**Article:**
Albarella, U., Higham, T. and McLean, A. (2023) An elusive ghost: searching for the Eagle Owl (Bubo bubo) in the past of Britain. International Journal of Osteoarchaeology, 33 (4). pp. 598-607. ISSN: 1047-482X

https://doi.org/10.1002/oa.3190

Received: 20 July 2022 | Revised: 21 November 2022 | Accepted: 5 December 2022

DOI: 10.1002/oa.3190

RESEARCH ARTICLE

# An elusive ghost: Searching for the Eagle Owl (*Bubo bubo*) in the past of Britain

**Umberto Albarella**[1] | **Tom Higham**[2,3,4] | **Alistair McLean**[5]

[1]Department of Archaeology, University of Sheffield, Sheffield, UK

[2]Department of Evolutionary Anthropology, Faculty of Life Sciences, University of Vienna, Vienna, Austria

[3]Oxford Radiocarbon Accelerator Unit, Research Laboratory for Archaeology, Oxford, UK

[4]Human Evolution and Archaeological Sciences (HEAS), University of Vienna, Vienna, Austria

[5]Weston Park Museum, Western Bank, Sheffield, UK

**Correspondence**
Umberto Albarella, Department of Archaeology, University of Sheffield, Minalloy House, 10-16 Regent Street, Sheffield S1 3NJ, UK.
Email: u.albarella@sheffield.ac.uk

## Abstract

The Eagle Owl (*Bubo bubo*) is currently absent as a regular breeder in Britain and its status as a native species has been debated. Its occurrence in the Pleistocene of Britain is sparse but uncontroversial, whereas its Holocene presence rests on very few ambiguous findings. Of these, a specimen from Demen's Dale (Derbyshire) originally attributed to the Mesolithic period is the most important. A re-evaluation of this bone (tarsometatarsus) is presented in this paper. Although its identification as an Eagle Owl is confirmed, radiocarbon dating suggests that the bird rather lived in the Late Pleistocene. On the basis of the current evidence, there are no Holocene remains of the Eagle Owl in the archaeological and fossil record of Britain and the native status of this species remains unconfirmed.

**KEYWORDS**
Britain, *Bubo bubo*, dating, Eagle Owl, identification, native fauna

## 1 | INTRODUCTION

This paper contributes to the discussion concerning the past presence of the Eagle Owl (*B. bubo*) in Britain by providing some new evidence and briefly reviewing the current one. The core research question it addresses is whether the Eagle Owl—today absent as a regular breeder in Britain—has been present in the past and, if so, when.

There are several reasons why a sound knowledge of the past distribution of this bird is valuable:

- It helps our understanding of the resources available to past people and the characteristics of the natural world they lived in.
- It provides information regarding the potential accumulating agents of the owl pellet deposits often found in association with archaeological sites.
- It can inform conservation programs, particularly concerning potential re-introduction plans.

## 2 | THE EAGLE OWL

The Eagle Owl (Figure 1) is the largest Strigiformes of the West Palearctic (Snow & Perrins, 1998, vol. 1, p. 893). It is a nocturnal species though, during the summer and in the most northern part of its range, it can fly in daylight. It lives in woodlands but also in more open areas, preferring rocky environments devoid of human disturbance, although it may find anthropic rural areas suitable as long as the environmental conditions are appropriate and there is limited disturbance. It does not build a nest but uses natural features, such as rock crevices and ledges, hollow trees, and scrub coverage to lay its eggs (Chiavetta, 1988, p. 75; Andrews, 1990, p. 189; Penterani & del Mar Delgado, 2019, pp. 103–104).

Like all other Strigiformes, the Eagle Owl is a predator. The size of its prey ranges from beetles to roe deer but, more normally, from water vole to hare. Mammals represent the majority of its diet, closely followed by birds. Reptiles, amphibians, fish, and insects are, however, also consumed, but in smaller proportions (Chiavetta, 1988, p. 73;

**FIGURE 1** The Eagle Owl. Photo via <a href="https://www.goodfreephotos.com/">Good Free Photos</a> [Colour figure can be viewed at wileyonlinelibrary.com]

Snow & Perrins, 1998, vol. 1, p. 896; Serjeantson, 2009, p. 115). Prey availability is key to the behaviour of this bird, which needs a vast home range (12–20 $km^2$) that is territorially defended. The bird is solitary or lives in pairs during the breeding season (Snow & Perrins, 1998, vol. 1, p. 896). Consequently, population density tends to be low, negatively affecting the chances of human encounters.

The Eagle Owl has a vast distribution covering most of Europe and Asia as well as North Africa. In Europe, it is present in most countries, though absent in the Netherlands and northern France as well as Britain and Ireland (but see Penterani & del Mar Delgado, 2019, p. 68, for a recent breeding expansion). There was a severe population decline in the 19th and 20th centuries but some recovery in more recent decades, partly due to reintroductions (Snow & Perrins, 1998, vol. 1, p. 894; Chiavetta, 1988, p. 77; Melling et al., 2008, p. 481). The presence of the bird in Scandinavia and other northern European countries indicates that its existence is compatible with British latitude. The species is, however, clearly susceptible to direct persecution as well as habitat disturbance, which probably explains the gaps in its European range. Important in the evaluation of its potential past distribution is the resident status of this species; although some seasonal movements have been recorded, particularly at northern latitudes, there is no evidence of true migratory patterns. Absence from most islands also seems to suggest a reluctance to cross sea stretches (Chiavetta, 1988, p. 74; Melling, 2011), a trait that it shares with other resident owls (Melling et al., 2008, pp. 483–484). Warburton (2010), however, emphasizes the importance of immature dispersal for the population dynamics of the species.

