FORESTRY IDEAS, 2019, vol. 25, No 1 (57): 56–69

FOOD SPECTRUM AND PREDOMINANT PREY IN THE DIET OF THE EAGLE OWL *BUBO BUBO* POPULATION IN SOUTHEASTERN BULGARIA

Boyan Milchev[1]* and Valeri Georgiev[2]

[1]University of Forestry, Department of Wildlife Management, 10 Kliment Ochridski Blvd., 1797 Sofia, Bulgaria. *E-mail: boyan.m@abv.bg
[2]Ministry of Environment and Water, 22 Maria Luisa Blvd., 1000 Sofia, Bulgaria. E-mail: valege@abv.bg

Received: 18 February 2019 Accepted: 08 April 2019

Abstract

Food spectrum was based on 62,314 prey specimens belonging to 367 taxa collected between 1994 and 2013. The diet included 40.9 % new taxa for the Eagle owl food in Bulgaria. Mammals and birds were most hunted, while reptiles, amphibians, fishes and arthropods were negligible with total 7.8 % by number and 0.8 % by biomass. Voles (*Microtus* spp.) 18.2 %, true mice (*Mus* spp.) 8.2 % and Northern white-breasted hedgehog (*Erinaceus roumanicus*) 5.9 % were the most numerous prey. The staple prey for food biomass were Northern white-breasted hedgehogs 22.9 %, European hares (*Lepus europaeus*) 8.9 %, Norway rats (*Rattus norvegicus*) 6.5 % and Common moorhens (*Gallinula chloropus*) 5.5 %. The individual diets of successful pairs were dominated most often by the same taxa. The present study reports increasing shares of small prey in total diet and first records of dominance in individual diets by a number of passerines, amphibians and arthropods. Hunting on predatory birds and mammals accounted for 11.4 % by biomass. Dominance by a carnivorous mammal, Red fox (*Vulpes vulpes*) – only young individuals, of the biomass of three individual diets is first reported for the country. The large share of small unusual prey and more predators in the diets were most likely the Eagle owl adaptation to local unfavourable food supply.

Key words: feeding ecology, food stress, pellet analysis, threatened owl.

Introduction

The Eagle owl (*Bubo bubo*) is an adaptive top predator which diet includes prey from all vertebrate classes, large invertebrates and occasionally carrion (Glutz von Blotzheim and Bauer 1994, Milchev and Spassov 2017, Penteriani and Delgado 2016). It prefers mammals and birds with a mass between 200 and 2000 g, but the habitat diversity in hunting territories with different local food supplies and prey accessibility may strongly influence the local food spectrum (Dalbeck 2003, Demay et al. 2015, Milchev and Gruychev 2015, 2016, Obuch and Karaska 2010, Schweiger and Lipp 2011, Shin et al. 2013, Tobajas et al. 2015). Several studies of Eagle owl's food in Bulgaria indicated a predominance of Northern white-breasted hedgehogs (*Erinaceus roumanicus*), European ground squirrels (*Spermophilus citellus*), hamsters, rats, European hares (*Lepus europaeus*) and voles (*Microtus*

spp.) among mammals and gallinaceous birds, corvids, pigeons and waterbirds among the avian prey (Simeonov et al. 1990). The populations of several main prey species have decreased and these species were included in Bulgarian Red Data Book: European ground squirrel and hamsters as 'vulnerable', European hare as 'near threatened' (Golemanski 2015). The national population of Eagle owl with a total 450–550 pairs was categorized as 'endangered' (BirdLife International 2015, Golemanski 2015). The structure of the Eagle owl's diet is crucial both for the management of the predator populations as well to sustain favourable status of the prey communities.

The present long-term study of the Eagle owl's diet aims to (i) complete and update the list of prey species; (ii) to characterize the dominant structure of the diet.

Material and Methods

The study area covers approximately 10,000 km2 with mostly hilly and plain landscape. Its borders are the Black Sea coast to the east, Bulgarian-Turkish border to the south, Maritza and Sazliyka Rivers to the west, and the northern foots of St. Iliyski, Bakadzhitsite and Hisar hills to the north. Deciduous forests dominated by oaks (*Quercus* spp.) predominate mainly along the state border with Turkey. Open habitats dominated by arable lands cover most of the central and northern parts of the area (see also Milchev and Menzel 2017).

Food remains (intact and disintegrated pellets, parts of carcasses, feathers, etc.) were collected from occupied rocky complexes in 53 Eagle owl localities between 1994 and 2013 (n = 1,050 samples). Localities with successful pairs raising at least one nestling to the age of 40–45 days (Glutz von Blotzheim and Bauer 1994, Penteriani and Delgado 2008) were visited three times during the breeding period: 1) end of April – beginning of May; 2) end of May – beginning of June; and 3) end of August – beginning of September. Food remains from the nests with later clutches were collected starting with the second visit and additionally once again in late June – mid-July. Sometimes, we could not visit the new difficult-to-reach nest places in the first visit. Other factors such as the proximity of people and human activities or unfavourable weather prevented us from accessing the nest sites for a complete collection of food remains. The collected food remains in such cases were combined with the materials from the following visit into one sample. Localities without breeding attempts or with destroyed clutches/broods were not visited subsequently due to the low amount of food remains in such situations (pers. obs.).

Prey species were identified using the specialized anatomical literature for the respective prey group, comparative material from the National Museum of Natural History, Sofia, and the authors' own comparative collection. The species identification relied mainly on: 1) fragments of crania and mandibles, pelvic and limb bones for mammals and birds, including also pectoral girdles and feathers of birds; 2) fragments of crania and mandibles, pelvic girdles for other vertebrates, including also squamae for reptiles and fish; 3) fragments of head, prothorax, wing cases and mandibles for invertebrates. In case of difficulty to distinguish a species to another, e.g. *Apodemus sylvaticus* and *A. flavicollis*, *Microtus arvalis* and *M. levis*, as well as *Mus macedonicus*, and *M. musculus*, the identification was made

only to the genus level, where the genus appellation refers to just these respective species pairs. Minimum number of individuals was estimated following the procedures by Frey (1973). Bird feathers identified to species were compared to the list of bone determinations from the same sample, and the missing species from bone samples were added to the species list. The biomass was calculated based on Glutz von Blotzheim and Bauer (1994), and Peshev et al. (2004) with the following additions: 1) the young specimens of 11 mammalian and bird species (Appendix 1) were added with reduced mass from one half to one tenth of the mass of an adult specimen based on the comparison of bone remains; 2) the biomass of young Eagle owls consumed due to cannibalism was after Penteriani et al. (2005); 3) indeterminate Passeriformes were size-split into two groups of 10 g and of 20 g; and 4) fish biologists determined fish biomass for individual specimens by species. The difference in frequencies of new taxa in the main prey classes in Eagle owl diet was tested with chi-square test.

