

## Chapter

# Owls (Strigiformes Wagler, 1830) in Bulgaria: Past and Present (A Review of the Fossil Record and Present Status of Recorded Species)

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## Abstract

Two families, 8 genera, 12 species, and 13 subspecies of recent owls are recorded in Bulgaria. Two species (*Bubo scandiacus* and *Strix nebulosa*), established in the Pleistocene localities, disappeared from the country's recent avifauna. The southernmost limits of the European breeding ranges of three species (*Stix uralensis*, *Aegolius funereus*, and *Glaucidium passerinum*) pass through the territory of Bulgaria. Three species are endangered, 2—vulnerable, 1—threatened, and all the 12 species are protected by law. Earliest record of owls came from Gelasian (2.5 Mya) and Calabrian (1.6 Mya). Bone finds of two Early Pleistocene localities are incompletely identified (as *Asio* and *Athene*, respectively). The find of *Athene* sp. is determined as the oldest European record of that genus. Some anthropogenic factors that cause owl mortality are also presented.

**Keywords:** Pleistocene owls, Quaternary birds, paleoenvironment, avian bone remains, wildlife of Bulgaria, birds of Balkan Peninsula

## 1. Introduction

Owls (Strigiformes Wagler, 1830) in Bulgaria have always been held in special esteem. With their large round eyes, large heads, fascial disc, powerful and sharp claws, soft plumage and silent flight, they were the personification of strength, power, majesty, mystery and bad luck and death. Such beliefs are deeply rooted in the consciousness of broad circles of the population. Even today, many people believe that if they hear a Little Owl calling from the roof of the neighbor's house, there will soon be a funeral in that home.

In Bulgarian ethnography, there are no studies on the role of owls in the life of the population. Images or sculptures of owls in prehistoric and ancient art have so far not been found in the country, unlike some neighboring countries (Greece, for example). Past distribution of owl also remained out of special research, except that of [1–3].

At present, order Strigiformes includes between 213 [4] and 220 [5] recent species in two families—Strigidae Leach, 1820, and Tytonidae Ridgway, 1814. Palearctic

fauna numbers 17 species [6], while in the Bulgarian avifauna 10 species are recorded. *Bubo scandiacus* (Linnaeus, 1758) and *Surnia ulula* (Linnaeus, 1758) are listed as likely to be found in the country ([7], although none of them has been recorded so far. The influence of global warming in recent decades reduces the chances of establishment of these boreal species in Bulgaria.

Owls (large owls) are often one of the most active accumulators of animal remains (bones, teeth) in the cave deposits. Their role as taphonomic agents is highly appreciated by the paleozoologists, speleologist and ecologist [8]. The food of most species of owls in Bulgaria (based on pellets analysis) is relatively well studied, but the most numerous are the studies on the diet of the Eagle Owl. The largest number of food components were found in this species. It is believed that in Bulgaria, its number is among the highest in the Balkans and in Europe.

## 2. Material and methods

The chronostratigraphy follows [9] (Mya): Gelasian (GE) 2.588–1.800 (covering parts of the former Late Pliocene—Early Pleistocene); Calabrian (CA) 1.800–0.774 (Early Pleistocene); Chibanian (CH) 0.770–0.129 (Middle Pleistocene); Upper Pleistocene (UP) 0.129–0.0117 (Late Pleistocene); Greenlandian (GR) 0.0117–0.0082 (Early Holocene); Northgrippian (NO) 0.0082–0.0042 (Middle Holocene); and Meghalayan (ME) 0.0042–0.0001 (Late Holocene). Taxonomy is after [4, 5].

Abbreviations: Mya—million years ago, and Mnts—Mountains.

## 3. Past and present of Bulgarian owls

Species of both families, present in the Western Palearctic [6], have been recorded in the fossil (Pleistocene) and subfossil and recent (Holocene) avifauna of Bulgaria.

### 3.1 Tytonidae Ridgway, 1914

#### 3.1.1 Barn Owl (*Tyto alba* (Scopoli, 1769))

Fossil/subfossil record: None.

Subspecies: *Tyto alba alba* (Scopoli, 1769) and *Tyto alba guttata* Brehm, 1931 [7].

Residence status: (*T. a. alba*): wintering [7], wintering, breeding [10]; (*T. a. guttata*): resident, vagrant, breeding, migratory [7].

