, which mainly feed on large crickets and grasshoppers during the pre-migration period (Sarà et al. 2014, Krištín et al. 2020), exploit this abundant food source in order to fill their energy reserves. Observations of large numbers of Kestrels from the 2023 summer school programme, the year before our study, support the assumption that the identified roost is used every year. Unfortunately, in 2023 the Kestrels were neither counted nor identified at the species level, but since Kestrels usually show high roost fidelity (Olea et al. 2004, Riegert & Fuchs 2011), it may reasonably be assumed that the same phenomenon occurred the year before. Because the pre-migration period is a sensitive time for Lesser Kestrels, during which they are compelled to fuel up for the energy-consuming flight to their wintering grounds (Martin et al. 2007, Sarà et al. 2014), localising and protecting such sites is of major importance for conserving this species (De Frutos & Olea 2008). Moreover, autumn pre-migration aggregations could service as a guide in the search for undiscovered breeding colonies, demonstrating the need for more rigorous field research in order to extend knowledge of the breeding distribution of the Lesser Kestrel in southeastern Europe.

REFERENCES

1. Aparicio J. M., Muñoz A., Cordero P. J. & Bonal R. 2023. Causes of the recent decline of a Lesser Kestrel (*Falco naumanni*) population under an enhanced conservation scenario. Ibis 165: 388–402. https://doi.org/10.1111/ibi.13145
2. BirdLife International 2011. *Falco naumanni.* The IUCN Red List of Threatened Species 2011: E.T22696357A27922102. IUCN Red List of Threatened Species. https://www.iucnredlist.org/en
3. BirdLife International 2024. Species factsheet: Lesser Kestrel *Falco naumanni*. BirdLife International. https://datazone.birdlife.org/species/factsheet/lesser-kestrel-falco-naumanni
4. Boileau N. & Bretagnolle V. 2014. Post-fledging Dependence Period in the Eurasian Kestrel (*Falco tinnunculus*) in Western France. Journal of Raptor Research 48: 248–256. https://doi.org/10.3356/JRR-11-70.1
5. Bounas A., Panuccio M., Evangelidis A., Sotiropoulos K. & Barboutis C. 2016a. The Migration of the Lesser Kestrel *Falco naumanni* in Eastern Europe—A Ringing Recovery and Direct Observation Approach. Acrocephalus 37: 49–56. https://doi.org/10.1515/acro-

2016-0002
6. Bounas A., Tsiakiris R., Vlachopoulo, K., Bukas N., […] & Sotiropoulos, K. 2016b. Large Premigratory Roost of Lesser Kestrels (*Falco naumanni*) in Ioannina City, Greece: Trends, Roost Characteristics, and Implications for Conservation. Journal of Raptor Research 50: 416–421. https://doi.org/10.3356/JRR-15-77.1
7. Burfield I., Bommel F. van 2004. Birds in Europe: Populations estimates, trends and conservation status. Birdlife International.
8. Bustamante J. 1994. Behavior of colonial Common Kestrels (Falco tinnunculus) during the post-fledging dependence period in southwestern Spain. Journal of Raptor Research 28: 79–83.
9. Catry I., Franco A. M. A., Rocha P., Alcazar R., […] & Moreira F. 2013. Foraging Habitat Quality Constrains Effectiveness of Artificial Nest-Site Provisioning in Reversing Population Declines in a Colonial Cavity Nester. PLOS ONE 8. https://doi.org/10.1371/journal.pone.0058320
10. Costantini D., Dell'Omo G. 2020. The kestrel: Ecology, behaviour and conservation of an open-land predator. Cambridge University Press.
11. Culina A., Mikulic K., Budinski I. & Jurinovic L. 2013. The return of the Lesser Kestrel *Falco naumanni* as a breeding bird to Croatia. Acrocephalus 34: 71–74.
12. De Frutos Á. & Olea P. P. 2008. Importance of the premigratory areas for the conservation of lesser kestrel: Space use and habitat selection during the post-fledging period. Animal Conservation, 11(3), 224–233. https://doi.org/10.1111/j.1469-1795.2008.00173.x
13. Dietzen C. 2016. Die Vogelwelt von Rheinland-Pfalz—Greifvögel bis Spechtvögel (Accipitriformes—Piciformes). Gesellschaft für Naturschutz und Ornithologie in Rheinland-Pfalz (GNOR).
14. Donázar J. A., Negro J. J., Hiraldo F. & Hiraldo F. 1993. Foraging Habitat Selection, Land-Use Changes and Population Decline in the Lesser Kestrel *Falco naumanni*. Journal of Applied Ecology, 30: 515–522. https://doi.org/10.2307/2404191
15. GBIF.org (12 December 2024) GBIF Occurence Download https://doi.org/10.15468/dl.mqkd8k. (o. J.). [Dataset]. https://doi.org/10.15468/dl.mqkd8k
16. Gradev G., Marin S., Zhelev P. & Antolín J. 2015. RECOVERING THE LESSER KESTREL (FALCO NAUMANNI) AS A BREEDER IN BULGARIA. Annuaire de l'Université de Sofia "St. Kliment Ohridski" Faculte de Biologie, 136–144.
17. Ille R., Hoi H., Grinschgl F. & Zink R. 2002. Paternity assurance in two species of colonially breeding falcon: The kestrel *Falco tinnunculus* and the red-footed falcon *Falco vespertinus*. Etologia 10: 11–15.
18. Iñigo A., & Barov B. 2010. Species Action Plan for the lesser kestrel *Falco naumanni* in the European Union. BirdLife International for the European Commission.
19. Kopij G. 2012. Changes in numbers of Lesser Kestrels *Falco naumanni* and Amur Falcons *F. amurensis* at a winter roost in Lesotho. Bull ABC 19: 160–165.
20. Krištín A., Bělka T., Horal D. & Bino T. 2020. Diet of the lesser kestrel *Falco naumanni* at post-breeding roosts in southern Albania. Raptor Journal 14: 15–22. https://doi.org/10.2478/srj-2020-0004
21. Martin T. G., Chadès I., Arcese P., Marra P. P., […] & Norris D. R. 2007. Optimal Conservation of Migratory Species. PLoS ONE 2. https://doi.org/10.1371/journal.pone.0000751
22. Minias P., Kaczmarek K., Piasecka A. & Kuncewicz M. 2009. Large Roost of Lesser Kestrels in Southeastern Albania. Journal of Raptor Research 43: 166–167. https://doi.org/10.3356/jrr-08-104.1
23. Morganti, M. 2021. Common kestrel *Falco*

