Archaeological Theory at the Edge(s)

Edited by Staša Babić and Monika Milosavljević

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Sonja Vuković
Laboratory for bioarchaeology, Archaeology Department,
University of Belgrade – Faculty of Philosophy,
sonja.vukovic@f.bg.ac.rs

Dimitrije Marković
Laboratory for bioarchaeology, Archaeology Department,
University of Belgrade – Faculty of Philosophy
dimitrije.markovic@f.bg.ac.rs

Amalia Sabanov
Laboratory for bioarchaeology, Archaeology Department,
University of Belgrade – Faculty of Philosophy
amalia.sabanov@f.bg.ac.rs

WHERE ARCHAEOLOGY AND WILDLIFE MANAGEMENT MEET: THE RELEVANCE OF STUDYING THE HOLOCENE HISTORY OF HUMAN-WILDLIFE INTERACTIONS IN THE CENTRAL BALKANS FOR REGIONAL CONSERVATION EFFORTS

Abstract: As some of the greatest threats humanity is currently facing, such as climate change and biodiversity loss, have their roots in our distant past, archaeology is becoming more and more involved in the research of their causes and effects. Archaeologists are becoming more aware of the significance of studying long-term human-environmental relationships via analysis of animal and plant remains from archaeological sites for modern environmental problems, and paleoenvironmental data are sometimes included in conservation decisions. In this paper, within the framework of the scientific project ARCHAEOWILD, which studies human-wildlife interactions in the Holocene past of the Central Balkans, we stress the significance of research that provides data on the spatiotemporal distribution of wildlife, extinction dynamics, translocations, as well as genetic diversity and dietary patterns of large mammals in the past for future wildlife management decisions in the region.

Keywords: archaeology, archaeozoology, archaeobotany, wildlife management, Holocene, Central Balkans

1. Introduction

Over the last few decades, interest in archaeology for contemporary environmental issues has grown (e.g. Rick and Sandweiss 2020, Wolverton, Nagaoka, and Rick 2016). By providing a deep-time perspective of interactions between past human societies and their environment, archaeology is in the position to illuminate the causes and contribute to solutions to global environmental problems. This is especially the case with archaeozoology, which studies past human-animal relationships by analyzing animal bones from archaeological sites, as well as archaeobotany, which studies plant remains from archaeological sites. In 1994, L. Lyman coined the phrase "*applied zooarchaeology,*" and by highlighting the potential contributions of archaeofaunal research to wildlife management, he called on archaeozoologists to "broaden the scope of their inquiries to include issues that are today, and will be in the future, important to humanity" (Lyman 1996, 111). Besides *applied zooarchaeology*, other similar research fields emerged that, for the most part, only differed in their time scope – namely *applied historical ecology* (Swetnam, Allen, and Betancourt 1999) and *conservational paleobiology* (Dietl and Flessa 2009). Since the beginning of the 21st century, numerous scientific works, including empirical studies, have stressed the potential benefits of using paleozoological and palaeobotanical records in ecosystem management (e.g. Dietl and Flessa 2011, Lauwerier and Plug 2004, Wolverton, Nagaoka, and Rick 2016, Lyman 2012, Askins et al. 2007).

This paper discusses the possible intersections between archaeology and wildlife management within the territory of the Central Balkans. More specifically, it describes how research on the Holocene history of human-wildlife conflict and coexistence can impact wildlife management decisions within the framework of ARCHAEOWILD, a three-year scientific project funded by the Science Fund of the Republic of Serbia that started in 2022. The project studies wildlife archaeological remains (wild mammals and wild plants), ancient DNA and isotope analysis of wild animal bones and teeth, and textual and iconographic evidence. It is focused on the Central Balkans region, which is considered an important biodiversity hotspot (Hewitt 2011), while it also encompasses adjacent regions (i.e., Southern Pannonian Plain). The project covers a long timeframe since it is related to the Holocene, the current geological epoch, which started at c. 11,650 cal BP (Walker et al. 2009) with an abrupt climate change, i.e. global warming and the disappearance of ice sheets in the Northern hemisphere.