Like other owls, the Eagle Owl produces pellets generally containing well-preserved bones of its prey. There is a report of the entire skeleton of a Polecat (*Mustela putorius*) found in an Eagle Owl pellet (Andrews, 1990, p. 188). Beak damage on bones found in pellets can be diagnostic, at least when compared with the damage caused by diurnal predators (cf. Laroulandie, 2002).

Archaeological evidence of the interaction between humans and Eagle Owls is rather limited, probably reflecting the nocturnal habits of the bird, combined with its tendency to live in rather remote places. However, a bird of such formidable size and striking appearance would not have been overlooked, despite its reclusiveness. Reviewing the evidence from Sweden, Ericson & Tyrberg (2004, p. 171) have reported the keeping of Eagle Owls in captivity during the Middle Ages and also noted that most of the Holocene finds originate from graves, suggesting a close relationship with humans. A perforated claw of an Eagle owl found in a Palaeolithic context in Romania (Gál, 2005 in Serjeantson, 2009, p. 225) is a further indication of the symbolic value that this bird may have held for humans. Historical and ethnographic evidence indicates that the bird could be used as a decoy to attract other birds to be hunted (van Wijngaarden-Bakker, 2010). Eagle Owl remains have also been reported from sites dating back to much more ancient times, for example, the Neanderthal period (e.g., Grotte du Renne, France Majkić et al., 2017). Along with the remains of other species of large predatory eagles and birds, they are associated with use for specific symbolic purposes, such as the use of talons for ornaments and perhaps also the targeting of feathers (see also Morin & Laroulandie, 2012; Radovčić et al., 2015; Radovčić et al., 2020; Rodríguez-Hidalgo et al., 2019).

## 3 | THE EAGLE OWL IN BRITAIN

As mentioned, the Eagle Owl can at most be regarded as a rare vagrant in contemporary Britain. Melling et al. (2008) consider the recent rare cases of Eagle Owl nidifications in Britain (Penterani & del Mar Delgado, 2019, p. 67) more likely to be the consequence of individuals escaped from captivity than a consequence of natural vagrancy but Warburton (2010) gives far more credit to the hypothesis of breeding as a consequence of natural dispersal. Stable isotopic analysis has tried to address the problem but has proven to be inconclusive (Kelly et al., 2010). The bird is commonly kept captive in the country, a tradition that apparently dates back to at least the 17th century (Melling et al., 2008, pp. 479–480).

The question of the native status of the Eagle Owl in Britain has been discussed at length by Melling et al. (2008) and Warburton (2010), who take opposite views. Their concerns are mainly about the management of current populations and conservation issues. As they also acknowledge, such efforts need to be informed by our fossil and archaeological records, which can provide information about the deeper history of our fauna, well beyond the origins of written records. Reviews of such evidence for the Eagle Owl are provided by Yalden & Albarella (2009, pp. 58–60) and, especially, Stewart (2007), who is mainly reliant on a list of records published by Turk (2004).

Findings of Eagle Owl bones from paleontological and archaeological sites, though not many (11 sites at the most), indicate a long presence of the Eagle Owl in the Pleistocene of Britain. Occurrences are recorded at 11 sites, 12 if we also consider the Middle Palaeolithic find from Pin Hole Cave (Derbyshire), which could only be identified at the genus level (Stewart & Jacobi, 2015). These span both glacial

and interglacial periods and cover at least 700,000 years (Stewart, 2007, p. 483). There is no way to know whether the species occurrence was continuous as the record, even if augmented, will always inevitably be incomplete. However, the evidence that British Palaeolithic humans shared their landscape with Eagle Owls at least at some points in their history appears to be solid.

The Postglacial/Holocene record for the species is scantier and more problematic. If we discount the unsubstantiated claim by Fisher (1966, p. 324) of the occurrence of the species in Britain between the 8th and 11th centuries AD, this is limited to two, arguably three, sites.

The most recent of these sites is represented by the Iron Age Meare Lake Village (Somerset), whose fauna was originally reported by Bate (1966). Stewart (2007, p. 485) and Yalden & Albarella (2009, p. 58) report that there are doubts about the identification of this specimen (also expressed by the original author). Additionally, its whereabouts are unknown and therefore there is no possibility of re-examining or dating it. Without the opportunity for verification, this specimen cannot be regarded as reliable evidence of the occurrence of the Eagle Owl in the 1st millennium BC in Britain.

An older site is represented by the Neolithic/Bronze Age barrow at Longstone Edge (Derbyshire) (Last, 2014). At this site, two barrows were excavated and one of them covered a cist grave that was filled up with small vertebrate bones (in addition to human remains and Beaker sherds). The bones were interpreted to derive from the pellets of Short-Eared Owl (*Asio flammeus*) and Eagle Owl, on the basis of the faunal spectrum and patterns of modification and digestion (Andrews, 2014, p. 143). Surprisingly, Andrews regards the Eagle Owl as one of the likely species to be present in prehistoric Britain, apparently unaware of the almost complete absence of this species in the paleontological and archaeological record of Holocene Britain. Although no bones of the Eagle Owl were found, Andrews' assessment cannot be lightly discounted, particularly because it was proposed by a researcher with vast experience in owl pellet accumulations (cf. Andrews, 1990). However, the evidence is too indirect to be conclusive and would need to be supported by the findings of actual remains of the bird to be entirely credible.