Results

The current diet analysis is based on 62,314 prey specimens from 367 taxa with prevalence of mammals (14.4 % by taxa, 53.1 % by number (% N), 50.4 % by biomass (% B) and birds (64.0 % by taxa, 39.1 % N, 48.8 % B) (Appendix 1). Overall, reptiles, amphibians, fishes and arthropods were negligible with a total of 7.8 % N and 0.8 % B. The cumulative total of all prey specimens of previous Eagle owl diet studies in Bulgaria accounts to only 8.9 % of the present study (Table 1). Respectively the present study includes 40.9 % new taxa (n = 367) for the Eagle owl's diet in the country. The new prey taxa presented 39.0 % ±7.9 (range 25.0–47.9 %) in the six main taxonomic groups. The individual frequencies of the new taxa in these six groups differed insignificantly (χ^2_5 = 4.65, p > 0.05). Bats increased the number of new mammalian taxa the most (60.9 %, n = 23), while orthopterans increased the number of invertebrates (42.9 %, n = 21). Passage migrants and vagrants increased the list

Table 1. Number of prey taxa and specimens in Eagle owl *Bubo bubo* diets in Bulgarian studies.

Prey	1		2		3		4		5		6		Present study		
	T	N	T	N	T	N	T	N	T	N	T	N	T	NT	N
Mammals	14	400	16	378	26	732	21	219	16	1087	18	183	53	21	33073
Birds	41	234	71	457	53	482	42	76	68	499	50	249	236	96	24345
Reptilia					5	39	1	4	7	3	1	1	12	5	105
Amphibians	1	33	1	15	4	86	2	10	1	10	1	4	6	2	2283
Fishes					8	19	1	1	2	28			12	3	75
Invertebrates	9	32	5	37	12	79	1	1	9	102	3	6	48	23	2433
Total	65	699	93	887	108	1449	68	311	103	1729	73	443	367	150	62314

Abbreviations and symbols: 1 – Baumgart et al. (1973), 2 – Baumgart (1975), 3 – Simeonov and Boev (1988), 4 – Obuch and Benda (1995), 5 – Simeonov et al. (1998), 6 – Milchev and Gruychev (2015); T – number of taxa; N – number of specimens; NT – number of new taxa.

of new bird taxa, independent of their taxonomy (passerines 42.7 %, *n* = 96, but passage migrants and vagrants 49.0 %). Among all avian taxa, passage migrants and vagrants made up a quarter (26.9 %, *n* = 236 taxa) but composed a small part of bird diet (3.8 % N, 4.2 % B).

Eagle owls hunted mostly rodents (43.0 % N) and passerine birds (15.6 % N). These two orders contributed together to more than the half of all prey specimens. Insectivorous mammals (Eulipotyphla), including mainly Northern white-breasted hedgehogs, together with rodents and rails (Gruiformes: Rallidae) composed half of the prey biomass (Fig. 1).

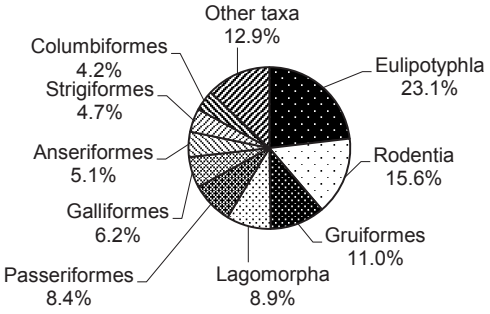

Fig. 1. Main orders for the food biomass of Eagle owls *Bubo bubo* in SE Bulgaria, 1994–2013.

Only three prey exceeded 5 % by total number (voles *Microtus* spp. 18.2 %, true mice *Mus* spp. 8.2 % and Northern white-breasted hedgehog 5.9 %) and contributed to 32.3 % N. Northern white-breasted hedgehogs (22.9 % B) with three other prey species exceeded 5 % B (European hare 8.9 %, Norway rat *Rattus norvegicus* 6.5 % and Common moorhen *Gallinula chloropus* 5.5 %) and made up together 43.8 % B.

The individual diets of successful pairs were dominated by 26 taxa (mostly mammals and birds, Table 2). The prey with highest occurrence as dominant by number (voles, Northern white-breasted hedgehogs and Norway rats) were the most numerous in 62.0 % of the individual diets (*n* = 226). The most dominant prey in terms of biomass was Northern white-breasted hedgehogs (69.5 %) and that together with Norway rats dominated 82.3 % of the diets. There was only one diet (0.4 %) of a successful pair without any hedgehogs, relying on voles (55.3 % N, 23.7 % B) and rats (5.6 % N, 20.3 % B) as the main prey. The predominant value varied within wide limits (range 6.2–70.4 % N, 11.4–72 % B). Black rats (*Rattus rattus*) attained the highest numerical dominance and Northern white-breasted hedgehogs attained the greatest prey biomass. The second positions by number and biomass in the diets were variously occupied by 37 taxa including the majority of dominant prey. Among the nine taxa with over 5 % occurrence, the food significance of European hares, Common moorhens, young Red foxes (*Vulpes vulpes*) and true mice increased as important subdominant prey (Table 2).

Table 2. The most important prey in diets (*n* = 226) of successful Eagle owl *Bubo bubo* pairs in SE Bulgaria, 1994–2013.