2. Historical perspective of wildlife distribution and baselines for conservational strategies

Previous research on the spatiotemporal distribution of large mammals over the Holocene in Europe demonstrated that human societies impacted biodiversity and that different species declined at different rates throughout the European past (Crees et al. 2016). This paper is based on a large-scale dataset and also includes a small part of faunal assemblages from the Central Balkans (c. 30 in comparison to c. 300). Therefore, high-quality data on the historical distribution of wildlife during the Holocene in the region is essential for understanding the dynamics between human societies and wildlife, as well as for providing baselines for environmental management in the Balkans. Numerous archaeofaunal (Dimitrijević, Vuković, and Živaljević 2022, and the extensive literature therein) and archaeobotanical (e.g. Filipović and Obradović 2013, Bulatović and Filipović 2022) collections from Holocene archaeological sites in Serbia have been analyzed in the past, providing information on various animal and plant taxa that were hunted, collected, bred, and cultivated by past societies. It is essential to synthesize and analyze all of the known data of wild animal and plant remains from archaeological sites spanning from the Mesolithic to the modern era on the territory of modern-day Serbia to identify and understand the wild species distribution trends between different periods and regions, individual sites and site types. With the incorporation of exploratory data analysis, the research will demonstrate how established social and environmental dynamics, such as the spread of agriculture, deforestation, climate changes, altitude, urbanization, and demography could have influenced wildlife distribution and their interaction with humans. As conservation managers use paleoenvironmental data as baselines for their strategies (e.g. Willis and Birks 2006), the results of the research on the spatial and temporal distribution of wild animals and plants during the Holocene should be presented to conservation biologists working in the region to impact their decisions.

3. Understanding the dynamics of Holocene mammal extinctions and biodiversity loss

The huge biodiversity loss, sometimes referred to as "Earth's sixth mass extinction" event (Barnosky et al. 2011), represents one of the greatest environmental crises that humanity is currently facing. The rapid trend of animal and plant extinctions in the recent past, as well as predictions about

extinction rates in the future (i.e., *Report of the Millennium Ecosystem Assessment*), are upsetting. Many scientific studies indicated that data on extinction dynamics in the past could be used to address biodiversity problems of today (e.g. Turvey 2009a, Turvey and Fritz 2011, Faurby and Svenning 2015, Andermann et al. 2020). The majority of large quaternary mammals (megafaunal species) became extinct worldwide (except in Africa) in the late Pleistocene, and debates about the causes of extinction – which included hypotheses of direct and indirect anthropogenic factors, the environmental hypothesis (i.e., climate change), and their combination – attracted significant scientific attention (e.g. Koch and Barnosky 2006, and the literature therein, Stuart and Lister 2007). The extinctions continued throughout the subsequent geologic era – the Holocene – characterized by minimal climate variations, unlike the Pleistocene. Because environmental conditions throughout the Holocene, which were very similar to today's, and causes of Holocene extinctions were mostly of anthropogenic origin, similar to those in the modern era, the study of Holocene extinctions has the potential to provide valuable data on long-term human impacts on the ecosystem, and thus provide insights into current biodiversity loss (Turvey 2009b, 17–18). Among animal remains from Holocene archaeological sites in the Central Balkans and Southern Pannonian Plain, two globally extinct large mammals have been discovered – the auroch (*Bos primigenius*, Bojanus 1827), a wild progenitor of domestic cattle, which went globally extinct in the 17th century (Vuure 2005), and the European wild ass (*Equus hydruntinus*, Regalia 1907), globally extinct since probably the Iron Age (6th century BC) (Crees and Turvey 2014). A study of wild cattle extinction dynamics in the central Balkans and Southern Pannonian Plain suggests that a significant decline in the auroch population occurred during the mid-5th millennium BC while fragmented populations survived at least until the early medieval period (9th–12th century AD) (Vuković 2021). Archaeozoological finds of European wild ass from Early Neolithic sites in the Southern Pannonian Plain and Iron Gates (Vörös 1981) suggest that this species survived in the region until at least the end of the 6th millennium BC. We aim to estimate the last known occurrences of both species and narrow the dates of their probable extinction from the region, as the project results will provide radiocarbon dates from the selected specimens. The project also explores diachronic changes in the sizes of those animals, as well as population genetics of wild cattle in the Balkans using ancient DNA analysis of their bones from Mesolithic to medieval-period archaeological sites. The results of archaeozoological and biomolecular analysis, as well as radiocarbon dating, will provide useful insights into the extinction causes, effects, and dynamics of those globally extinct megafaunal species.