The third and final site to be discussed here is Demen's Dale, a rock shelter in Derbyshire, which was excavated in 1947–1950 and revealed evidence of human occupation from Upper Palaeolithic to Roman times. Most of the finds from that excavation are currently stored in Weston Park Museum, Sheffield. The site produced a small collection of animal bones, which was reported by Bramwell and Yalden (1988) concerning the bird bones. The whole animal bone assemblage was assigned a Mesolithic date based on stratigraphic evidence and associated archaeological finds (flint microliths and small mammals), but the relationship between the main phases and the actual finds has been lost, with the exception of the bird bones, which have been attributed to layer "G," containing Mesolithic flakes (Bramwell & Yalden, 1988, fig. 1). Despite the absence of clear butchery marks the bird assemblage appears to have been accumulated by people because of its association with human debris. The bird bones include, together with some species still common in the area, two more unusual species. These are a likely ptarmigan (*Lagopus mutus*), a species no longer found in England (but present in Scotland), and an almost complete tarsometatarsus of a large owl, identified by Bramwell & Yalden (1988, p. 145) as an Eagle Owl.

The importance of this bone—as representing the only possible evidence of the occurrence of the Eagle Owl in Holocene Britain currently available for verification—meant that a reanalysis was deemed to be necessary. Validation of identification and dating were required before the occurrence of the Eagle Owl in Holocene Britain could be confirmed, as also suggested by Cooper et al. (2022, p. 919) in a very recent publication. Dan Bramwell and Derek Yalden were renowned and respected experts whose competence in identifying the bone correctly should not be questioned. However, the importance of the specimen and the limited amount of detail concerning its identification provided in the original report (no photograph, for example) meant that scientific rigor requires multiple observations to be carried out before any firm conclusions can be drawn.

## 4 | DEMEN'S DALE REVISITED

The Demen's Dale specimen was accessed through the Natural Science Section of the Weston Park Museum (Sheffield Museums Trust), where the animal bone collection is stored and curated. The specimen was temporarily held for study at the Department of Archaeology of the University of Sheffield and eventually returned to the Museum.

### 4.1 | Identification

As Bramwell & Yalden (1988, p. 144) pointed out, the Eagle Owl bone from Demen's Dale is a tarsometatarsus (Figure 2). Both articular ends are damaged and incomplete, and the diaphysis (shaft) is affected by soil concretions but, luckily, neither problem prevented the taking of length and width measurements. Reasonably, Bramwell & Yalden regarded the Demen's Dale specimen as too large to belong to a


**FIGURE 2** The Eagle Owl tarsometatarsus from Demen's dale. Accession number SHEFM: 1989.1.1. Photograph by UA

**TABLE 1** Details of the specimens used for the biometrical analysis

| GL | Bp | SC | Bd | Measured by | Collection | Geography | Modern/arch | Sex | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Eagle owl (*Bubo bubo*) tarsometatarsus | | | | | | | | | |
| 77.1 | | 11.4 | 23.2 | Umberto Albarella | Weston Park museum, Sheffield | Demen's dale, Peak District (England) | A | | Juv. |
| | | 8.5 | 19.4 | Graf, 1967 | N/A | Hundersingen an der Donau (Germany) | A | | Unknown chronology |
| 79 | 19 | | | Megan Spitzer | National Museum of Natural History Smithsonian Institution | Hallan Çemi (Turkey) | A | | Pre-pottery Neolithic (PPN); GL estimated |
| | 19.9 | | | Megan Spitzer | National Museum of Natural History Smithsonian Institution | Hallan Çemi (Turkey) | A | | PPN |
| | 18.6 | | | Megan Spitzer | National Museum of Natural History Smithsonian Institution | Hallan Çemi (Turkey) | A | | PPN |
| | | | 23.5 | Megan Spitzer | National Museum of Natural History Smithsonian Institution | Hallan Çemi (Turkey) | A | | PPN |
| | | | 21.3 | Megan Spitzer | National Museum of Natural History Smithsonian Institution | Hallan Çemi (Turkey) | A | | PPN |
| | | 9.7 | | Megan Spitzer | National Museum of Natural History Smithsonian Institution | Hallan Çemi (Turkey) | A | | PPN |
| | | 11.7 | | Megan Spitzer | National Museum of Natural History Smithsonian Institution | Hallan Çemi (Turkey) | A | | PPN |
| 77.6 | 19.9 | 9.9 | 21.2 | Mourer-Chauvire & Weesie, 1986 | ? | Europe | M | | Mean (n = 16; 15 for Bp) |
| 72.3 | 16.4 | 7.8 | 18.1 | Mourer-Chauvire & Weesie, 1986 | ? | Europe | M | | Min (n = 16; 15 for Bp) |
| 85.9 | 23 | 11.5 | 24.5 | Mourer-Chauvire & Weesie, 1986 | ? | Europe | M | | Max (n = 16; 15 for Bp) |
| 74.2 | 18.1 | 9.2 | 19.3 | Sheila Hamilton-dyer | SHD | Spain | M | | |
| 78.7 | | 9.5 | 21.7 | Campbell & Bocheński, 2010 | ? | ? | M | | Mean (n = 4) |
| 74.4 | | 8.8 | 20 | Campbell & Bocheński, 2010 | ? | ? | M | | Min (n = 4) |
| 81.6 | | 10.1 | 23.2 | Campbell & Bocheński, 2010 | ? | ? | M | | Max (n = 4) |
| 73 | 20 | 11 | 20 | Ninna Manaseryan | Yerevan academy of science | Armenia | M | | |
| 75.1 | 17.4 | 9.2 | 21.8 | Igor Askeyev | Tatarstan Academy of Sciences (Russia) | Middle Volga | M | M | |
| 80 | 18.2 | 9.9 | 22.9 | Igor Askeyev | Tatarstan Academy of Sciences (Russia) | Middle Volga | M | F | |
| 74.7 | 18.3 | 8.8 | 18.7 | Francis Koolstra | University of Groningen | San Miguel de Bernux (Segovia), Spain | M | | |
| 81.1 | 23.2 | 11.9 | 23.7 | Francis Koolstra | University of Groningen | ? | M | | |
| 74.8 | 21.6 | 9.5 | 21.5 | Nadja Poellath | Institut für Paläoanatomie und geschichte der Tiermedizin, München | ? | M | M | |
| 76.9 | 18.2 | 8.6 | 19.8 | Nadja Poellath | | Zoo Nürnberg | M | M | |