Prey	Dominant by number		Dominant by biomass	
	% occurrence as dominant prey	% N AM ±SD, min–max	% occurrence as dominant prey	% B AM ±SD, min–max
Erinaceus roumanicus	17.3	17.4 ±7.5, 6.2–42.1	69.5	29.2 ±10.8, 11.4–72.0
Lepus europaeus			4.0	19.7 ±5.3, 11.4–28.9
Glis glis	3.5	19.6 ±7.3, 11.4–35.0		
Microtus spp.	30.1	30.0 ±15.5, 8.7–65.7	2.2	19.9 ±3.5, 16.3–23.7
Microtus guentheri	0.9	22.0–31.6		
Arvicola amphibius	4.4	19.2 ±4.6, 13.6–28.2	0.4	13.6
Apodemus spp.	3.5	16.7 ±6.9, 8.0–29.5		
Rattus rattus	1.3	38.0 ±28.6, 16.2–70.4	0.9	35.7, 58.7
Rattus norvegicus	14.6	26.7 ±12.5, 9.0–60.7	12.8	32.6 ±13.9, 14.6–62.8
Mus spp.	8.4	22.7 ±11.6, 6.8–50.9		
Vulpes vulpes			1.3	19.3 ±3.2, 15.9–22.3
Coturnix coturnix	0.4	10.2		
Alectoris chukar	0.4	12.5		
Spatula querquedula	0.4	8.7	0.4	11.5
Tachymarptis melba	0.4	15.4		
Gallinula chloropus	8.8	14.9 ±6.4, 7.0–34.6	4.4	20.5 ±6.2, 14.6–34.4
Fulica atra			3.1	17.8 ±4.8, 12.7–27.3
Garrulus glandarius	0.4	10.9		
Corvus frugilegus			0.4	20.9
Corvus corone	0.4	11.4		
Melanocorypha calandra	0.4	9.3		
Turdus merula	3.1	14.8 ±6.9, 10.4–29.6		
Pelobates syriacus	2.7	14.8 ±4.0, 9.3–21.1		
Cyprinus carpio			0.4	23.2
Potamon ibericum	1.3	18.5 ±5.5, 12.6–23.4		
Decticus albifrons	0.4	27.1		
	Subdominant by number (only prey with > 5 % occurrence)		Subdominant by biomass (only prey with > 5 % occurrence)	
Erinaceus roumanicus	16.8	10.1 ±3.0, 4.3–16.0	17.7	16.0 ±5.0, 7.0–28.1
Lepus europaeus			26.5	14.1 ±4.1, 6.4–23.3
Microtus spp.	19.0	12.5 ±5.0, 5.8–29.3		
Arvicola amphibius	5.3	12.1 ±5.2, 7.9–26.3		
Apodemus spp.	7.1	11.2 ±3.5, 6.8–19.2		
Rattus norvegicus			8.0	16.9 ±7.6, 7.6–35.6
Mus spp.	12.8	11.9 ±3.9, 5.4–19.6		
Vulpes vulpes			5.3	13.8 ±6.0, 7.4–28.7
Gallinula chloropus	8.8	8.1 ±1.9, 4.7–12.1	11.1	12.3 ±4.2, 6.2–19.8

Abbreviations and symbols: % N – percent by number in individual diets; % B – percent by biomass in individual diets; AM ±SD – arithmetic mean ± standard deviation; min–max – minimum – maximum value.

Discussion

The highly diverse food spectrum of Eagle owls in SE Bulgaria reflects their opportunistic hunting on prey of different sizes, taxonomic groups and preferred habitats (Marks et al. 1999, Mebs and Scherzinger 2008). The number of new taxa in the food did not present any preference for prey of a particular class compared to the known prey list in Bulgaria. Differences in the number of new species were within classes due to larger catches of mostly small species such as bats, passerines and orthopterans. The western Black Sea flyway passes over the study area. This explained the greater number of passage migrants and vagrants as new bird species in owls' food. Despite the great variety of species, these birds contribute very little to the diet biomass.

Mammals and birds were the main Eagle owl prey, as characteristic for this species (Mebs and Scherzinger 2008, Penteriani and Delgado 2016), but their distribution among these taxa was subject to local conditions. The Eagle owls in SE Bulgaria have hunted more on smaller prey as rodents and passerines. The true mice *Mus* spp. with two species, one being wild (*Mus macedonicus*; Peshev et al. 2004), became a frequent Eagle owl prey in Bulgaria for first time. Similar importance of true mice was found for Eagle owls in Northern Spain but with different wild species (*Mus spretus*, Lataste, 1883; Donazar 1989, Serrano 1998). The high availability of true mice was indirectly confirmed by their high frequency in Barn owl (*Tyto alba*) diets in SE Bulgaria, a smaller owl that alike the Eagle owl prefers also opportunistic hunting in open habitats (Milchev 2016). Several other small animals dominated by number a few annual diets of different pairs as exceptions: Eastern spadefoot (*Pelobates syriacus*), Freshwater crab (*Potamon ibericum*) and Mediterranean wart-biter (*Decticus albifrons*). Günther's voles (*Microtus guentheri*) and Mediterranean wart-biters were the only new species in the present study, which Eagle owls hunted more often and were the dominant prey. Calandra larks (*Melanocorypha calandra*), an endangered passerine bird according to the Bulgarian Red Data Book (Golemanski 2015) dominated an Eagle owl diet. The increased hunting on this species was probably due to its locally numerous breeding population in Sakar Mountain.

The main prey for diet biomass, such as Northern white-breasted hedgehogs, rats, European hares and rails, was consistent with the results of most studies on the Balkan Peninsula (Mihelič 2002, Milchev and Gruychev 2015, Papageorgiou et al. 1993, Sándor and Ionescu 2009, Simeonov et al. 1990). The rare occurrences for the Eagle owl diet were the dominance for diet biomass of European carps (*Cyprinus carpio*) in a breeding season and young Red foxes three times in different localities. Fish is a rare additional prey of Eagle owls (Glutz von Blotzheim and Bauer 1994). Simeonov et al. (1998) reported a diet where fish composed 12.5 % B as an exception in Bulgaria. It formed 27.1 % B in the diet predominated by European carps in the present study.

The share of predatory birds and mammals (Accipitriformes, Strigiformes, Falconiformes and Carnivora) in Eagle owls diets is indicative for the level of food stress (Lourenço et al. 2011, 2018). The contribution of predators to food biomass in this study (11.4 % B) was among the high values in Europe (6.0 % ±4.7 B, Lourenço et al. 2011). The main prey for food biomass was the predatory mammal for first time. Superpredation in the three localities with

high hunting on young Red foxes in south-eastern Bulgaria was comparable only to the recent data from the Eagle owl food in Kazanlak Valley, Central Bulgaria (superpredation 20.4 % B, Milchev and Gruychev 2015). The level of superpredation and the prevalence of small prey in diets most likely demonstrate the adaptation of the Eagle owls to the unfavourable food supply in some breeding places of south-eastern Bulgaria.

Acknowledgements

We express our deep gratitude to A. Kovachev, U. Georgieva, M. Chelebiev, G. Gruychev, P. Arsov, D. Emin and M. Slavchev for their assistance in the field. We thank J. Menzel for the identification of the bird feathers to species, V. Beshkov and N. Tzankov for identification of the reptiles, B. Marinov, Y. Sivkov and A. Apostolos for identification of fish, and D. Chobanov, B. Georgiev, N. Kodszabashev, O. Iliev and N. Simov for the determination of the invertebrates. Most bats and carnivores were identified by V. Popov and N. Spassov, while Z. Boev and H. Frey determined bird's bones in some samples from 1994–1996. Thanks are due to the anonymous reviewers for their valuable comments. Investigations were carried out under grant B-302/1993 of the National Fund for Scientific Research (1994–1996) and with the financial support of J. Menzel since 1998 and H. Frey in 2005. This study complies with the current laws in Bulgaria.