4. Translocation of wildlife in the Holocene past and biological invasions

The introduction of a non-autochthonous animal and plant species that may have a significant impact on the environment into a region represents another biodiversity threat. These invasions are not new phenomena. They occurred around the world and throughout various periods of our past when human societies would alter environments by introducing various animal and plant species into their regions. Wildlife managers and other stakeholders must have an understanding of the history of biological species introduction when making decisions about environmental restorations (Hofman and Rick 2018). Within the faunal assemblages originating from the Holocene archaeological sites in the Central Balkans and Southern Pannonian Plain, two allochthonous large mammal species have been discovered: European fallow deer (*Dama dama*, Linnaeus 1758) and leopard (*Panthera pardus*, Linnaeus 1758). It has been proposed that humans brought European fallow deer to the continent from the Eastern Mediterranean and Southern Europe between the Neolithic and Roman periods, as well as during later medieval times (Sykes 2004, Masseti and Mertzanidou 2008), and that fallow deer populations survived the last glaciation in the Balkan peninsula, where they continued to live until late prehistory (Karastoyanova, Gorczyk, and Spassov 2020). Allochthonous fallow deer populations now occupy enclosed hunting grounds in Serbia (Stevanović and Vasić 1995), while their remains have been discovered within only a few Neolithic (Dimitrijević 2008, Russell 1993), Bronze Age (Becker 1991), and Roman faunal assemblages (Vuković, unpublished data) in the region. To better understand the natural history of European fallow deer, it is important to explore the origin and status of individuals from Holocene archaeological sites in the region. The hypothesis of their introduction and possible prehistoric extinction will be explored using archaeozoological and genetic data, as well as textual and iconographic archaeological evidence. Large felids – leopards – went extinct in Europe during the late Pleistocene (Sommer and Benecke 2006), and only a few remains of the species from Holocene archaeological sites in Europe are believed to originate from traded specimens (Bartosiewicz 2009). Leopard remains, recently discovered within the area of the Roman amphitheater in Viminacium, are most likely the remains of exotic animals traded alive in the Balkans for participation in amphitheater shows (Vuković, unpublished data). As nine leopard subspecies from different regions differ genetically (Uphyrkina et al. 2001), the genetic analysis of those remains, which are currently underway, will allow us to determine the subspecies and the probable origin of leopards discovered in Viminacium. The re-

sults will provide insight into the trade routes of living animals in Roman times. Furthermore, as there are no genetic evidence of leopards in the past, the results will allow us to reconstruct the history of the species, which might aid in its conservation[1].

5. Research of genetic diversity and dietary patterns of wild mammals in the Holocene past and the conservation of (strictly) protected taxa

As already discussed in this paper, understanding the long-term impact of human activity on the environment offers important evidence for conservation management. By corroborating the large-scale data on genetic diversity and dietary patterns of wild mammals in the Holocene past, the ARCHAEOWILD project is developing a novel approach to understanding the anthropogenic impact on the environment. Two autochthonous wild mammal species were chosen for this research – a brown bear (*Ursus arctos*, Linnaeus 1758) and red deer (*Cervus elaphus*, Linnaeus 1758). Both species occupied the region of the Central Balkans throughout the whole Holocene period, were hunted since the Mesolithic, and are now available for biomolecular analysis as their remains have been discovered within the majority of archaeological sites. The fragmented populations of these species still occupy the region and are subject to regional protection measures. According to the *Rulebook on the proclamation and protection of strictly protected wild species of plants, animals, and fungi of the Republic of Serbia*[2], the brown bear is declared strictly protected, while red deer is declared a protected wild species. Brown bear and red deer remains (bones and teeth) from c. 40 archaeological sites dating from the Mesolithic to the modern era were sampled for ancient DNA and carbon/nitrogen stable isotope analysis. Previous studies of brown bear ancient DNA included specimens from other regions in Euroasia (e.g. Valdiosera et al. 2007, Hirata et al. 2014, Molodtseva et al. 2022), while the study of ancient brown bears in Bulgaria (Mizumachi et al. 2020) provides significant evidence for understanding the formation of the Balkan brown bear populations' gene pool. However, no genetic study on either ancient or modern Central Balkans brown bear populations has been performed yet. Previous research on both modern and ancient DNA of red deer from Europe includes some Holocene samples from the Central Balkans (Skog

1 Several leopard subspecies are critically endangered, while the species is classified as Vulnerable according to the International Union for the Conservation of Nature (IUCN) (Jacobson et al. 2016, and references therein).

2 "Službeni glasnik RS," no. 5, February 5, 2010, no. 47, June 29, 2011, no. 32, March 30, 2016, no. 98, December 8, 2016.

et al. 2009, Niedziałkowska et al. 2021), albeit on a small scale. Although most analyses of carbon/nitrogen stable isotopes in wild animal remains from the Central Balkans were performed for studies of human dietary patterns (e.g. Jovanović et al. 2019), there is one study that discusses the human impact on local landscapes through stable isotopes of red deer remains from two Late Neolithic sites in the region (Gillis et al. 2020). Therefore, biomolecular analysis of red deer and brown bear remains from many Holocene archaeological sites in Serbia represents the first large-scale research on the genetics and dietary patterns of wild mammals in the region. The detailed study on the genetics of both brown bears and red deer will provide insight into the distribution of genetically specific populations of those animals in different periods. The understanding of differences between populations through time will be then used for tracing the anthropogenic influence, such as possible translocations. The studies of dietary patterns of wild mammals in the past, via analysis of carbon and nitrogen stable isotope ratios in their bones, will also be relevant for understanding the possible anthropogenic pressure on wildlife, as possible dietary changes between periods and regions might reflect environmental changes and human influence on the ecosystem. As the same individuals were sampled for both ancient DNA and stable isotopes, the results will match the data on genetics, namely population history and diet through time, which is an excellent dataset for comprehending the history of ecology of those species and may be used for their conservation in the future.

