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Mammals in the food of the tawny owl *Strix aluco* in Gorzekały in the Great Masurian Lakeland

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Abstract: The study was carried out in Gorzekały, situated ca. 10 km east of Lake Śniardwy in the Masurian Lake District (NE Poland). Pellets of *Strix aluco* were collected in an abandoned church three times in 2020. Analyses revealed the presence of 141 small mammals belonging to 13 species. The most abundant were: *Clethrionomys glareolus*, *Microtus agrestis* and *Apodemus flavicollis*. Soricomorpha species were relatively rarely (7%) captured by owls. From among bats, two common species (*Eptesicus serotinus, Nyctalus noctula*) were found. The most valuable rodent species was *Sicista betulina*, which occurred fairly frequently in the food of *S. aluco* from Gorzekały.

Key words: owls, pellets, small mammals, Masurian Lakeland, north-eastern Poland

INTRODUCTION

Up-to-date data on small mammals in the Masurian Lakeland originate mainly from the analysis of owls' diet (Pucek & Raczyński 1983). Two major reports published to date on small mammals are based on the analysis of the diet of *Strix aluco*. The data come from site Karwik near the SE end of Lake Seksty (Kowalski 1961) and from site Osa by the eastern shore of Lake Łuknajno (Kowalski & Lesiński 1988). The aim of this paper was to collect current data and supplement information on small mammals of this area.

MATERIAL AND METHODS

To complement the data on small mammals in the Masurian Lakeland, we collected pellets of *S. aluco* in the Gorzekały locality (53.75ºN, 22.04ºE), situated about 10 km east of Lake Śniardwy. An owl roost was found in an abandoned and partially ruined church. The land within a radius of 500 m from the site were dominated by forests (from the east, south and west) and by open areas with grasslands (from the north). Tree stands were dominated by pine trees (up to 76 years old in the western part, and up to 111 years old in the eastern part). A small area covered by spruce and alder tree stands was located in the northern part, while a young oak forest (25 years old) was found in the southern part (Polish Forest Data Bank). More wet grounds were situated about 200 m south and 400 m south-west of the church. The study material was collected on 21 May, 30 July and 10 October 2020. One hundred and forty-one small mammals belonging to 13 species were prepared from this material (Table) as well as 14 birds and 23 amphibians. Species of mammals were determined with the use of a key edited by Pucek (1984) and publications by Ruprecht (1979, 1987). Proportions in the number of individuals of each species and the number of individuals of the remaining species between sites were compared using the Chi^2 test (df = 1, significance level p = 0.05).

Table. Mammals in the food of *Strix aluco* in Gorzekały compared with other samples of the food of this owl species from the Great Masurian Lakeland.

No.	Prey	Gorzekały, original data					Karwik (Kowalski 1961)		Osa (Kowalski & Lesiński 1988)	
		21 May 2020	30 Jul 2020	10 Oct 2020	Total	%	N	%	N	%
1.	*Talpa europaea* Linnaeus, 1758	0	2	1	3	2.1	2	0.7	7	1.0
2.	*Sorex araneus* Linnaeus, 1758	1	4	0	5	3.5	32	11.0	130	18.6
3.	*Sorex minutus* Linnaeus, 1766	0	1	1	2	1.4	6	2.1	73	10.4
4.	*Neomys fodiens* (Pennant, 1771)	0	0	0	0	0	5	1.7	20	2.8
5.	*Myotis daubentonii* (Kuhl, 1819)	0	0	0	0	0	0	0	1	0.1
6.	*Eptesicus serotinus* (Schreber, 1774)	1	0	2	3	2.1	0	0	0	0
7.	*Nyctalus noctula* (Schreber, 1774)	1	0	0	1	0.7	6	2.1	0	0
8.	*Pipistrellus pipistrellus s.l.*	0	0	0	0	0	2	0.7	0	0
9.	*Plecotus auritus* (Linnaeus, 1758)	0	0	0	0	0	1	0.3	0	0
-.	Chiroptera sp.	0	1	0	1	0.7	0	0	0	0
10.	*Clethrionomys glareolus* (Schreber, 1780)	12	12	7	31	22.0	70	24.1	102	14.6
11.	*Arvicola amphibius* (Linnaeus, 1758)	9	2	0	11	7.8	0	0	18	2,6
12.	*Microtus arvalis* (Pallas, 1779)	3	5	2	10	7.1	34	11.7	42	6.0
13.	*Microtus agrestis* (Linnaeus, 1761)	5	13	6	24	17.0	46	15.8	17	2.4
14.	*Microtus oeconomus* (Pallas, 1766)	1	7	0	8	5.7	50	17.2	126	17.9
-.	*Microtus* spp.	0	0	0	0	0	0	0	18	2.6
15.	*Mus musculus* Linnaeus, 1758	0	0	0	0	0	4	1.4	6	0.9
16.	*Rattus norvegicus* (Berkenhout, 1769)	0	0	0	0	0	0	0	2	0.3
17.	*Apodemus agrarius* (Pallas, 1771)	0	0	0	0	0	0	0	35	5.0
18.	*Apodemus sylvaticus* (Linnaeus, 1758)	0	0	0	0	0	12	4.1	0	0
19.	*Apodemus flavicollis* (Melchior, 1834)	12	5	2	19	13.5	11	3.8	15	2.1
-.	*Apodemus* spp.	5	7	3	15	10.6	0	0	55	7.8
20.	*Micromys minutus* (Pallas, 1771)	1	0	0	1	0.7	1	0.3	17	2.4
21.	*Sicista betulina* (Pallas, 1779)	0	5	2	7	5.0	9	3.1	15	2.1
-.	Rodentia sp.	0	0	0	0	0	0	0	1	0.1
22.	*Mustela erminea* Linnaeus, 1758	0	0	0	0	0	0	0	2	0.3
	Total	51	64	26	141	100.0	291	100.0	702	100.0