References

Baumgart W. 1975. An Horsten des Uhus (*Bubo bubo*) in Bulgarien. II. Der Uhu in Nordostbulgarien. Zoologische Abhandlungen (Dresden) 33: 251–275.

Baumgart W., Simeonov S., Zimmermann M., Bünsche H., Baumgart P., Kühnast G. 1973. An Horsten des Uhus (*Bubo bubo*) in Bulgarien. I. Der Uhu im Iskerdurchbruch (Westbalkan). Zoologische Abhandlungen (Dresden) 32: 203–247.

BirdLife International 2015. European Red List of Birds. Luxembourg: Office for Official Publications of the European Communities. http://bd.eionet.europa.eu/article12/report

Dalbeck L. 2003. Der Uhu *Bubo bubo* (L.) in Deutschland – autökologische Analysen an einer wieder angesiedelten Population – Resümee eines Artenschutzprojekts. Shaker Verlag Aachen. 159 p.

Demay J., Bautheac D., Ponchon C., Badan O. 2015. Relations entre régime alimentaire et disponibilité des proies chez le Grand-duc d'Europe *Bubo bubo* dans le massif des Alpilles depuis 30 ans. Alauda 83: 195–202.

Donazar J. 1989. Variaciones geográficas y estacionales en la alimentación del búho real (*Bubo bubo*) en Navarra. Ardeola 36: 25–39.

Frey H. 1973. Zur Ökologie niederösterreichischer Uhupopulationen. Egretta 16: 1–68.

Glutz von Blotzheim U., Bauer K. 1994. Handbuch der Vögel Mitteleuropas. Bd. 9 Akademische Verlagsgesellschaft, Wiesbaden. 1148 p.

Golemanski V. (Ed.) 2015. Red Data Book of the Republic of Bulgaria. Volume 2. Animals. IBEI – BAS & MOEW, Sofia. 383 p.

Lourenço R., Santos S., Rabaça J., Penteriani V. 2011. Super-predation patterns in four large European raptors. Population Ecology 53: 175–185.

Lourenço R., Delgado M., Campioni L., Goytre F., Rabaça J., Koprimäki E., Penteriani V. 2018. Why do top predators engage in superpredation? From an empirical scenario to a theoretical framework. Oikos 127(11): 1563–1567. DOI.org/10.1111/oik.05118

Marks J., Cannings R., Mikkola H. 1999. Strigidae (Typical Owls). In: del Hoyo J., Elliott A., Sargatal J. (Eds) Handbook of the Birds of the World. Vol. 5. Barn owls to Humming-

birds, Linx Edicions, Barcelona: 76–242.

Mebs T., Scherzinger W. 2008. Die Eulen Europas: Biologie, Kennzeichen, Bestände. Franckh-Kosmos Verlag, Stuttgart. 398 p.

Mihelič T. 2002. Prehrana velike uharice *Bubo bubo* v jugozahodni Sloveniji. Acrocephalus 23: 81– 86.

Milchev B. 2016. Dietary comparison of coexisting barn owl (*Tyto alba*) and eagle owl (*Bubo bubo*) during consecutive breeding seasons. Animal Biology 66: 219–228.

Milchev B., Gruychev G. 2015. Why does the Eagle Owl, *Bubo bubo* (L.), breed rarely in the Kazanlak Valley, Central South Bulgaria? Acta zoologica bulgarica 67: 67–74.

Milchev B., Gruychev G. 2016. Successful breeding of a flightless female Eagle Owl *Bubo bubo*. Avian Biology Research 9: 217–223.

Milchev B., Menzel J. 2017. Eagle Owl *Bubo bubo* diet indicates new localities of poorly known and threatened breeding birds in Bulgaria. Vogelwelt 137: 289–294.

Milchev B., Spassov N. 2017. First evidence for carrion–feeding of Eurasian Eagle-owl (*Bubo bubo*) in Bulgaria. Ornis Hungarica 25: 58–69. DOI: 10.1515/orhu-2017-0005

Obuch J., Benda P. 1996. Contribution to the feeding ecology of *Strix aluco* and *Bubo bubo* (Aves: Strigiformes) in Southwestern Bulgaria. Acta Societatis Zoologicae Bohemicae 60: 43–49.

Obuch J., Karaska D. 2010. The Eurasian Eagle owl (*Bubo bubo*) diet in the Orava Region (N Slovakia). Slovak Raptor Journal 4: 83–98.

Papageorgiou N., Vlachos C., Bakaloudis D. 1993. Diet and nest site characteristics of Eagle Owl (*Bubo bubo*) breeding in two different habitats in north-eastern Greece. Avocetta 17: 49–54.

Penteriani V., Delgado M., Maggio C., Aradis A., Sergio F. 2005. Development of chicks and predispersal behaviour of young in the Eagle Owl *Bubo bubo*. Ibis 147: 155–168.

Penteriani V., Delgado M. 2008. Brood-switching in Eagle Owl *Bubo bubo* fledglings. Ibis 150: 816–819.

Penteriani V., Delgado M. 2016. Búho real – *Bubo bubo*. In: Salvador A., Morales B. (Eds). Enciclopedia Virtual de los Vertebrados Españoles. Museo Nacional de Ciencias Naturales, Madrid: 1–41. Available at: http://www.vertebradosibericos.org/

Peshev C., Peshev D., Popov V. 2004. Fauna Bulgarica. Vol. 27 Mammalia, BAS, Sofia. 632 p. (in Bulgarian with English summary).

Sándor A., Ionescu D. 2009. Diet of the Eagle owl (*Bubo bubo*) in Braşov, Romania. North-western Journal of Zoology 5: 170–178.

Schweiger A., Lipp L. 2011. Wühlmäuse (Arvicolinae) als bevorzugte Beute des Uhus *Bubo bubo* während der Jungenaufzucht in Bayern. Ornithologische Anzeiger 50: 1–25.

Serrano D. 1998. Diferencias interhábitat en la alimentación del Buho Real (*Bubo bubo*) en el valle medio del Ebro (NE de España): efecto de la disponibilidad de conejo (*Oryctolagus caniculus*). Ardeola 45: 35–46.

Shin D.-M., Yoo J.-C., Jeong D.-M. 2013. Spatial variation of Eurasian Eagle Owl diets in wetland and non-wetland habitats in west-central Korea. Journal Raptor Research 47: 400–409.