6. Conclusions and perspectives

In this paper, we stressed the relevance of studying human-wildlife interactions in the Holocene for a better understanding of modern biodiversity problems and their inclusion in conservation efforts. Alongside this, we made an overview of the ARCHAEOWILD project's research objectives, which aim to impact wildlife management decisions in Serbia (Central Balkans and Southern Pannonian Plain). A spatial and temporal distribution of wild animals and plants, as well as data on biological invasions, will provide baselines on paleoenvironments, which are needed for environmental restoration goals. Conservation scientists and wildlife managers must be informed about the specific wildlife species that occupied the region in the past to make appropriate decisions on environmental restorations. The recent "reintroduction" of the European bison (*Bison bonasus*, Linnaeus 1758) in the Fruška Gora National Park, located in the Southern Pannonian Plain in Serbia, is an example of a decision that did not take paleoenvironmental data into account. Specifically, five bison individuals from Poland were introduced to the national park located on the

Fruška Gora Mountain in March 2022. Although this national park stated on its webpage[3] that the European bisons occupied the Fruška Gora areas until c. 200 years ago, there are not any data to support this. There are, however, data that here once lived the steppe bison, *Bison priscus*, Bojanus 1827, a globally extinct species that occupied the European region until the end of the Pleistocene (Zver, Toškan, and Bužan 2021) and whose remains have been discovered in the late Pleistocene Janda cavity fossil deposit in Fruška Gora mountain (Dimitrijević, Dulić, and Cvetković 2014), among other Pleistocene sites in Serbia. There is no scientific evidence that the European bison, the species that was introduced last year in the Fruška Gora Mountain, occupied the region of Serbia in the Holocene. Beyond providing the baseline of the original distribution of wildlife species in the past landscapes of Serbia, the research on the Holocene history of human-wildlife interactions aims to impact conservation efforts of both strictly protected and protected wild mammal species in Serbia (brown bear and red deer), as well as allow for better comprehension of the history of vulnerable species outside the region (i.e., leopard). The study of the extinction dynamics of large mammals that occupied the Central Balkan and the Southern Pannonian Plain in the Holocene (auroch and European wild ass), as well as the plausible decline rate and changes in genetic populations and dietary patterns of extant wildlife, should also impact the understanding of the current biodiversity loss.

From this paper, it is clear that archaeology and wildlife management meet in theory, but do they meet in practice? It seems that most archaeological papers addressing modern biodiversity problems stress the significance of using paleoenvironmental data for contemporary issues. However, there are examples across the world of archaeology meeting wildlife management in practice. For example, in western Canada, archaeozoological research played a crucial role in the reintroduction of bison into the Rocky Mountain parks. By examining archaeological sites and historical records, researchers were able to determine the range and abundance of bison in the area before European settlement, as well as the hunting strategies used by indigenous peoples. The information was used to develop a habitat restoration plan that created suitable conditions for bison to thrive, including the reintroduction of native grasses and the restoration of natural grazing patterns (Kay and Clifford 2001, Langemann 2004). Another successful example is from the field of archaeobotany. The Nature Conservancy in Indonesia Program utilized data from archaeobotanical research on the extent of human impact on the environment in the Lore Lindu Biosphere Reserve and National Park in central Sulawesi.

3 https://www.npfruskagora.co.rs/lat/bizoni-na-fruskoj-gori/

One of the points brought forward by palynological research was that the wide grasslands that presently dominate the landscape of the region are the result of human activity over the last 2000 years and that this region was previously covered by an undisturbed montane forest (Kirleis, Pillar, and Behling 2011). This data prompted the decision to extend the forest borders (*The Nature Conservancy Indonesia Program* ca. 2004).