Population number: (*T. a. alba*): no data; single pairs (*T. a. guttata*): 1500–1700 pairs [11], 500–1000 pairs [12], 600 pairs [10].

Conservation status: (*T. a. alba*): protected [12], vulnerable [10]; (*T. a. guttata*): protected [12], vulnerable [10].

Peculiarities: Both European subspecies are spread in the country.

### 3.2 Strigidae Wagler, 1830

#### 3.2.1 Eurasian Pygmy Owl *Glaucidium passerinum* (Linnaeus, 1758)

Fossil/subfossil record: UP: [13–15]. The find from the Devetashka Cave is the fifth World fossil record of this species [13].

Subspecies: *Glaucidium passerinum passerinum* (Linnaeus, 1758) [7].

Residence status: resident, breeding [7, 12].

Population number: 100–120 pairs [11], 30–120 pairs [12], 150–200 pairs [16].

Conservation status: threatened [12], endangered [10].

Peculiarities: The southern border of the breeding range of the species passes through the territory of the country. Bulgarian populations are refugial montane and inhabit old-growth prime coniferous forests [17, 18]. The largest compact prime habitat on the Balkan Peninsula is preserved in the Rhodopes Mnts. [19].

### 3.2.2 Little Owl (*Athene noctua* (Scopoli, 1769))

Fossil/subfossil record: UP, GR, NO, ME: [1, 2, 14, 15, 20–23].

Subspecies: *Athene noctua indigena* Brehm, 1855 [7].

Residence status: resident, wintering, vagrant, breeding [7, 12].

Population number: 16,000–18,000 pairs [11], 7500–10,000 pairs [12].

Conservation status: protected [12].

Peculiarities: 90% of the Bulgarian Little owls breed and winter in human settlements [24].

### 3.2.3 *Athene F. Boie*, 1822 sp.

Fossil/subfossil record: GE: [25–27]. This is the oldest record of a strigiform bird in Bulgaria. It is dated ca. 2.5 Mya. The only find (incomplete sternum) came from the Early Pleistocene (Middle Villafranchian, MN 17) locality near Dolno Ozirovo village (Montana Region; NW Bulgaria), known as Varshets locality. The find is evaluated as the oldest so far European record of that genus in Europe [28].

### 3.2.4 Boreal (Tengmalm's) Owl (*Aegolius funereus* (Linnaeus, 1758))

Fossil/subfossil record: UP, ME: [14, 15].

Subspecies: *Aegolius funereus funereus* (Linnaeus, 1758) [7].

Residence status: resident, vagrant, breeding [7, 12].

Population number: 1100–1200 pairs [11], 600–900 pairs [12].

Conservation status: vulnerable [10, 12].

Peculiarities: The Pleistocene locality of the species in the Devetashka Cave falls outside the modern breeding range. The southern border of the breeding range of the species passes through the territory of Bulgaria and Greece. Bulgarian populations are refugial montane and inhabit old-growth prime coniferous forests [17, 18]. The largest compact prime habitat on the Balkan Peninsula is preserved in the Rhodopes Mnts. [19].

### 3.2.5 Eurasian scops owl (*Otus scops* (Linnaeus, 1758))

Fossil/subfossil record: UP, GR, NO: [13, 23, 29, 30].

Subspecies: *Otus scops scops* (Linnaeus, 1758) [7].

Residence status: breeding, migratory [7].

Population number: 12,000–14,000 pairs [11], 6000–9000 pairs [12].

Conservation status: protected [12].

Peculiarities: Some individuals winter in the country [31]. A singing male recorded on 12.02.2014 in a park in Sofia City [32].

### 3.2.6 Long-eared Owl (*Asio otus* (Linnaeus, 1758))

Fossil/subfossil record: UP, GR, NO, ME: [13, 23, 29, 33].

Subspecies: *Asio otus otus* (Linnaeus, 1758) [7].

Residence status: wintering, breeding [7, 12].

Population number: 12,000–14,000 pairs [11], 3000–5000 pairs [12].

Conservation status: protected [12].

Peculiarities: In winter, migratory specimens from the north form numerous aggregations in forest areas in the country, where they usually stay for several weeks during the coldest periods.