Simeonov S., Michev T., Nankinov D. 1990. Fauna Bulgarica. Vol. 20. Aves. Part I. BAS, Sofia. 350 p. (in Bulgarian).

Simeonov S., Boev Z. 1988. A study of the nutritive spectrum of the Eagle Owl (*Bubo bubo* (L.) in Bulgaria. Ecologie (Sofia) 21: 47–56 (in Bulgarian).

Simeonov S., Milchev B., Boev Z. 1998. Study of the Eagle Owl (*Bubo bubo* (L.)) (Aves: Strigiformes) in the Strandzha mountain (Southeast Bulgaria). II. Food spectrum and trophic specialization. Acta zoologica bulgarica 50: 87–100.

Tobajas J., Fernandez-de-Simon J., Díaz-Ruiz F., Villafuerte R., Ferreras P. 2015. Functional responses to changes in rabbit abundance: is the Eagle owl a generalist or a specialist predator? European Journal of Wildlife Research 62: 85–92.

Appendix 1. Prey of Eagle owl *Bubo bubo* in SE Bulgaria, 1994–2013.

Prey	% O	Number	% N	% B
Talpa europaea, Linnaeus, 1758	100	238	0.4	0.1
Crocidura leucodon (Hermann, 1780)	100	199	0.3	tr.
Crocidura suaveolens (Pallas, 1811)	95	159	0.3	tr.
Erinaceus roumanicus, Barrett-Hamilton, 1900	100	3695	5.9	22.9
Lepus europaeus, Pallas, 1778; 1474 juv.	100	1549	2.5	8.9
Spermophilus citellus (Linnaeus, 1766)	90	120	0.2	0.3
Glis glis (Linnaeus, 1766)	100	698	1.1	0.7
Microtus arvalis (Pallas, 1779)*/M. levis*, Miller, 1908	100	11324	18.2	2.8
Microtus guentheri (Danford and Alston, 1880)	80	374	0.6	0.2
Arvicola amphibius (Linnaeus, 1758)	100	1707	2.7	1.4
Apodemus flavicollis (Melchior, 1834)*/A. sylvaticus* (Linnaeus, 1766)	100	3018	4.8	0.7
Rattus rattus (Linnaeus, 1758)	100	1135	1.8	1.9
Rattus norvegicus, Berkenhout, 1769)	100	3036	4.9	6.5
Mus musculus, Linnaeus, 1766*/M. macedonicus*, Petrov and Ruzic, 1983	100	5136	8.2	0.8
Nannospalax leucodon (Nordmann, 1840)	95	92	0.1	0.2
Vulpes vulpes (Linnaeus, 1758) all juv.	95	124	0.2	2.5
Mustela nivalis, Linnaeus, 1766	100	196	0.3	0.2
Felis catus, Linnaeus, 1758	20	6	tr.	0.2
Mammalia subtotal	100	33072	53.1	50.5
Coturnix coturnix (Linnaeus, 1758)	100	1052	1.7	0.8
Alectoris chukar (J. E. Gray, 1830)	80	96	0.2	0.4
Phasianus colchicus, Linnaeus, 1758	60	61	0.1	0.6
Perdix perdix (Linnaeus, 1758); 3 juv.	100	1183	1.9	3.7
Gallus gallus dom., Linnaeus, 1758; 2 juv.	85	68	0.1	0.7
Spatula querquedula (Linnaeus, 1758)	100	327	0.5	1.1
Anas platyrhynchos, Linnaeus, 1758; 116 juv.	100	378	0.6	2.6
Anas crecca, Linnaeus, 1758	60	42	0.1	0.1
Anas crecca/Spatula querquedula	100	80	0.1	0.2
Anas sp.	95	70	0.1	0.5
Tachybaptus ruficollis (Pallas, 1764)	100	523	0.8	0.9
Podiceps cristatus (Linnaeus, 1758)	65	30	tr.	0.3
Columba livia f . dom., Gmelin, 1789	100	583	0.9	1.6
Columba palumbus, Linnaeus, 1758	100	450	0.7	1.8
Streptopelia turtur (Linnaeus, 1758)	100	274	0.4	0.3
Streptopelia decaocto (Frivaldszky, 1838)	100	271	0.4	0.4
Tachymarptis melba (Linnaeus, 1758)	25	32	0.1	tr.
Cuculus canorus, Linnaeus, 1758	95	79	0.1	0.1
Rallus aquaticus, Linnaeus, 1758	100	279	0.4	0.3

Prey	% O	Number	% N	% B
Crex crex (Linnaeus, 1758)	100	582	0.9	0.8
Porzana porzana (Linnaeus, 1766)	95	99	0.2	0.1
Porzana parva (Scopoli, 1769)	85	99	0.2	tr.
Gallinula chloropus (Linnaeus, 1758); 2 juv.	100	2369	3.8	5.5
Fulica atra, Linnaeus, 1758	100	675	1.1	4.4
Ixobrychus minutus (Linnaeus, 1766)	100	388	0.6	0.5
Nycticorax nycticorax (Linnaeus, 1758)	100	183	0.3	1.1
Ardea purpurea, Linnaeus, 1766	45	12	tr.	0.1
Microcarbo pygmaeus (Pallas, 1773)	70	31	tr.	0.2
Burhinus oedicnemus (Linnaeus, 1758)	95	62	0.1	0.2
Vanellus vanellus (Linnaeus, 1758)	85	74	0.1	0.1
Scolopax rusticola, Linnaeus, 1758	100	316	0.5	0.7
Larus cachinnans, Pallas, 1811/*L. michahellis*, J. F. Naumann, 1840; 7 juv.	75	35	0.1	0.2
Tyto alba (Scopoli, 1769)	100	449	0.7	1.1
Athene noctua (Scopoli, 1769)	100	329	0.5	0.5
Otus scops (Linnaeus, 1758)	95	213	0.3	0.2
Asio otus (Linnaeus, 1758)	100	896	1.4	2.0
Asio flammeus (Pontoppidan, 1763)	85	90	0.1	0.3
Strix aluco, Linnaeus, 1758	90	103	0.2	0.4
Bubo bubo (Linnaeus, 1758); all juv.	75	32	0.1	0.2
Accipiter nisus (Linnaeus, 1758)	95	82	0.1	0.1
Accipiter gentilis (Linnaeus, 1758)	90	45	0.1	0.3
Buteo buteo (Linnaeus, 1758); 5 juv.	100	384	0.6	2.5
Falco tinnunculus, Linnaeus, 1758	100	262	0.4	0.4
Lanius collurio, Linnaeus, 1758	100	483	0.8	0.1
Garrulus glandarius (Linnaeus, 1758)	100	717	1.2	0.9
Pica pica (Linnaeus, 1758)	100	478	0.8	0.8
Corvus monedula, Linnaeus, 1758	90	76	0.1	0.1
Corvus frugilegus, Linnaeus, 1758; 17 juv.	45	103	0.2	0.4
Corvus corone, Linnaeus, 1758	100	478	0.8	2.0
Corvus corax, Linnaeus, 1758	55	21	tr.	0.2
Melanocorypha calandra (Linnaeus, 1766)	80	89	0.1	tr.
Calandrella brachydactyla (Leisler, 1814)	90	106	0.2	tr.
Galerida cristata (Linnaeus, 1758)	95	76	0.1	tr.
Lullula arborea (Linnaeus, 1758)	100	132	0.2	tr.
Alauda arvensis, Linnaeus, 1758	100	403	0.6	0.1
Sturnus vulgaris, Linnaeus, 1758	100	662	1.1	0.4
Pastor roseus (Linnaeus, 1758)	20	48	0.1	tr.
Turdus merula, Linnaeus, 1758	100	1970	3.2	1.4
Turdus pilaris, Linnaeus, 1758	95	99	0.2	0.1