RESULTS

Rodents of the subfamily Arvicolinae, especially *Clethrionomys glareolus* and *Microtus agrestis*, were the most abundant (about 60% of caught mammals) in the diet of *S. aluco* in Gorzekały. *Apodemus flavicollis* with a share of 13.5% was also frequently noted. However, most individuals were determined only to belong to the genus *Apodemus* (about 10% of prey); but they likely belonged to this species. Notably, *Sicista betulina* was observed, which constituted 5% of mammalian prey. Soricomorphs (Soricomorpha) – three species (7%) and bats Chiroptera – two species (3.5%) were relatively rarely caught (Table).

DISCUSSION

The results of up-to-date studies in Masurian Lakeland (Karwik, Osa), compared with the results from Gorzekały, indicate varying differences in the share of particular species (Table). In our study area, the share of soricomorphs was distinctly smaller ($Chi^2 = 5.26$, $p = 0.022$ as compared to the Karwik site, and $Chi^2 = 28.32$, $p < 0.001$ as compared to the Osa site). *Neomys fodiens*, although not numerous in the other two sites in the Masurian Lakeland, was absent in Gorzekały. The share of bats was comparable with that in Karwik ($Chi^2 = 0.00$, $p = 0.968$) and markedly greater than that in the Osa site ($Chi^2 = 14.73$, $p < 0.001$). In this type of habitat, bats as the prey of *S. aluco* are usually noted infrequently and constitute less than 0.5% of prey throughout Poland (Lesiński et al. 2009b). *Pipistrellus pipistrellus* (Schreber, 1774) reported in the site Karwik (Kowalski 1961) may also belong to *Pipistrellus pygmaeus* (Leach, 1825) – a species distinguished in later years from the former. Five common species of these mammals were found in three sites, which makes up about 1/3 of species possible to record in this part of Poland (Sachanowicz et al. 2006).

C. glareolus was frequently caught in all three sites. A notable find was the absence of *Arvicola amphibius* from the site Karwik, while in the two other sites, it was caught fairly regularly. Voles *Microtus* spp. (three species) were the basis of the diet of *S. aluco*. In Gorzekały, *M. agrestis* was relatively frequent, and *M. oeconomus* was the least frequent compared with the two other sites (Karwik: $Chi^2 = 9.93$, $p = 0.002$; Osa: $Chi^2 = 12.23$, $p < 0.001$). Most synanthropic rodents (*Mus musculus* and *Rattus norvegicus*) were not present in the diet of *S. aluco* in our study area. The share of *A. flavicollis* in Gorzekały was relatively high, as it was in the other forest sites in the NE part of the country (Jędrzejewska & Jędrzejewski 2001, Lesiński et al. 2009a, Gryz et al. 2012, Lesiński & Błachowski 2023). *S. betulina* was regularly caught in Gorzekały as well as in the sites Karwik and Osa. Finding this rare species is important and confirms that it is rather common and forms numerous populations in Masurian Lakeland. Notably, *Muscardinus avellanarius* (Linnaeus, 1758) was absent from Gorzekały as well as from the two other sites around Lake Śniardwy, even though this species was reported from NE Poland (Pucek 1983, Żmihorski & Osojca 2006, Lesiński & Gryz 2008, Lesiński et al. 2009a, Gryz et al. 2011, Lesiński & Błachowski 2023). Gorzekały is likely situated outside the continuous range of this species.

The species composition of small mammals found in the study area in Gorzekały is certainly incomplete. It is possible to find about 12 more bat species and about 5–6 more terrestrial rodent species. Their absence likely results from the relatively small sample of the owls' prey in Gorzekały (141) compared with the two other sites in the Masurian Lakeland (291 and 702) (Table).

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STRESZCZENIE

[Ssaki w pokarmie puszczyka *Strix aluco* w Gorzekałach w Krainie Wielkich Jezior Mazurskich]

Zbadano drobne ssaki w miejscowości Gorzekały, znajdującej się w Krainie Wielkich Jezior Mazurskich w odległości ok. 10 km od jeziora Śniardwy. Wypluwki puszczyka *Strix aluco* zebrano w opuszczonym kościele. W roku 2020 trzykrotnie zbierano materiał, w którym po analizie stwierdzono obecność 141 drobnych ssaków należących do 13 gatunków (Tab.). Najliczniejsze były trzy gryzonie: *Clethrionomys glareolus*, *Microtus agrestis* i *Apodemus flavicollis*. Soricomorpha były łowione przez sowy rzadko (7%). Nietoperze były reprezentowane przez dwa pospolite gatunki (*Eptesicus serotinus, Nyctalus noctula*). Cenne jest stwierdzenie prawdopodobnie dość licznej populacji *Sicista betulina*. Stwierdzony skład gatunkowy jest bardzo niekompletny, a możliwych do stwierdzenia jest jeszcze kilkanaście gatunków drobnych ssaków, zwłaszcza nietoperzy.

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