Although these examples point to a direct link between archaeology and wildlife management, disciplinary barriers remain and must be understood for us to overcome them. In their valuable compilation of case studies that show how archaeozoological data can influence environmental policy and management practice, S. Wolverton, L. Nagaoka, and T.C. Rick (2016) stressed that archaeological results may be invisible to conservation scientists due to discipline barriers. On the other hand, as the implementation of conservation practices depends on political, social, and economic factors, they argue that scientific research data are sometimes ignored at the expense of other social needs. This work proposed the future directions of *applied zooarchaeology*, which include producing high-quality data, publishing research results in biological journals, gaining more visibility, fostering interdisciplinarity, and engaging with the public. The planned promotion of the ARCHAEOWILD project includes scientific publications, but also public lectures, a museum exhibition, and workshops that stress the importance of archaeological research for contemporary environmental issues. The project also aims to establish connections and collaborations with conservation biologists, organizations dealing with wildlife management in the region, and national park authorities to exchange knowledge and inform researchers from other disciplines about the planned project impact. The aim is to highlight not just the importance of the project's findings for future conservation decisions in Serbia, but also the significance of archaeological research for the present problems facing humanity. We all need to be aware that even modern conservation efforts represent, as C. Hofman and T. Rick (2018) emphasized "the latest wave of a continuum of human-environmental management that extends deep into the human past."

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Bibliography

Andermann, Tobias, Søren Faurby, Samuel T. Turvey, Alexandre Antonelli, and Daniele Silvestro. 2020. "The past and future human impact on mammalian diversity." *Science Advances* 6 (36):eabb2313. doi: 10.1126/sciadv.abb2313.

Askins, Robert A., Felipe Chávez-Ramirez, Brenda C. Dale, Carola A. Haas, and James R. Herkert. 2007. "Conservation of Grassland Birds in North America: Understanding Ecological Processes in Different Regions: "Report of the AOU Committee on Conservation"." *Ornithological Monographs* (64):iii-46. doi: 10.2307/40166905.

Barnosky, Anthony D., Nicholas Matzke, Susumu Tomiya, Guinevere O. U. Wogan, Brian Swartz, Tiago B. Quental, Charles Marshall, Jenny L. McGuire, Emily L. Lindsey, Kaitlin C. Maguire, Ben Mersey, and Elizabeth A. Ferrer. 2011. "Has the Earth's sixth mass extinction already arrived?" *Nature* 471 (7336):51–57. doi: 10.1038/nature09678.

Bartosiewicz, László. 2009. "A Lion's share of attention: Archaeozoology and the Historical Record." *Acta Archaeologica Academiae Scientiarum Hungaricae* 60 (1):275–289.

Becker, Cornelia. 1991. „Haustierhaltung und Jagd in der frühen Bronze– und Eisenzeit in der Vojvodina – Erste Resultate zu Tierknochenfunden aus Feudvar." In *Vorbericht über die jugoslawisch-deutschen Ausgrabungen in der Siedlung von Feudvar bei Mosorin (Gern. Titel, Vojvodina) von 1986–1990. Bronzezeit – Vorrömische Eisenzeit*, edited by Bernhard Hänsel and Predrag Medović, 178–190. Mainz: Philipp von Zabern.

Bulatović, Jelena, and Dragana Filipović. 2022. „Pregled arheozooloških i arheobotaničkih podataka sa eneolitskih nalazišta u Srbiji." In *Bubanj, praistorijsko naselje i nekropola iz novog veka*, edited by Aleksandar Bulatović, Dragan Milanović and Tatjana Trajković-Filipović, 160–177. Beograd & Niš: Arheološki institut Beograd & Narodni muzej Niš.

Crees, Jennifer J., Chris Carbone, Robert S. Sommer, Norbert Benecke, and Samuel T. Turvey. 2016. "Millennial-scale faunal record reveals differential resilience of European large mammals to human impacts across the Holocene." *Proceedings of the Royal Society B: Biological Sciences* 283 (1827):20152152. doi: 10.1098/rspb.2015.2152.

Crees, Jennifer J., and Samuel T. Turvey. 2014. "Holocene extinction dynamics of Equus hydruntinus, a late-surviving European megafaunal mammal." *Quaternary Science Reviews* 91:16–29. doi: https://doi.org/10.1016/j.quascirev.2014.03.003.

Dietl, Gregory P, and Karl W Flessa, eds. 2009. *Conservation Paleobiology Using the Past to Manage for the Future*. Lancaster: Paleontological Society.

Dietl, Gregory P., and Karl W. Flessa. 2011. "Conservation paleobiology: putting the dead to work." *Trends in Ecology & Evolution* 26 (1):30–37. doi: https://doi.org/10.1016/j.tree.2010.09.010.

Dimitrijević, Vesna. 2008. "Vertebrate fauna of Vinča – Belo Brdo: Excavation campaigns 1998–2003." *Starinar* LVI:245–269.