**TABLE 1** (Continued)

| GL | Bp | SC | Bd | Measured by | Collection | Geography | Modern/arch | Sex | Notes |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Institut für Paläoanatomie und geschichte der Tiermedizin, München | | | | |
| 72.7 | 18.6 | 9 | 19.7 | Nadja Poellath | Institut für Paläoanatomie und geschichte der Tiermedizin, München | Zoo Nürnberg | M | M | |
| 79.1 | 21 | 10.2 | 21.9 | Nadja Poellath | Institut für Paläoanatomie und geschichte der Tiermedizin, München | Schleißheim (wild?) | M | F | |
| 80 | 20.8 | 10.3 | 21.7 | Nadja Poellath | Institut für Paläoanatomie und geschichte der Tiermedizin, München | Wild; roadkill | M | F | |
| 77.4 | 20.3 | 9.8 | 20.3 | Nadja Poellath | Institut für Paläoanatomie und geschichte der Tiermedizin, München | Schleißheim (wild?) | M | F | |
| 82.2 | 22.8 | 11.3 | 23.1 | Megan Spitzer | National Museum of Natural History Smithsonian Institution | Sweden | M | F | |
| 78.6 | 19.9 | 9.5 | 21.4 | Megan Spitzer | National Museum of Natural History Smithsonian Institution | Sweden | M | M | |
| 78.1 | 20.4 | 9.5 | 21.7 | Megan Spitzer | National Museum of Natural History Smithsonian Institution | Sweden | M | | |
| 80.8 | 18.9 | 9.7 | 20.4 | Ben Gruwier | Ben Gruwier personal collection (Lille, France) | Zoo specimen | M | | |
| 81.3 | 22.3 | 11.2 | 24.1 | Evelyne Browaeys | Natural History Museum at Tring | Norway | M | F | |
| 83.6 | 19.9 | 9.4 | 21.7 | Evelyne Browaeys | Natural History Museum at Tring | UK - North Yorkshire | M | | |
| 86.3 | 22.7 | 10.9 | 24.6 | Evelyne Browaeys | Natural History Museum at Tring | Russia | M | | |
| 79.6 | 21.5 | 10.4 | 22.4 | Evelyne Browaeys | Natural History Museum at Tring | Died in captivity,(zoo: Society), Newton collection | M | | |
| 81.8 | 23.1 | 11.2 | 23.5 | Evelyne Browaeys | Natural History Museum at Tring | Russia | M | F | |
| 74.3 | 21.6 | 10.5 | 21.7 | Aurélie Guidez | Musée Zoologique de Strasbourg | ? | M | | |
| 78.3 | 20.9 | 10.2 | 21.6 | Aurélie Guidez | Musée Zoologique de Strasbourg | ? | M | | |
| 78.4 | 17.6 | 7.8 | 19 | Aurélia Borvon | Veterinary school, Nantes | ? | M | | |
| 81.1 | 16.8 | 7.4 | 18 | Evelyne Browaeys | Natural History Museum at Tring | North Africa | M | | |
| 69.9 | 12.7 | 5.7 | 14.3 | Evelyne Browaeys | Natural History Museum at Tring | Abu Dhabi Islands | M | M | |
| Great Grey owl (*Strix nebulosa*) tarsometatarsus | | | | | | | | | |
| 54.4 | 13.4 | | 15.2 | http://www.royalbcmuseum.bc.ca/Natural_History/Bones/Species-Pages/GGOW.htm | Royal BC Museum | North America | M | M | Mean (n = 10) |
| 52.2 | 12.9 | | 14.7 | http://www.royalbcmuseum.bc.ca/Natural_History/Bones/Species-Pages/GGOW.htm | Royal BC Museum | North America | M | M | Min (n = 10) |
| 55.8 | 13.9 | | 15.6 | | Royal BC Museum | North America | M | M | Max (n = 10) |

(Continues)

