



## Small mammals of Mława Upland (middle-northern Poland) in the pellets of the barn owl *Tyto alba* and long-eared owl *Asio otus*

Marta BARDZIŃSKA and Jerzy ROMANOWSKI

*Faculty of Biology and Environmental Sciences, Cardinal Stefan Wyszyński University in Warsaw, Wóycickiego 1/3, 01-938 Warsaw, Poland, ORCID 0009-0003-7533-3862, Poland, e-mail: bardzinska.m.m@gmail.com; ORCID 0000-0003-1050-6403, e-mail: j.romanowski@uksw.edu.pl (corresponding author)*

**Abstract:** The species composition of a small mammal community of Mława Upland (middle-northern Poland) was studied using the analysis of pellets of the barn owl *Tyto alba* and long-eared owl *Asio otus*. Total of 1748 individuals of small mammals were identified from 77 pellets of *Tyto alba* collected near Kuczbork, and from 452 pellets of *Asio otus* pellets collected near Kobuszyn in the years 2014–2016. Rodentia were represented by 7 species and made up the main part of the owls' diet. Among four Soricomorpha species, *Sorex araneus* was the most frequent one. The predominant prey was *Microtus arvalis*, accounting for 60% of *Tyto alba* diet, and nearly 90% of *Asio otus* diet. Species of small mammals recorded in Mława Upland are widely distributed in central Poland and are mostly associated with agricultural land and mosaic landscapes.

**Key words:** Mammalia, species composition, pellets, diet of owls, faunistics

### INTRODUCTION

Pellet analysis offers an efficient means to sample small mammal communities and is widely used for local and landscape-level assessments of mammalian populations. Heisler et al. (2016) have shown that small mammal community composition estimated via pellets was better represented compared to estimates from conventional trapping. In this paper we applied analysis of pellets of two species of owls, the barn owl *Tyto alba*, and the long-eared owl *Asio otus* aiming to identify the species richness and composition of a community of small mammals in the landscape of Mława Upland, middle-northern Poland. Knowledge on the distribution of small mammal species in this region of Poland is rather fragmentary, and is based mostly on records collected before 1980 (Pucek & Raczyński 1983).

### MATERIAL AND METHODS

The area of app. 80 km<sup>2</sup> in Mława Upland (Wysoczyzna Mławska) was searched for pellets of owls from 26 Oct 2014–20 Jun 2016. The study area is located east of River Wkra in northern part of Mazovia in Poland. Most of the area is agricultural land with a well-developed drainage system and numerous wetlands. Larger forest complexes are found on the peripheries of the uplands.

Total of 77 pellets of *Tyto alba* were collected in abandoned buildings near Kuczbork Kolonia (N 53° 4' 1.3", E 20° 2' 47.3"). Total of 452 pellets of *Asio otus* were collected from spruce young growth east of Kobuszyn (53°0'20.5" N, 20°5'48.6" E).

The analysis of pellets was performed after soaking in water. The skeletal elements of mammal's skeleton (mainly skulls, less often humeral bones) were separated. Prey was identified based on the lower jaws, skulls, teeth, parts of beaks, and femurs, according to the identification key by Pucek (1984), and using reference collections. The number of prey individuals was calculated separately for each complete pellet based on the most frequent skull element. The

remaining fragments of pellets were pooled together to estimate the number of prey individuals. Total material contained 1748 individuals of small mammals, and 5 birds (small Passeriformes) preyed by *Tyto alba* and *Asio otus*.

## RESULTS

A total of 11 species of small mammals were recorded in the diet of owls studied in Mława Upland. *Tyto alba* utilized 9 species, including three Soricomorpha species, while *Asio otus* utilized 7 species, including only one Soricomorpha (Table 1). Rodentia were represented by 7 species and comprised the main part of the owls' diet, accounting for more than 80% of *Tyto alba* diet, and nearly 100% of *Asio otus* prey (Table 1). Soricomorpha were represented by four species, with *Sorex araneus* being the most frequent one. The predominant food was *Microtus arvalis*, accounting for approximately 60% of the *Tyto alba* diet, and nearly 90% of the *Asio otus* diet. Other small mammals also accounted for a substantial share of the predators' diet, including *S. araneus* (14.6% in *Tyto alba* diet), and *Microtus oeconomus*, accounting for at least 6% of the prey of two owl species (Table 1).

Table 1. Small mammals in the diet of the barn owl *Tyto alba* and the long-eared owl *Asio otus* in Mława Upland.