Dimitrijević, Vesna, Ivan Dulić, and Nevena Cvetković. 2014. "The Janda cavity at Fruška Gora, the first cave assemblage from the southeast Pannonian lowland (Vojvodina, Serbia)." *Quaternary International* 339–340:97–111. doi: https://doi.org/10.1016/j.quaint.2013.06.005.

Dimitrijević, Vesna, Sonja Vuković, and Ivana Živaljević. 2022. "Making Room for Animals: The Development of Archaeozoology Within Serbian Archaeology." In *STEM in Heritage: Procedures, Methods, and Teaching*, edited by Jasna Vuković, 39–64. Belgrade: University of Belgrade – Faculty of Philosophy.

Faurby, Søren, and Jens-Christian Svenning. 2015. "Historic and prehistoric human-driven extinctions have reshaped global mammal diversity patterns." *Diversity and Distributions* 21 (10):1155–1166. doi: https://doi.org/10.1111/ddi.12369.

Filipović, D., and Đ. Obradović. 2013. "Archaeobotany at Neolithic sites in Serbia: a critical overview of the methods and results." In *Bioarchaeology in the Balkans. Balance and Perspectives*, edited by N. Miladinović-Radmilović and S. Vitezović, 25–55. Belgrade: Srpsko arheološko društvo.

Gillis, Rosalind E., Jelena Bulatović, Kristina Penezić, Miloš Spasić, Nenad N. Tasić, and Cheryl A. Makarewicz. 2020. "Herding and Hunting at Vinča – Belo Brdo and Stubline During the Late Neolithic, a Stable Isotopic Perspective." In *Animal Husbandry and Hunting in the Central and Western Balkans Through Time*, edited by Jelena Bulatović and Nemanja Marković, 19–39. Oxford: Archaeopress.

Hewitt, Godfrey M. 2011. "Mediterranean Peninsulas: The Evolution of Hotspots." In *Biodiversity Hotspots*, edited by Frank E. Zachos and Jan Christian Habel. Berlin, Heidelberg: Springer.

Hirata, Daisuke, Alexei V. Abramov, Gennady F. Baryshnikov, and Ryuichi Masuda. 2014. "Mitochondrial DNA haplogrouping of the brown bear, Ursus arctos (Carnivora: Ursidae) in Asia, based on a newly developed APLP analysis." *Biological Journal of the Linnean Society* 111 (3):627–635. doi: 10.1111/bij.12219.

Hofman, Courtney A., and Torben C. Rick. 2018. "Ancient Biological Invasions and Island Ecosystems: Tracking Translocations of Wild Plants and Animals." *Journal of Archaeological Research* 26 (1):65–115. doi: 10.1007/s10814–017–9105–3.

Jacobson, Andrew P., Peter Gerngross, Joseph R. Lemeris, Rebecca F. Schoonover, Corey Anco, Christine Breitenmoser-Würsten, Sarah M. Durant, Mohammad S. Farhadinia, Philipp Henschel, Jan F. Kamler, Alice Laguardia, Susana Rostro-García, Andrew B. Stein, and Luke Dollar. 2016. Leopard (Panthera pardus) status, distribution, and the research efforts across its range. *PeerJ* 4: e1974. Accessed 2016. doi:10.7717/peerj.1974.

Jovanović, Jelena, Camille de Becdelièvre, Sofija Stefanović, Ivana Živaljević, Vesna Dimitrijević, and Gwenaëlle Goude. 2019. "Last hunters–first farm-

ers: new insight into subsistence strategies in the Central Balkans through multi-isotopic analysis." *Archaeological and Anthropological Sciences* 11 (7):3279–3298. doi: 10.1007/s12520–018–0744–1.

Karastoyanova, Nadezhda, John Gorczyk, and Nikolai Spassov. 2020. "The natural history of the fallow deer, Dama dama (Linnaeus, 1758) in Bulgaria in prehistory and new evidence for the existence of an autochthonous Holocene population in the Balkans." *International Journal of Osteoarchaeology* n/a (n/a). doi: 10.1002/oa.2886.

Kay, Charles E., and White A. Clifford. 2001. "Reintroduction of bison into the Rocky Mountain parks of Canada: historical and archaeological evidence." In *Crossing Boundaries in Park Management, Proceedings of the 11th Conference on Research and Resource Management in Parks and on Public Lands*, edited by D. Harmon, 143–151. Hancock, Michigan: The George Wright Society.

Kirleis, Wiebke, Valério D. Pillar, and Hermann Behling. 2011. "Human–environment interactions in mountain rainforests: archaeobotanical evidence from central Sulawesi, Indonesia." *Vegetation History and Archaeobotany* 20 (3):165–179. doi: 10.1007/s00334–010–0272–0.