**TABLE 1** (Continued)

| GL | Bp | SC | Bd | Measured by | Collection | Geography | Modern/arch | Sex | Notes |
|---|---|---|---|---|---|---|---|---|---|
| | | | | http://www.royalbcmuseum.bc.ca/Natural_History/Bones/Species-Pages/GGOW.htm | | | | | |
| 57.3 | 14.9 | | 17 | http://www.royalbcmuseum.bc.ca/Natural_History/Bones/Species-Pages/GGOW.htm | Royal BC Museum | North America | M | F | Mean (n = 11) |
| 53.4 | 14.2 | | 16.2 | http://www.royalbcmuseum.bc.ca/Natural_History/Bones/Species-Pages/GGOW.htm | Royal BC Museum | North America | M | F | Min (n = 11) |
| 60.4 | 15.5 | | 17.6 | http://www.royalbcmuseum.bc.ca/Natural_History/Bones/Species-Pages/GGOW.htm | Royal BC Museum | North America | M | F | Max (n = 11) |
| 57.1 | 14.6 | 7.7 | 16.6 | Campbell & Bocheński, 2010 | ? | ? | M | | Mean (n = 8; Bp = 7) |
| 54.2 | 14 | 6.8 | 14.7 | Campbell & Bocheński, 2010 | ? | ? | M | | Min (n = 8; Bp = 7) |
| 59.9 | 15.2 | 8.2 | 17.3 | Campbell & Bocheński, 2010 | ? | ? | M | | Max (n = 8; Bp = 7) |
| 60.1 | 15 | 8.3 | 17.3 | Igor Askeyev | Tatarstan Academy of Sciences (Russia) | Middle Volga | M | F | |
| 55.4 | 13.1 | 6.5 | 14.1 | Nadja Poellath | Institut für Paläoanatomie und geschichte der Tiermedizin, München | Zoo Nürnberg | M | M | |
| 58.5 | 14.9 | 7.4 | 15.1 | Nadja Poellath | Institut für Paläoanatomie und geschichte der Tiermedizin, München | Schleißheim | M | F | |
| 53.9 | 13 | 6.5 | 13.9 | Nadja Poellath | Institut für Paläoanatomie und geschichte der Tiermedizin, München | Zoo Nürnberg (from Helsinki) | M | M | |
| 60.2 | 15.1 | 7.6 | 16.7 | Nadja Poellath | Institut für Paläoanatomie und geschichte der Tiermedizin, München | Zoo Nürnberg | M | F | |
| 56.1 | 12.7 | 6 | 14.1 | Nadja Poellath | Institut für Paläoanatomie und geschichte der Tiermedizin, München | Schleißheim | M | M | |
| 56.9 | 14.8 | 7.6 | 15.37 | Megan Spitzer | National Museum of Natural History Smithsonian Institution | Sweden | M | F | |
| 56.4 | 14.6 | 7.7 | 15.35 | Megan Spitzer | National Museum of Natural History Smithsonian Institution | Sweden | M | F | |
| 49.8 | 12.8 | 6 | 13.69 | Megan Spitzer | National Museum of Natural History Smithsonian Institution | Minnesota (US) | M | M | |
| 55.6 | 13.5 | 7.1 | 13.8 | Evelyne Browaeys | Natural History Museum at Tring | ? | M | U | Left tmt (ID: S/2014.12.1) |

Snowy Owl (*Bubo scandiacus*), a vagrant to Britain from northern Europe (Hume et al., 2016, p. 288). The Snowy Owl has robust but much shorter bones than the Eagle Owl, and that also applies to the tarsometatarsus (cf. Ericson & Tyrberg, 2004, p. 172, fig. 24).

There is, however, another European owl, which may overlap in size with the Eagle Owl (Snow & Perrins, 1998, vol. 1, p. 893)—the Great Grey Owl (*Strix nebulosa*). Bramwell & Yalden had not considered this possibility presumably because there is no evidence of the occurrence of this species in Britain. However, this owl is northerly but widely distributed (including North America) and may well have inhabited Britain in the past. It is "almost as long as Eagle Owl but less barrel-shaped" (Snow & Perrins, 1998, vol. 1, p. 913), which means that it may, dimensionally, represent a potentially more confusing species than the more robust but shorter Snowy Owl.

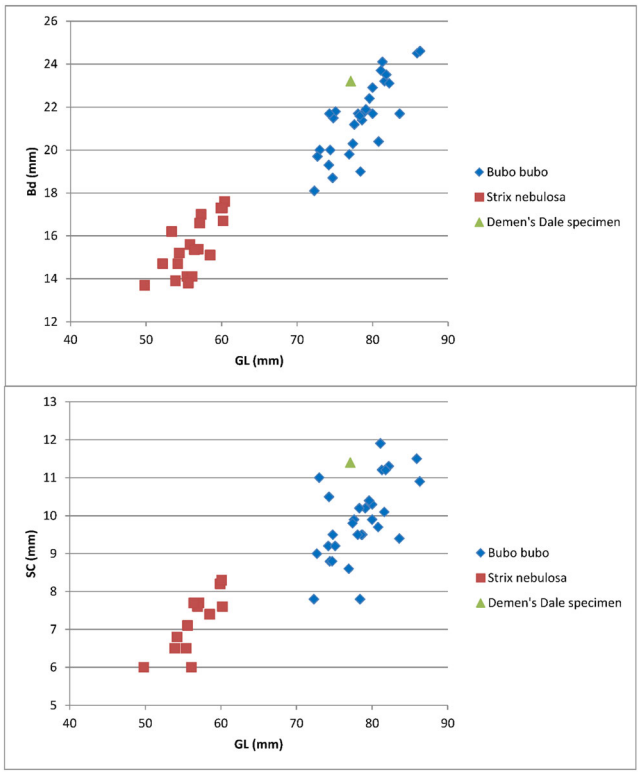


**FIGURE 3** Scatterplots comparing the Demen's dale tarsometatarsus with the Eagle Owl and Great Grey Owl measurements outlined in Table 1. For measurement codes, see von den Driesch (1976). [Colour figure can be viewed at wileyonlinelibrary.com]

The dimensions of the Demen's Dale specimen have therefore been compared with both archaeological and contemporary Eagle Owl and Great Grey Owl tarsometatarsi from various localities across Europe, eastern Russia, Turkey, North Africa, the Persian Gulf, and North America (Table 1). Data originally collected for the purpose of this paper, those kindly provided by colleagues, and some extracted from the literature were all combined. The results of this comparison are shown in Figure 3, which plots the greatest length (GL) versus the distal width (Bd) and the greatest length (GL) versus the smallest width of the diaphysis (SD). There is almost no overlap between the two groups, which is surprising considering that there is an overlap in the size of the living birds. Evidently, the Great Grey Owl has a rather small skeletal structure for its overall body size. This, however, facilitates the interpretation as the Demen's Dale specimen plots (in both diagrams) clearly in the larger Eagle Owl Group and, in fact, in its top half. Our biometric analysis, therefore, confirms the correctness of Bramwell and Yalden's identification.