### 3.2.7 Short-eared Owl (*Asio flammeus* (Pontoppidan, 1763))

Fossil/subfossil record: UP, NO: [13, 23].

Subspecies: *Asio flammeus flammeus* (Pontoppidan, 1763) [7].

Residence status: wintering, resident, breeding [7, 12].

Population number: 3–6 pairs [11], 0–6 pairs [12].

Conservation status: threatened [12].

Peculiarities: The southern border of the breeding range of the species passes through the territory of the country. Last breeding recorded in July 2009 [34].

### 3.2.8 *A. otus* (Linnaeus, 1758)/*A. flammeus* (Pontoppidan, 1763)

Fossil/subfossil record: UP: [14]. The finds (20 items) originate from the Late Wurm (Middle Paleolithic, ca. 70,000 BP) deposits of the Devetashkata Cave near Devetaki village (Lovech Region, CN Bulgaria). It is the largest Bulgarian Cave and the richest avian paleontological locality in Bulgaria. Most of the finds represent pedal phalanges, ulnare bones, or bone fragments of immature individuals that could not be reliably identified up to species level. Therefore, it is preferable to leave the determination open, i.e., until genus level (*Asio*) with an assumption of one of two mentioned species.

### 3.2.9 Tawny Owl (*Strix aluco* Linnaeus, 1758)

Fossil/subfossil record: CA, UP, NO, ME: [1, 2, 13–15, 20, 23, 35–37].

Subspecies: *Strix aluco aluco* Linnaeus, 1758 [7].

Residence status: resident, breeding [7].

Population number: 10,000–12,000 pairs [11] 4000–8000 pairs [12].

Conservation status: protected [12].

Peculiarities: Individuals from both phases, gray (**Figure 1**) and brown (**Figure 2**), have been found in Bulgaria.

### 3.2.10 Ural Owl (*Strix uralensis* Pallas, 1771)

Fossil/subfossil record: None.

Subspecies: *Strix uralensis liturata* Tengmalm, 1793 [7].

Residence status: resident, vagrant, breeding [7, 12].

Population number: 150–200 pairs [11], 20–60 pairs [12].

Conservation status: threatened [12], endangered [10].



**Figure 1.**  
*Tawny owl (Strix aluco aluco), gray phase. Orsoya village (Montana Region, NW Bulgaria), 26.04.2020.*  
Photograph: Nikolay Karaivanov.

Peculiarities: The southern border of the breeding range of the species passes through the territory of the country. The Bulgarian population is a relict of the last glaciations [38].

### 3.2.11 Great gray Owl (*Strix nebulosa* Forster, 1772)

Fossil/subfossil record: UP: [13, 14, 39].  
Residence status: not recorded in the Holocene [7].  
Population number: none [7, 12].  
Conservation status: none.

Peculiarities: It is possible that the species will be established in Bulgaria during the eruptive movements in the winter period.

### 3.2.12 Eurasian Eagle-Owl (*Bubo bubo* (Linnaeus, 1758))

Fossil/subfossil record: CA, UP, GR, NO, ME: [1, 2, 14, 15, 23, 40–43].  
Subspecies: *Bubo bubo bubo* (Linnaeus, 1758) [7].  
Residence status: resident, breeding [7, 12].  
Population number: 120–150 pairs [44], 650–700 pairs [11], 420–490 pairs [12].  
Conservation status: threatened [12], endangered [10].

Peculiarities: The species' population obviously increases at least triple in the last 3–4 decades, despite the decades-long incidents of shooting specimens by unenlightened hunter-poachers (**Figures 3 and 4**).

### 3.2.13 Snowy Owl (*B. scandiacus* (Linnaeus, 1758))

Fossil/subfossil record: UP: [13, 14, 45].  
Residence status: not recorded in the Holocene; probable [7].  
Population number: none [7, 12].  
Conservation status: none.



**Figure 2.**  
*Tawny owl (Strix aluco aluco), brown phase. Ofeliite Locality, Vitosha Mnt. (CW Bulgaria), 22.06.2020. Photograph: Lyubomir Hristov.*



**Figure 3.**  
*A shot Eagle owl (Bubo bubo bubo). Near Reselets village (Pleven Region, NW Bulgaria). 16.07.1977. Photograph: Zlatozar Boev.*

Peculiarities: It is possible that the species will be established in Bulgaria during the winter period.