No.	Prey species	<i>Tyto alba</i>		<i>Asio otus</i>	
		n	%	n	%
1.	<i>Talpa europaea</i> Linnaeus, 1758	0	0	2	0.1
2.	<i>Sorex araneus</i> Linnaeus, 1758	60	14.6	0	0
3.	<i>S. minutus</i> Linnaeus, 1766	22	5.3	0	0
4.	<i>Neomys fodiens</i> Pendant, 1771	2	0.5	0	0
5.	<i>Clethrionomys glareolus</i> (Schreber, 1780)	3	0.7	10	0.7
6.	<i>Microtus arvalis</i> (Pallas, 1779)	249	60.4	1192	89.2
7.	<i>M. oeconomus</i> (Pallas, 1766)	29	7.0	80	6.0
-.	<i>Microtus</i> sp.	1	0.2	9	0.7
8.	<i>Mus musculus</i> Linnaeus, 1758	23	5.6	0	0
9.	<i>Apodemus agrarius</i> (Pallas, 1771)	9	2.2	4	0.3
10.	<i>A. flavicollis</i> (Melchior, 1834)	0	0	7	0.5
-.	<i>Apodemus</i> spp.	9	2.2	30	2.2
11.	<i>Micromys minutus</i> (Pallas, 1771)	5	1.2	2	0.1
Total		412	100.0	1336	100.0

## DISCUSSION

*Tyto alba* and *Asio otus* are common predators of agricultural areas, and mosaic landscapes composed of farmland, build-up areas and forest patches (Goszczyński 1981). Several specific differences in dimensions of their ecological niches were described: *Tyto alba* utilizes the build-up areas more often compared to the other owl species and has a relatively broad dietary niche (Romanowski & Lesiński 2019), while *Asio otus* is one of the most specialized predators preying mostly on colonial *Microtus* species (Jędrzejewska & Jędrzejewski 1998). Our data are in accordance with the above studies: prey of *Tyto alba* in Mława Upland consisted of a higher number of mammalian species, as compared with *Asio otus*, and included one synanthropic rodent *Mus musculus*.

Species of small mammals recorded in this study are widely distributed in central Poland (Pucek 1984, Lesiński et al. 2013) and northern Mazovia (Lesiński 2022), and were reported as common species in a recent research of floodplains of Vistula River (Romanowski et al 2023). Several of the species are associated with agricultural land (*M. arvalis*, *Apodemus agrarius*, *Micromys minutus*), forest and mosaic landscapes (*Clethrionomys glareolus*, *S. araneus*,

*A. flavicollis*). Two species, *M. oeconomus* and *Neomys fodiens* are inhabitants of the wetlands and wet sedge meadows (Lesiński et al. 2016, Romanowski et al 2023).

The documented list of small mammals of Mława Upland is most likely incomplete due to the limited number of study sites. Future studies should focus on the potential presence of bats Chiroptera, as well as terrestrial species, especially ones associated with forests and riparian habitats.

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#### STRESZCZENIE

#### [Drobne ssaki Wysoczyzny Mławskiej (środkowo-północna Polska) w wyplawkach płomykówki *Tyto alba* i uszatki *Asio otus*]

Wyplawki sów zbierano na obszarze Wysoczyzny Mławskiej na wschód od rzeki Wkra w okresie 26.10.2014–20.06.2016. Zebrano łącznie 77 wyplawek płomykówki *Tyto alba* w niezamieszkałych budynkach na skraju Kuczbork Kolonia, oraz 452 wyplawek uszatki *Asio otus* w młodniku świerkowym na wschód od Kobuszyna. Analiza wyplawek wykazała obecność 1748 osobników drobnych ssaków – 412 w diecie płomykówki, oraz 1336 w diecie uszatki (Tab. 1). Odnotowano 11 gatunków drobnych ssaków: 4 Soricomorpha i 7 Rodentia. Najczęściej łowionymi gatunkami były: *Apodemus flavicollis* i *Microtus arvalis*. Wśród Soricomorpha najczęstsze były: *Sorex araneus* i *Talpa europaea*, ale ich udział w diecie sów był stosunkowo niewielki (mniej niż 5% ssaków). Skład gatunkowy ssaków jako ofiar sów stwierdzony w analizowanym pokarmie wskazuje, że areale łowieckie drapieżników obejmowały różne środowiska: sąsiedztwo zabudowy, dolinę rzeki i tereny zadrzewione.

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