There is one further osteological characteristic of the Demen's Dale specimen, which was not reported by Bramwell & Yalden but is worth mentioning. The bone is porous at both ends, indicating that it belonged to a juvenile bird. This is important as its occurrence would indicate the presence of a breeding population rather than just a vagrant. Bird bones are generally fully ossified by the time the bird becomes a fledgling (Serjeantson, 2009, p. 36). This also means that the bone would have probably grown further, thus reinforcing its identification as belonging to an Eagle Owl.

## 4.2 | Dating

We radiocarbon dated the Demen's Dale Eagle Owl bone at the University of Oxford Radiocarbon Accelerator Unit (ORAU). It provided a conventional radiocarbon age of 12,115 ± 55 BP (OxA-32,603) which, when calibrated using the latest international calibration curve (INTCAL20, Reimer et al., 2020), resulted in an age range of 12,250–11,860 cal BC (Table 2; Figure 4). This is earlier than we should have expected for the Mesolithic and places the specimen in the Late Upper Palaeolithic. In terms of geological phases, the date falls within the warm Bølling–Allerød interstadial, at the very end of the Pleistocene, before the much colder Younger Dryas and the subsequent Post-glacial warming, which will characterize Mesolithic cultures and the transition to the Holocene (Figure 5). At the time when the Demen's Dale Eagle Owl lived, Britain was still connected to the European Continent through a land bridge.

**TABLE 2** Analytical data for the measured bone sample

| OxA | Material | Used (mg) | Yield (mg) | %Yld | %C | $\delta^{13}C$ (‰) | $\delta^{15}N$ (‰) | CN atomic ratio |
|---|---|---|---|---|---|---|---|---|
| 32,603 | Bone | 600 | 42.77 | 7.1 | 42.8 | −21.1 | 4.6 | 3.4 |

*Note*: The sample was treated using the AF* protocol at the ORAU. This denotes the extraction of ultrafiltered collagen) with a solvent wash prior to the chemistry (see Brock et al., 2007, 2010). "Used (mg)" denotes the weight of bone used. "Yield (mg)" is the weight of extracted collagen. "%Yld" is the percent yield of extracted collagen as a function of the starting weight of the bone analyzed. "%C" represents the carbon present in the combusted collagen. Stable isotope ratios of carbon and nitrogen are reported in per mille relative to VPDB and AIR with a mass spectrometric precision of ±0.2‰ and ±0.3‰, respectively. "C/N" is the carbon to nitrogen atomic ratio.

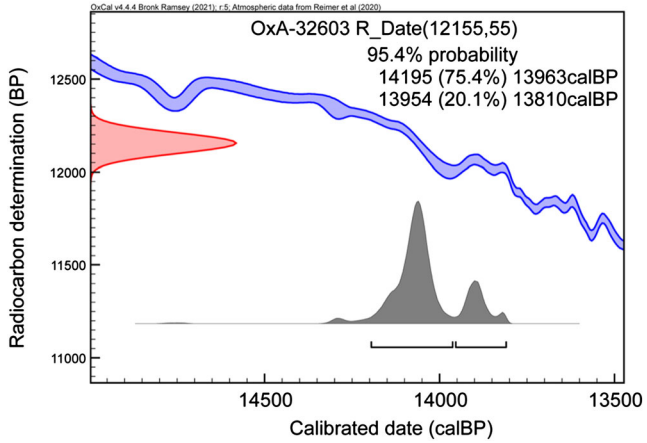


**FIGURE 4** Details of the calibrated radiocarbon date undertaken on the Demen's dale specimen [Colour figure can be viewed at wileyonlinelibrary.com]

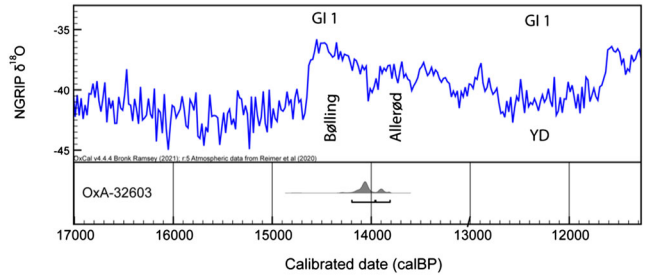


**FIGURE 5** The chronological position of the Demen's dale specimen relatively to the overall diachronic sequence and key geological phases [Colour figure can be viewed at wileyonlinelibrary.com]

## 5 | CONCLUSIONS

The re-analysis of the Demen's Dale specimen confirms that the Eagle Owl used to live in Britain. Any evidence of a Holocene presence remains, however, elusive as direct dating suggests that the Demen's Dale bird rather lived during the very late Pleistocene, when geographic, climatic, and environmental conditions were still substantially different. Having established that the Demen's Dale Eagle Owl is older than initially thought, a review of current knowledge indicates that no other secure identification of the Eagle Owl currently exists for the British Holocene. In fact, the Demen's Dale specimen, though older than the Mesolithic, may still be regarded as the youngest remain of the species currently known in Britain. This is difficult to establish with any certainty as questions have been raised regarding the correct identification of some of the other Late Pleistocene remains (cf. Stewart, 2007, p. 484), whose chronology is also rather vague. The re-evaluation of the Demen's Dale specimen highlights the need to carry out direct dating of any available Eagle Owl remains, if we want them to contribute meaningfully to our understanding of the natural history of the British fauna. This is especially the case for material deriving from old excavations, which rarely provide reliable stratigraphic information. Ideally, each Eagle Owl specimen found in Britain should be re-evaluated in the way it has been done for this paper, or by Stewart (2007, p. 484) for the specimen from Chelm's Combe Shelter, Somerset, which he regarded as potentially attributable to a Snowy Owl.