Koch, Paul L., and Anthony D. Barnosky. 2006. "Late Quaternary Extinctions: State of the Debate." *Annual Review of Ecology, Evolution, and Systematics* 37 (1):215–250. doi: 10.1146/annurev.ecolsys.34.011802.132415.

Langemann, E. Gwyn. 2004. "Zooarchaeological research in support of a reintroduction of bison to Banff National Park, Canada." In *The future from the past: archaeozoology in wildlife conservation and heritage management*, edited by Roel Lauwerier and Ina Plug, 79–89. Oxford: Oxbow book.

Lauwerier, Roel, and Ina Plug, eds. 2004. *The future from the past: archaeozoology in wildlife conservation and heritage management*. Oxford: Oxbow books.

Lyman, R. Lee. 1996. "Applied Zooarchaeology: The Relevance of Faunal Analysis to Wildlife Management." *World Archaeology* 28 (1):110–125.

Lyman, R. Lee. 2012. "A warrant for applied palaeozoology." *Biological Reviews* 87:1–13.

Masseti, Marco, and Despina Mertzanidou. 2008. "Dama dama " In *IUCN Red List of Threatened Species. Version 2013.2. http://www.iucnredlist.org.*

Mizumachi, Kaito, Nikolai Spassov, Dimitar Kostov, Evgeniy G. Raichev, Stanislava Peeva, Daisuke Hirata, Yoshinori Nishita, Yayoi Kaneko, and Ryuichi Masuda. 2020. "Mitochondrial haplogrouping of the ancient brown bears (Ursus arctos) in Bulgaria, revealed by the APLP method." *Mammal Research* 65 (2):413–421. doi: 10.1007/s13364–020–00482–2.

Molodtseva, Anna S., Alexey I. Makunin, Valentina V. Salomashkina, Ilya G. Kichigin, Nadezhda V. Vorobieva, Sergey K. Vasiliev, Mikhail V. Shunkov, Alexey A. Tishkin, Sergey P. Grushin, Peeter Anijalg, Egle Tammeleht, Marju Keis, Gennady G. Boeskorov, Nikolai Mamaev, Innokenty M. Okhlopkov, Alexey P. Kryukov, Elena A. Lyapunova, Marina V. Kholodova, Ivan V. Seryodkin, Urmas Saarma, Vladimir A. Trifonov, and Alexander

S. Graphodatsky. 2022. "Phylogeography of ancient and modern brown bears from eastern Eurasia." *Biological Journal of the Linnean Society* 135 (4):722–733. doi: 10.1093/biolinnean/blac009.

Niedziałkowska, Magdalena, Karolina Doan, Marcin Górny, Maciej Sykut, Krzysztof Stefaniak, Natalia Piotrowska, Bogumiła Jędrzejewska, Bogdan Ridush, Sławomira Pawełczyk, Paweł Mackiewicz, Ulrich Schmölcke, Pavel Kosintsev, Daniel Makowiecki, Maxim Charniauski, Dariusz Krasnodębski, Eve Rannamäe, Urmas Saarma, Marine Arakelyan, Ninna Manaseryan, Vadim V. Titov, Pavel Hulva, Adrian Bălăşescu, Ralph Fyfe, Jessie Woodbridge, Katerina Trantalidou, Vesna Dimitrijević, Oleksandr Kovalchuk, Jarosław Wilczyński, Theodor Obadă, Grzegorz Lipecki, Alesia Arabey, and Ana Stanković. 2021. "Winter temperature and forest cover have shaped red deer distribution in Europe and the Ural Mountains since the Late Pleistocene." *Journal of Biogeography* 48 (1):147–159. doi: https://doi.org/10.1111/jbi.13989.

Rick, Torben C., and Daniel H. Sandweiss. 2020. "Archaeology, climate, and global change in the Age of Humans." *Proceedings of the National Academy of Sciences* 117 (15):8250–8253. doi: 10.1073/pnas.2003612117.

Russell, Nerissa. 1993. *Hunting, Herding and Feasting: human use of animals in Neolithic Southeast Europe*. Berkeley: University of California.

Skog, A., F. E. Zachos, E. K. Rueness, P. G. D. Feulner, A. Mysterud, R. Langvatn, R. Lorenzini, S. S. Hmwe, I. Lehoczky, G. B. Hartl, N. C. Stenseth, and K. S. Jakobsen. 2009. "Phylogeography of red deer (Cervus elaphus) in Europe." *Journal of Biogeography* 36 (1):66–77. doi: 10.1111/j.1365–2699.2008.01986.x.

Sommer, Robert S., and Norbert Benecke. 2006. "Late Pleistocene and Holocene development of the felid fauna (Felidae) of Europe: a review." *Journal of Zoology* 269:7–19.