Prey	% O	Number	% N	% B
Turdus iliacus, Linnaeus, 1758	80	66	0.1	tr.
Turdus philomelos, Brehm, 1831	100	1488	2.4	0.8
Turdus viscivorus, Linnaeus, 1758	100	183	0.3	0.2
Turdus sp.	100	250	0.4	0.2
Luscinia megarhynchos, C. L. Brehm, 1831	80	67	0.1	tr.
Passer domesticus (Linnaeus, 1758)	90	80	0.1	tr.
Coccothraustes coccothraustes (Linnaeus, 1758)	100	121	0.2	0.1
Emberiza calandra, Linnaeus, 1758.	100	282	0.5	0.1
Emberiza sp.	95	80	0.1	tr.
Passeriformes indet.	100	239	0.4	tr.
Non-passerines indet.	100	75	0.1	0.1
Aves subtotal	100	24345	39.1	48.8
Reptilia subtotal	100	105	0.2	tr.
Pelobates syriacus, Boettger, 1889	100	1689	2.7	0.2
Pelophylax ridibundus (Pallas, 1771)	100	581	0.9	0.1
Amphibia subtotal	100	2283	3.7	0.3
Cyprinus carpio, Linnaeus, 1758	35	22	tr.	0.2
Actinopterygii subtotal	70	75	0.1	0.3
Potamon ibericum (Bieberstein)	100	526	0.8	tr.
Decticus albifrons (Fabricius, 1775)	45	419	0.7	tr.
Decticus albifrons/verrucivorus	80	298	0.5	tr.
Tettigonia sp.	35	70	0.1	tr.
Gryllotalpa cf. *stepposa*, Zhantiev, 1991	90	119	0.2	tr.
Copris hispanus (Linnaeus, 1764)	45	82	0.1	tr.
Cerambyx cerdo, Linnaeus, 1758	40	71	0.1	tr.
Cerambyx sp.	45	131	0.2	tr.
Lucanus cervus (Linnaeus, 1758)	100	411	0.7	tr.
Arthropoda subtotal	100	2433	3.9	0.1

Abbreviations and symbols: % O – % occurrence in 20 annual diets; % N – % by 62,314 specimens; % B – % by biomass (12,083,399.0 kg); tr. – traces (<0.1 %); juv. – number of juveniles added with reduced mass; [1]prey with less than 0.1 % N and % B, number of specimens.

[1]Mammalia: *Talpa martinorum*, Krystufek, 2018 – 43; *Talpa* sp. – 12; *Sorex araneus* Linnaeus, 1758 – 3; *Sorex minutus* Linnaeus, 1766 – 1; *Neomys anomalus*, Cabrera, 1907 – 12; *Suncus etruscus* (Savi, 1822) – 3; *Rhinolophus ferrumequinum* (Schreber, 1774) – 4; *Eptesicus serotinus* (Schreber, 1774) – 4; *Myotis blythii* (Tomes, 1857) – 2; *Myotis daubentonii* (Kuhl, 1817) – 1; *Myotis capaccinii* (Bonaparte, 1837) – 1; *Myotis myotis* (Borkhausen, 1797) – 1; *Myotis* sp. – 1; *Plecotus austriacus* (J. Fischer, 1829) – 1; *Pipistrellus pipistrellus* (Schreber, 1774) – 1; *Pipistrellus nathusii* (Keyserling and Blasius, 1839) – 1; *Nyctalus lasiopterus* (Schreber, 1780) – 1; *Nyctalus noctula* (Schreber, 1774) – 3; Vespertilionidae gen. – 9; *Miniopterus schreibersii* (Kuhl, 1817) – 3; *Sciurus vulgaris*, Linnaeus,

1758 – 12; *Myocastor coypus* (Molina, 1782) – 1 juv.; ?*Myocastor coypus* – 1 juv.; *Cricetulus migratorius* (Pallas, 1773) – 2; *Mesocricetus newtoni* (Nehring, 1898) – 1; *Dryomys nitedula* (Pallas, 1778) – 38; *Myomimus roachi* (Bate, 1937) – 9; *Microtus subterraneus* (Selys-Longchamps, 1836) – 51; *Micromys minutus* (Pallas, 1771) – 14; *Apodemus agrarius* (Pallas, 1771) – 24; *Sus scrofa* dom., Linnaeus, 1758 (carrion) – 1; *Dama dama* (Linnaeus, 1758) (carrion) – 1; *Ovis aries*/*Carpa hircus* (carrion) – 1; *Mustela putorius*, Linnaeus, 1758 – 1; *Martes foina* (Erxleben, 1777) – 2; *Vormela peregusna* (Güldenstädt, 1770) – 1.