#### 4. Discussion

Based on the occurrences as rare winter vagrants in the neighboring Balkan countries, [7] (1990) list two additional species as probable for the Bulgarian avifauna—*S. ulula* (subspecies *S. u. ulula* Linnaeus, 1758.) and *B. scandiacus*. In the last more than three decades, there have been no sightings of both species, but we do not rule out the possibility of their records. Both species have a propensity for non-periodic long winter migrations to the south.



**Figure 4.**  
A shot Eagle owl (*Bubo bubo bubo*). Near Town of Belogradchik (Vidin Region, NW Bulgaria). 01.10.1993.  
Photograph: Zlatozar Boev.

*B. scandiacus* is already established in the country, albeit in the Late Pleistocene, and for *S. ulula*, its Late Pleistocene presence has recently been established in the Eastern Palearctic as far south as even North Vietnam [46].

Although all owls in Bulgaria are protected by law, numerous are the hazards that still cause their death. The road kills from traffic have the most significant impact. In the open plain and lowland landscapes of Southern Bulgaria, Barn owls especially often die like this. However, they are not the only victim of the roads among the owls. Some species preferring woodlands and forest habitats also die in the same way on mountain roads (**Figure 5**).

At night, owls easily find the still warm bodies of killed or injured birds and small mammals on the roadway and swoop down on easy prey. In such situations on the road, blinded by the powerful headlights of cars, they are run over. Barn owls often die like this every year in southern Bulgaria.



**Figure 5.**  
A Tawny owl (*Strix aluco aluco*) run over on the road. Studenets Natura 2000 Special Protected Area (NC Bulgaria). Photograph: 12.11.2009. Zlatozar Boev.



**Figure 6.**  
A Little owl (*Athene noctua indigena*) died from the 230-volt electric voltage on open power lines in the village of Archar (Vidin Region, NW Bulgaria). Photograph: 12.11.2009. Zlatozar Boev.

A special survey of a 68-kilometer section of the Thrace highway between the cities of Pazardzhik and Plovdiv found that seven individuals of *A. otus* and five individuals of *T. alba* died in 20 days [47].

Some other relatively rare factors also contribute to owl mortality. In the urban areas (even rural), owls are sometimes injured and being killed by the electricity power as a result of flying into overhead wires (**Figure 6**). Unfortunately, not only small owls such as Little owls, but also the largest Eagle owls die from an electric shock from a short circuit. Such a case is presented by [48], making a proposal to replace electric poles or secure them with respect to birds. More than 30 years have passed since then, but today the situation is not much different.

## 5. Conclusions

Two owl species (*B. bubo* and *S. aluco*) are established in the Calabrian, and a genus (*Athene*) even in the Gelasian. Data from Bulgaria confirm that *B. bubo* and *S. aluco* coexisted with the Paleolithic man at least since 1.6 Mya. Although hominine remains have not been found in the Gelasian bird localities in Bulgaria, it is beyond any doubt that the owls and the first people in Bulgaria and the Balkans shared their cave dwellings. The present study is the first attempt to summarize available information on the composition, chronostratigraphic distribution, current conservation, and residential status and threats of owls in Bulgaria. Although scarce, these are also the first data on the past of owls in the country.

The Quaternary Bulgarian strigiform avifauna is rich and diversified. Two families, 8 genera, 12 species, and 13 subspecies of recent owls are recorded in the country's nature in the last over 2 Mya. Bone finds of two Early Pleistocene localities are incompletely identified (as *Asio* and *Athene*, respectively). Two species (*B. scandiacus* and *S. nebulosa*) disappeared from the country's recent avifauna. The southernmost limits of the breeding ranges of three species (*Stix uralensis*, *A. funereus*, and *G. passerinum*) pass through the territory of Bulgaria, which lies on the southern periphery of their ranges. Three species are endangered, 2—vulnerable, 1—threatened, and all the 12 species are protected by law. Only one species (*T. alba*) is represented by two



subspecies in the Bulgarian fauna. Earliest record of owls came from Gelasian (2.5 Mya) and Calabrian (1.6 Mya). The find of *Athene* sp. is determined as the oldest European record of that genus.

Although not abundant, the fossil/subfossil record of owls is highly intriguing and promising field of paleozoological research.

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## Conflict of interest

The author declares no conflict of interest.

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