It would, however, be unwise to conclude from the current research that no Eagle Owls existed in Britain during the Holocene. Though currently there is no positive evidence for Eagle Owl occurrence, it is important to consider that bone remains of past animals typically turn up at archaeological sites. Although this gives us valuable opportunities, humans—through their hunting and gathering—acted as a filter of the wildlife inhabiting the countryside surrounding a specific site. In no way should archaeological sites be regarded as a direct representation of the fauna occurring in the site environs—both in terms of presence and abundance of species. Though past human communities may have developed an interest in large birds of prey, the strictly nocturnal habits of the Eagle Owl mean that encounters must have been infrequent. Owls and people may have inhabited worlds that overlapped very little.

We can feel more confident to conclude, however, that, if at all present in the British Holocene, the Eagle Owl must have been rare, especially if we consider the great intensity of archaeological investigations in Britain compared with other countries. In the Netherlands, where the Eagle Owl has, like in Britain, been until recently absent, Eagle Owl bones have been found in Mesolithic (Serjeantson, 2009, p. 374) as well as later prehistoric contexts (Penterani & del Mar Delgado, 2019, p. 68). Even more significantly, in Sweden, where the Eagle Owl has never entirely become extinct (despite 20th century decline), there are numerous records of its presence throughout the Holocene (Ericson & Tyrberg, 2004, p. 171).

Whether we could or should regard the Eagle Owl as part of the native British fauna depends on how this latter is defined. If one accepts Stewart's (2007, p. 481) interpretation of the native British fauna as represented by those species that lived in Britain after the end of the last glacial maximum (c. 16,000 years BP), then the Demen's Dale specimen, being later than that, would lead to the classification of the Eagle Owl as a native British bird. Should we, however, require survival into the Holocene as a necessary criterion for a species to be considered indigenous, then the Eagle Owl—on the basis of the current evidence—would not satisfy it. This argument runs the risk of becoming merely semantic and the current evidence does not seem to be sufficiently persuasive to encourage any form of re/introduction scheme in the name of a hypothetical native status of the Eagle Owl. There also seems to be little ground to be alarmed by the occasional breeding of Eagle Owl escapees in the British countryside (cf. Warburton, 2010). Discouraging the keeping of birds in captivity would seem to represent a much better approach, also to avoid accidental crosses of captive birds and potential natural vagrants. There are no geographic, climatic, or environmental reasons why the Eagle Owl could not live in Britain and a natural expansion of the species on British soil should be cherished as a great addition to the natural as well as cultural richness of the country. There is, however, no

ground for an artificial intervention of people in a process that should, and potentially could be natural.

## ACKNOWLEDGMENTS

Some of the research for this paper was supported by a Pamela Staunton endowment awarded to UA. A few colleagues—to whom we are very grateful—kindly and generously provided owl biometric data: Igor Askeyev, Aurélia Borvon, Evelyne Browaeys, Ben Gruwier, Aurélie Guidez, Sheila Hamilton-Dyer, Francis Koolstra, Ninna Manaseryan, Nadja Pöllath, and Megan Spitzer. We would like to thank Dale Serjeantson's for her advice and three anonymous reviewers for their valuable comments. We would like to dedicate this paper to the memory of Derek Yalden, who always thought that the Demen's Dale Eagle Owl specimen needed to be radiocarbon dated but did not find the opportunity to do so during his lifetime. We thank the staff at the ORAU for their careful analytical work in the AMS dating of the specimen.

## DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

## ORCID

*Umberto Albarella* https://orcid.org/0000-0001-5092-0532

## REFERENCES

Andrews, P. (1990). *Owls, caves and fossils*. Natural History Museum Publications.

Andrews, P. (2014). Microfauna. In the excavation of two round barrows on Longstone edge, Derbyshire, Last J. *Derbyshire Archaeological Journal*, *134*, 137–144.

Bate, D. A. (1966). Bird Bones. In H. S. G. Gray (Ed.). *The Meare Lake Village* (Vol. 3, pp. 408–410). Taunton Castle.

Bramwell, D., & Yalden, D. (1988). Birds from the Mesolithic of Demen's dale, Derbyshire. *Naturalist*, *113*, 141–147.

Brock, F., Bronk Ramsey, C., & Higham, T. F. G. (2007). Quality assurance of ultrafiltered bone dating. *Radiocarbon*, *49*, 187–192. https://doi.org/10.1017/S0033822200042107

Brock, F., Higham, T., Ditchfield, P., & Bronk, R. C. (2010). Current pretreatment methods for AMS radiocarbon dating at the Oxford radiocarbon accelerator unit (ORAU). *Radiocarbon*, *52*, 103–112. https://doi.org/10.1017/S0033822200045069

Campbell, K. E. Jr., & Bocheński, Z. M. (2010). A new genus for the extinct Late Pleistocene owl *Strix brea* Howard (Aves: Strigiformes) from rancho La Brea, California. *Records of the Australian Museum*, *62*, 123–144. https://doi.org/10.3853/j.0067-1975.62.2010.1534

Chiavetta, M. (1988). *Guida ai Rapaci Notturni. Strigiformi d'Europa, Nord Africa e Medio Oriente*. Zanichelli.

Cooper, J. H., Stewart, J. R., & Serjeantson, D. (2022). The birds of ancient Britain: First recommendations for category F of the British list. *Ibis*, *164*, 911–923. https://doi.org/10.1111/ibi.13066

Ericson, G. P., & Tyrberg, T. (2004). *The early history of the Swedish avifauna*. Stockholm.

Fisher, J. (1966). *The Shell bird book*. Ebury Press and Michael Joseph.

Graf, G. (1967). Tierknochen von der Heuneburg einem frühkeltischen Herrensitz bei Hundersingen an der Donau (Grabungen 1959 und 1963). In *Nichtpaarhufer. Diss. med. vet., LMU-München. Naturwissenschaftliche Untersuchungen zur Vor- und Frühgeschichte in Württemberg und Hohenzollern 6*.