Aves: *Pasianus/Gallus* – 2; *Branta ruficollis* (Pallas, 1769) – 1; *Anser anser f. dom.* (Linnaeus, 1758) – 4; *Anser albifrons* (Scopoli, 1769) – 1; *Mergus albellus*, Linnaeus, 1758 – 1; *Tadorna tadorna* (Linnaeus, 1758) – 4; *Tadorna* sp. – 1; *Netta rufina* (Pallas, 1773) – 1; *Aythya ferina* (Linnaeus, 1758) – 14; *Aythya nyroca* (Güldenstädt, 1770) – 9; *Aythya fuligula* (Linnaeus, 1758) – 1; *Aythya* sp. – 3; *Spatula clypeata* (Linnaeus, 1758) – 15; *Mareca penelope* (Linnaeus, 1758) – 3; *Mareca strepera* (Linnaeus, 1758) – 11; *Anas acuta*, Linnaeus, 1758 – 6; *Cairina moschata* dom. (Linnaeus, 1758) – 1; *Podiceps grisegena* (Boddaert, 1783) – 5; *Podiceps nigricollis*, Brehm, 1831 – 22; *Columba oenas*, Linnaeus, 1758 – 6; *Columba* sp. – 4; *Caprimulgus europaeus*, Linnaeus, 1758 – 28; *Apus apus* (Linnaeus, 1758) – 15; *Porzana pusilla* (Pallas, 1776) – 9; *Porzana parva/pusilla* – 9; *Puffinus yelkouan* (Acerbi, 1827) – 1; *Botaurus stellaris* (Linnaeus, 1758) – 8; *Ardeola ralloides* (Scopoli, 1769) – 14; *Ardea cinerea*, Linnaeus, 1758 – 1; *Ardea alba*, Linnaeus, 1758 – 2; *Egretta garzetta* (Linnaeus, 1766) – 18; *Phalacrocorax aristotelis* (Linnaeus, 1761) – 1; *Haematopus ostralegus*, Linnaeus, 1758 – 6; *Recurvirostra avosetta*, Linnaeus, 1758 – 8; *Himantopus himantopus* (Linnaeus, 1758) – 11; *Pluvialis apricaria* (Linnaeus, 1758) – 16; *Pluvialis* sp. – 2; Charadriidae gen. – 6; *Numenius arquata* (Linnaeus, 1758) – 1; *Limosa limosa* (Linnaeus, 1758) – 2; *Numenius/Limosa* – 2; *Calidris pugnax* (Linnaeus, 1758) – 8; *Calidris ferruginea* (Pontoppidan, 1763) – 1; *Calidris temminckii* (Leisler, 1812) – 1; *Calidris alpina* (Linnaeus, 1758) – 3; *Calidris minuta* (Leisler, 1812) – 9; *Calidris minuta/temminckii* – 2; *Gallinago media* (Latham, 1787) – 6; *Gallinago gallinago* (Linnaeus, 1758) – 32; *Lymnocryptes minimus* (Brunnich, 1764) – 1; *Actitis hypoleucos* (Linnaeus, 1758) – 3; *Tringa ochropus*, Linnaeus, 1758 – 11; *Tringa erythropus* (Pallas, 1764) – 1; *Tringa totanus* (Linnaeus, 1758) – 1; *Tringa glareola*, Linnaeus, 1758 – 7; *Tringa* sp. – 10; Scolopacidae gen. – 21; *Hydrocoloeus minutus* (Pallas, 1776) – 3; *Larus genei*, Breme, 1839 – 1; *Larus melanocephalus*, Temminck, 1820 – 1; *Larus ridibundus*, Linnaeus, 1766 – 23; *Larus* sp. – 7; *Chlidonias hybrida* (Pallas, 1811) – 3; *Chlidonias leucopterus* (Temminck, 1815) – 3; *Chlidonias niger* (Linnaeus, 1758) – 6; *Chlidonias* sp. – 3; *Sterna hirundo*, Linnaeus, 1758 – 11; *Thalasseus sandvicensis* (Latham, 1787) – 3; *Aegolius funereus* (Linnaeus, 1758) – 1; *Pernis apivorus* (Linnaeus, 1758) – 11; *Clanga pomarina* (Brehm, 1831) – 3; *Hieraaetus pennatus* (Gmelin, 1788) – 8; *Circus aeruginosus* (Linnaeus, 1758) – 14; *Circus cyaneus* (Linnaeus, 1766) – 9; *Circus macrourus* (S. G. Gmelin, 1770) – 5; *Circus pygargus* (Linnaeus, 1758) – 28; *Circus* sp. – 10; *Accipiter nisus/brevipes* – 4; *Buteo lagopus* (Pontoppidan, 1763) – 1; *Buteo rufinus* (Cretzschmar, 1829) – 4, 2 juv.; *Merops apiaster*, Linnaeus,