tinnunculus. In: Panuccio, M., Mellone, U., Agostini, N. (ed.),
24. Migration Strategies of Birds of Prey in Western Palearctic. 1st edition. CRC Press, Boca Ratin, Florida,
25. pp.212-216
26. Newton I. 2008. The migration ecology of birds. Elsevier Academic Press.
27. Olea P. P., Vera R., De Frutos A. & Robles H. 2004. Premigratory communal roosts of the Lesser Kestrel in the boreal summer. Journal of Raptor Research 38: 12.
28. Orihuela-Torres A., Perales P., Rosad, D. & Pérez-García J. M. 2017. Feeding ecology of the Common Kestrel *Falco tinnunculus* in the south of Alicante (SE Spain). Revista Catalana d'Ornitologia 33: 10–16.
29. Orta J., Boesman P. F. D. & Mark, J. S. 2020. Eurasian Kestrel (*Falco tinnunculus*), version 1.0. Birds of the World. https://doi.org/10.2173/bow.eurkes.01species_shared.bow.project_name
30. Orta J. & Kirwan G. M. 2020. Lesser Kestrel (*Falco naumanni*), version 1.0. Birds of the World. https://doi.org/10.2173/bow.leskes1.01species_shared.bow.project_name
31. Riegert J. & Fuchs R. 2011. Fidelity to roost sites and diet composition of wintering male urban Common Kestrels *Falco tinnunculus*. Acta Ornithologica 46: 183–189.
32. Sarà M., Campobello D., Zanca L. & Massa B. 2014. Food for flight: Pre-migratory dynamics of the Lesser Kestrel *Falco naumanni*. Bird Study 61: 29–41. https://doi.org/10.1080/00063657.2013.867476
33. Sarà M., Bondi S., Bermejo A., Bourgeois M., […] & Rubolini D. 2019. Broad-front migration leads to strong
34. migratory connectivity in the lesser kestrel (*Falco naumanni*). Journal of Biogeography 46: 2663-2677.
35. https://doi.org/10.1111/jbi.13713
36. Saveljić D., & Jovićević M. 2015. Popis ptica Crne Gore sa bibliografijom. Agencija za zaštitu životne sredine Crne Gore. https://epa.org.me/wp-content/uploads/2023/01/Crvena-lista-ptica-Crne-Gore.pdf
37. Topić G., Topić B., Kotrošan D., Šarac M. & Vekić J. 2019. Analysis of the occurrence of Lesser Kestrel (*Falco naumanni*) and Red-footed Falcon (*Falco vespertinus*) in the karst poljes of Bosnia and Herzegovina in the 2012-2017 period. In: Sackl, P., Ferger, SW, Sarajlić, N. Kotrošan, D., Topić, G.(eds), Dinaric Karst Poljes–Nature Conservation and Rural Development. Ornitološko društvo „Naše ptice "Sarajevo, pp. 93–112.
38. Tulis F., Slobodník R., Langraf V., Noga M., […] Krištín, A. 2017. Diet composition of syntopically breeding falcon species *Falco vespertinus* and *Falco tinnunculus* in south-western Slovakia.
39. Slovak Raptor Journal 11: 15.
40. Van Zyl A. J. 1994. A comparison of the diet of the Common Kestrel *Falco tinnunculus* in South Africa and Europe. Bird Study 41: 127–130. https://doi.org/10.1080/00063659409477208
41. Village A. 2010. The Kestrel. Bloomsbury Publishing PLC.
42. Wiklund C. G. & Village A. 1992. Sexual and seasonal variation in territorial behaviour of kestrels, *Falco tinnunculus*. Animal Behaviour, 43: 823–830. https://doi.org/10.1016/S0003-3472(05)80205-2

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