Hume, R., Still, R., Swash, A., Harrop, H., & Tipling, D. (2016). *Britain's birds. An identification guide to the birds of Britain and Ireland*. Princeton.

Kelly, A., Leighton, K., & Newton, J. (2010). Using stable isotopes to investigate the provenance of an eagle owl found in Norfolk. *British Birds*, *103*, 213–222.

Laroulandie, V. (2002). Damage to pigeon long bones in pellets of the eagle owl *Bubo bubo* and food remains of Peregrine falcon *Falco peregrinus*: Zooarchaeological implications. *Acta Zoologica Cracoviensa*, *45*. (special issue): 331-339.

Last, J. (2014). The excavation of two round barrows on Longstone edge, Derbyshire. *Derbyshire Archaeological Journal*, *134*, 81–172. https://doi.org/10.5284/1066716

Majkić, A., Evans, S., Stepanchuk, V., Tsvelykh, A., & d'Errico, F. (2017). A decorated raven bone from the Zaskalnaya VI (Kolosovskaya) Neanderthal site, Crimea. *PLoS ONE*, *12*(3), e0173435. https://doi.org/10.1371/journal.pone.0173435

Melling, T. (2011). Status and movements of eagle owls in Europe. *British Birds Letters*, *104*, 544–546.

Melling, T., Dudley, S., & Doherty, P. (2008). The eagle owl in Britain. *British Birds*, *101*, 478–490.

Morin, E., & Laroulandie, V. (2012). Presumed symbolic use of diurnal raptors by Neanderthals. *PLoS ONE*, *7*(3), e32856. https://doi.org/10.1371/journal.pone.0032856

Mourer-Chauvire, S., & Weesie, P. D. M. (1986). *Bubo insularis* n. sp., Forme Endemique Insulaire de Grand-Duc (Aves, Strigiformes) du Pleistocene de Sardaigne et de Corse. *Revue de Paléobiologie*, *5*(2), 197–205.

Penterani, V., & del Mar Delgado, M. (2019). The Eagle Owl. In *Poyser monographs*. Bloomsbury Publishing.

Radovčić, D., Birarda, G., Oros Sršen, A., Vaccari, L., Radovčić, J., & Frayer, D. W. (2020). Surface analysis of an eagle talon from Krapina. *Scientific Reports*, *10*, 6329. https://doi.org/10.1038/s41598-020-62938-4

Radovčić, D., Oros Sršen, A., Radovčić, J., & Frayer, D. W. (2015). Evidence for Neandertal jewelry: Modified white-tailed eagle claws at Krapina. *PLoS ONE*, *10*(3), e0119802. https://doi.org/10.1371/journal.pone.0119802

Reimer, P. J., Austin, W., Bard, E., Bayliss, A., Blackwell, P., Bronk Ramsey, C., Butzin, M., Cheng, H., Edwards, R. L., Friedrich, M., Grootes, P. M., Guilderson, T. P., Hajdas, I., Heaton, T. J., Hogg, A. G., Hughen, K. A., Kromer, B. K., Manning, S. W., Muscheler, R., … Talamo, S. (2020). The IntCal20 northern hemisphere radiocarbon age calibration curve (0–55 cal kBP). *Radiocarbon*, *62*(4), 725–757. https://doi.org/10.1017/RDC.2020.41

Rodríguez-Hidalgo, A., Morales, J. I., Cebrià, A., Courtenay, L. A., Fernández-Marchena, J. L., García-Argudo, G., Marín, J., Saladié, P., Soto, M., Tejero, J. M., & Fullola, J. M. (2019). The Châtelperronian Neanderthals of Cova Foradada (Calafell, Spain) used imperial eagle phalanges for symbolic purposes. *Science Advances*, *5*(11), eaax1984. https://doi.org/10.1126/sciadv.aax1984

Serjeantson, D. (2009). *Birds*. Cambridge University Press.

Snow, D. W., & Perrins, C. M. (1998). *The birds of the Western Palaearctic* (Concise ed.. Two Volumes). Oxford University Press.

Stewart, J. R. (2007). The fossil and archaeological record of the eagle owl in Britain. *British Birds*, *100*, 481–486.

Stewart, J. R., & Jacobi, R. M. (2015). The long term response of birds to climate change: New results from a cold stage avifauna in northern England. *PLoS ONE*, *10*(5), e0122617. https://doi.org/10.1371/journal.pone.0122617

Turk, T. (2004). The eagle owl in Britain. Has the native returned? *Tyto*, *9*(3), 9–20.

van Wijngaarden-Bakker, L. H. (2010). The Eagle Owl, *Bubo bubo*, Predator or Decoy. In W. Prummel, J. T. Zeiler, & D. C. Brinkhuizen (Eds.). *Birds in archaeology. Proceedings of the 6th meeting of the ICAZ Brid working Group in Groningen (23.8–27.8.2008)* (pp. 153–162). Barkhuis Groningen University Library.

von den Driesch, A. (1976). A Guide to the Measurement of Animal bones from Archaeological Sites. In *Peabody museum bulletin 1*. Harvard University.

Warburton, T. (2010). The Eagle Owl in Britain. Native or alien? A report by the World Owl Trust. In *The world owl trust*.

Yalden, D., & Albarella, U. (2009). *The history of British birds*. Oxford University Press.

**How to cite this article:** Albarella, U., Higham, T., & McLean, A. (2022). An elusive ghost: Searching for the Eagle Owl (*Bubo bubo*) in the past of Britain. *International Journal of Osteoarchaeology*, 1–10. https://doi.org/10.1002/oa.3190