1758 – 19; *Coracias garrulus*, Linnaeus, 1758 – 24; *Alcedo atthis* (Linnaeus, 1758) – 7; Alcedinidae gen. – 1; *Upupa epops*, Linnaeus, 1758 – 52; *Jynx torquilla*, Linnaeus, 1758 – 10; *Picus viridis*, Linnaeus, 1758 – 46; *Picus canus*, Gmelin, 1788 – 3; *Dryocopus martius* (Linnaeus, 1758) – 3; *Leiopicus medius* (Linnaeus, 1758) – 9; *Dryobates minor* (Linnaeus, 1758) – 3; *Dendrocopos leucotos* (Bechstein, 1802) – 1; *Dendrocopos major* (Linnaeus, 1758) – 33; *Dendrocopos syriacus* (Hemprich, Ehrenberg, 1833) – 8; *Dendrocopos major/syriacus* – 26; *Falco naumanni*, Fleischer, 1818 – 1; *Falco tinnunculus/naumani* – 1; *Falco vespertinus*, Linnaeus, 1766 – 11; *Falco columbarius*, Linnaeus, 1758 – 2; *Falco subbuteo*, Linnaeus, 1758 – 21; *Falco cherrug*, J. E. Gray, 1834 – 3; *Falco peregrinus*, Tunstall, 1771 – 2; *Lanius senator*, Linnaeus, 1758 – 41; *Lanius minor*, Gmelin, 1788 – 8;, *Lanius nubicus*, Lichtenstein, 1823 – 2;, *Oriolus oriolus*, Linnaeus, 1758 – 37; *Poecile palustris*, Linnaeus, 1758 – 1; *Parus major*, Linnaeus, 1758 – 5; *Cyanistes caeruleus* (Linnaeus, 1758) – 5; *Parus* sp. – 4; *Hirundo rustica*, Linnaeus, 1758 – 44; *Cecropis daurica* (Laxmann, 1769) – 1; *Delichon urbicum* (Linnaeus, 1758) – 21; *Aegithalos caudatus* (Linnaeus, 1758) – 1; *Calandrella* sp. – 7; *Eremophila alpestris* (Linnaeus, 1758) – 4; Alaudidae gen. – 3; *Locustella* sp. – 11; *Acrocephalus arundinaceus* (Linnaeus, 1758) – 41; *Acrocephalus schoenobaenus* (Linnaeus, 1758) – 1; *Acrocephalus scirpaceus* (Hermann, 1804) – 3; *Acrocephalus* sp. – 39; *Hippolais* sp. – 1; *Phylloscopus collybita* (Vieillot, 1817) – 1; *Phylloscopus* sp. – 7; *Sylvia atricapilla* (Linnaeus, 1758) – 34; *Sylvia borin* (Boddaert, 1783) – 1; *Sylvia communis*, Latham, 1787 – 3; *Sylvia curruca* (Linnaeus, 1758) – 2, *Sylvia crassirostris*, Cretzschmar, 1830 – 4; *Sylvia nisoria* (Bechstein, 1792) – 38; *Sylvia* sp. – 43; Sylviidae gen. – 66; *Sitta europaea*, Linnaeus, 1758 – 1; *Turdus torquatus*, Linnaeus, 1758 – 2; *Turdus naumanni*, Temminck, 1820 – 1; *Erithacus rubecula* (Linnaeus, 1758) – 43; *Luscinia luscinia* (Linnaeus, 1758) – 1; *Luscinia* sp. – 15; *Phoenicurus ochruros* (S. G. Gmelin, 1774) – 2; *Phoenicurus phoenicurus* (Linnaeus, 1758) – 2; *Phoenicurus* sp. – 4; *Saxicola torquata* (Linnaeus, 1766) – 9; *Saxicola* sp. – 1; *Oenanthe isabellina* (Temminck , 1829) – 4; *Oenanthe oenanthe* (Linnaeus, 1758) – 56; *Oenanthe* sp. – 41; *Ficedula hypoleuca* (Pallas, 1764) – 1; Muscicapidae gen. – 54; *Passer hispaniolensis* (Temminck, 1820) – 7; *Passer montanus* (Linnaeus, 1758) – 11; *Passer* sp. – 1; *Motacilla alba*, Linnaeus, 1758 – 4; *Motacilla flava*, Linnaeus, 1758 – 19; *Anthus trivialis* (Linnaeus, 1758) – 1; *Anthus pratensis/cervinus* – 1; *Anthus* sp. – 14; *Fringilla coelebs*, Linnaeus, 1758 – 41; *Chloris chloris* (Linnaeus, 1758) – 25; *Spinus spinus* (Linnaeus, 1758) – 1; *Carduelis carduelis* (Linnaeus, 1758) – 22; *Linaria cannabina* (Linnaeus, 1758) – 4; Fringillidae gen. – 4; *Emberiza citrinella*, Linnaeus, 1758 – 21; *Emberiza cirlus*, Linnaeus, 1766 – 7; *Emberiza hortulana*, Linnaeus, 1758 – 12; *Emberiza melanocephala*, Scopoli, 1769 – 35.

Reptilia: *Testudo graeca*, Boulenger, 1889 – 1; *Ablepharus kitaibelii* (Bibron, Bory St-vincent, 1833) – 1; *Lacerta viridis* (Laurenti, 1768) – 18; *Lacerta trilineata*, Bedriaga, 1886 – 12; *Lacerta* sp. – 28; *Dolychophis caspius* (Gmelin, 1789) – 8; *Zamenis longissimus* (Laurenti, 1768) – 2; *Elaphe sauromates* (Pallas, 1811) – 1; *Natrix tessellata* (Laurenti, 1768) – 6; *Natrix natrix* (Linnaeus, 1758) – 16; *Natrix* sp. – 10; Serpentes indet. – 2.

Amphibia: *Triturus ivanbureschi*, Arntzen and Wielstra, 2013 – 2; *Bufo bufo*

(Linnaeus, 1758) – 8; *Bufotes* sp. – 1; *Rana dalmatina*, Fitzinger in Bonaparte, 1839 – 2.

Actinopterygii: *Anguilla anguilla* (Linnaeus, 1758) – 1; *Rutilus rutilus* (Linnaeus, 1758) – 1; *Vimba vimba* (Linnaeus, 1758) – 4; *Barbus bergi*, Boulenger, 1911 – 2; *Scardinius erythrophthalmus* (Linnaeus, 1758) – 1; *Squalius cephalus* (Linnaeus, 1758) – 10; *Carassius gibelio* (Bloch, 1782) – 20; Ciprinidae gen. – 10; Cypriniformes – 1; *Sander lucioperca* (Linnaeus, 1758) – 1; *Perca fluviatilis*, Linnaeus, 1758 – 2.

Arthropoda: *Scolopendra* sp. – 16; *Bradyporus dasypus* (Illiger, 1800) – 5; *Bradyporus macrogaster* (Lefebvre, 1831) – 11; *Bucephaloptera bucephala* (Brunner von Wattenwyl, 1882) – 8; *Decticus verrucivorus* (Linnaeus, 1758) – 4; *Pholidoptera brevipes*, Ramme, 1939 – 1; *Platycleis affinis*, Fieber, 1853 – 2; *Platycleis escalerai*, Bolívar, I., 1899 – 1; *Platycleis intermedia* (Serville 1838) – 1; *Platycleis* sp. – 50; *Saga natoliae*, Serville, 1838 – 2; *Tettigonia viridissima* (Linnaeus, 1758) – 3; *Tettigonia* cf. *caudata* (Charpentier, 1845) – 15; *Anacridium aegyptium* (Linnaeus, 1764) – 3; *Calliptamus italicus* (Linnaeus, 1758) – 1; *Mantis religiosa* (Linnaeus, 1758) – 11; *Lethocerus patruelis* (Stål, 1854) – 1; *Calosoma inquisitor* (Linnaeus, 1758) – 3; *Calosoma sycophanta* (Linnaeus, 1758) – 1; *Carabus scabriusculus* G.A.Olivier, 1795 – 1; *Carabus graecus* (Dejean, 1829) – 1; *Carabus coriaceus*, Géhin, 1885 – 2; Carabidae gen. – 8; *Ophonus* sp. – 1; *Harpalus* sp. – 2; *Morimus asper* (Sulzer, 1776) – 2; *Prionus besikanus*, Fairmaire, 1855 – 1; Cerambycidae gen. – 24; *Hydrophilus* sp. – 1; *Copris lunaris* (Linnaeus, 1758) – 15; *Copris* sp. – 24; *Geotrupes vernalis* (Linnaeus, 1758) – 1; *Cetonia aurata* (Linnaeus, 1761) – 1; *Dorcus parallelipipedus* (Linnaeus, 1758) – 3; *Oryctes nasicornis* (Linnaeus, 1758) – 59; *Scarabaeus* sp. – 3; Scarabaeioidea – 6; Tenebrionidae gen. – 5; Coleoptera – 7.