Stevanović, Vladimir, and Voislav Vasić, eds. 1995. *Biodiverzitet Jugoslavije – sa pregledom vrsta od međunarodnog značaja*. Beograd: Biološki fakultet.

Stuart, Anthony J., and Adrian M. Lister. 2007. "Patterns of Late Quaternary megafaunal extinctions in Europe and northern Asia." *Courier Forschungsinstitut Senckenberg* 259:289–299.

Swetnam, Thomas W., Craig D. Allen, and Julio L. Betancourt. 1999. "Applied Historical Ecology: Using the Past to Manage for the Future." *Ecological Applications* 9 (4):1189–1206. doi: 10.2307/2641390.

Sykes, Naomi. 2004. "The introduction of Fallow deer to Britain: a zooarchaeological perspective." *Environmental Archaeology* 9:75–83.

Turvey, Samuel T. 2009a. "Holocene mammal extinctions." In *Holocene Extinctions*, edited by Samuel T. Turvey, 41–61. Oxford: Oxford University Press.

Turvey, Samuel T. 2009b. "In the shadow of the megafauna: prehistoric mammal and bird extinctions across the Holocene." In *Holocene Extinctions*, edited by Samuel T. Turvey, 17–39. Oxford: Oxford University Press.

Turvey, Samuel T., and Susanne A. Fritz. 2011. "The ghosts of mammals past: biological and geographical patterns of global mammalian extinction across the Holocene." *Philosophical Transactions of the Royal Society B: Biological Sciences* 366 (1577):2564–2576. doi: 10.1098/rstb.2011.0020.

Uphyrkina, Olga, Warren E. Johnson, Howard Quigley, Dale Miquelle, Laurie Marker, Mitchel Bush, and Stephen J. O'Brien. 2001. "Phylogenetics, genome diversity and origin of modern leopard, Panthera pardus." *Molecular Ecology* 10 (11):2617–2633. doi: 10.1046/j.0962–1083.2001.01350.x.

Valdiosera, Cristina E., Nuria GarcÍA, Cecilia Anderung, Love DalÉN, Evelyne CrÉGut-Bonnoure, Ralf-Dietrich Kahlke, Mathias Stiller, Mikael BrandstrÖM, Mark G. Thomas, Juan Luis Arsuaga, Anders GÖTherstrÖM, and I. A. N. Barnes. 2007. "Staying out in the cold: glacial refugia and mitochondrial DNA phylogeography in ancient European brown bears." *Molecular Ecology* 16 (24):5140–5148. doi: 10.1111/j.1365–294X.2007.03590.x.

Vörös, István. 1981. "Wild equids from the Early Holocene in the Carpathian Basin." *Folia Archaeologica* 32:37–68.

Vuković, Sonja. 2021. "The Story of a Vanished Creature: Extinction Dynamics of the Aurochs from the Territory of Present-Day Serbia." In *Archaeology of Crisis*, edited by Staša Babić, 221–238. Belgrade: Faculty of Philosophy, University of Belgrade.

Vuure, Cis Van. 2005. *Retracing The Aurochs: History, Morphology & Ecology of An Extinct Wild Ox*. Sofia/Moscow: Pensoft Pub.

Walker, Mike, Sigfus Johnsen, Sune Olander Rasmussen, Trevor Popp, Jørgen-Peder Steffensen, Phil Gibbard, Wim Hoek, John Lowe, John Andrews, Svante Björck, Les C. Cwynar, Konrad Hughen, Peter Kershaw, Bernd Kromer, Thomas Litt, David J. Lowe, Takeshi Nakagawa, Rewi Newnham, and Jakob Schwander. 2009. "Formal definition and dating of the GSSP (Global Stratotype Section and Point) for the base of the Holocene using the Greenland NGRIP ice core, and selected auxiliary records." *Journal of Quaternary Science* 24 (1):3–17. doi: 10.1002/jqs.1227.

Willis, Katherine J., and Harry John B. Birks. 2006. "What Is Natural? The Need for a Long-Term Perspective in Biodiversity Conservation." *Science* 314 (5803):1261. doi: 10.1126/science.1122667.

Wolverton, Steve, Lisa Nagaoka, and Torben C. Rick. 2016. *Applied Zooarchaeology. Five Case Studies*. New York: Eliot Werner Publications.

Zver, Lars, Borut Toškan, and Elena Bužan. 2021. "Phylogeny of Late Pleistocene and Holocene Bison species in Europe and North America." *Quaternary International* 595:30–38. doi: https://doi.org/10.1016/j.quaint.2021.04.022.