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BOOK REVIEW

Bat Roosts in Rock - A Guide to Identification and Assessment for Climbers, Cavers & Ecology Professionals - *Henry Andrews* (2021) Pelagic Publishing, Exeter, United Kingdom, 301 pp. ISBN: 978-1-78427-261-6

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The number of books published about bat ecology and conservation has drastically increased over the last decade, echoing the rise of naturalists surveying bats and new citizen science projects on bat conservation. In October 2021, Henry Andrews, founder of both the "Bat Tree Habitat Key" and "Bat Rock Habitat Key" projects, together with Steven Hopkins (geologist), Robert Bell (bat expert), James McGill (entomologist, ornithologist, and botanist) and Hal Starkie (bat ecologist) presented this new book regarding bat roosts in rocks, following its predecessor entitled "Bat Roosts in Trees" (2018). Bat Roosts in Rock has been conceived as an extensive and detailed manual for bat workers, climbers, and cavers from the British Isles to characterise used and potential bat roosts commonly found in rocks, either in rock faces, loose rocks or underground roosts, and standardise the information collected by both scientists and naturalists. This book review results from an academic group discussion undertaken with members of the Natural Sciences Museum of Granollers and the participation of a range of potential users of the book, from bat professionals with more than 15 years of experience to young students that have recently joined the research team.

This book was born within the "Bat Rock Habitat Key" project (http://www.batrockhabitatkey.co.uk/) and pursued three main objectives under the umbrella of a predictive framework to define and compare bat roost surveys: a) the description of Potential Roost Features that are commonly encountered on rock habitats; b) the collation of published descriptions of bat roosts, and c) the creation of an online open-access database to fill knowledge gaps and provide evidence for practical conservation initiatives. With these objectives in mind, the book aims to contribute to advancing knowledge about bat roosting in cliffs, crevices, or caves. It is well known that caves are the most studied roosting typology related to rocks and that other potential roosts, such as crevices, are generally overlooked (Bachen et al. 2019). Some studies, however, demonstrated the importance of these ignored roosts for bat ecology (Vaughan et al. 1976, Chruszcz et al. 2002). For instance, due to their colder and drier characteristics, rock crevices sometimes offer better protection from White-nose Syndrome (Moosman et al. 2017), or are used by threatened species for the most vulnerable periods while they are breeding or hibernating (Slough 2009, White et al. 2020).

The book chapters can be classified into three main sections; 1) a geological introduction to the different kinds of rock forms and materials found in the British Isles (which will be especially useful in the second section of the book), 2) three chapters dedicated to the three kinds of rock landforms classified in the book (rock faces, loose rocks, and subterranean structures) with the corresponding field form for each landform, how-to-use indications, and examples, and 3) a final chapter on recommendations and guidelines for ecologists, cavers, or environmental consultants on how to conduct field surveys of potential bat roosts. The structure turns out to be highly appropriate, especially considering the need to clarify some technical aspects and geological terminology that potential readers may not be familiar with as naturalists. Despite the topic's specificities and complexity, the book excels in providing a robust platform and baseline information to collect data about bats roosting in rocks. The summary listed in each chapter helps the reader navigate between sections. However, we believe a more comprehensive index would further benefit readers searching for specific information or who is unfamiliar with the material.

The second chapter, 'An introduction to rock', introduces the reader to the classification system that will be used throughout the following chapters. This chapter

is particularly valuable as it provides comprehensive descriptions for each of the different types of geological formations, structures, and materials referred to later in the book. Supplemented with high-quality photographs, the information is easy for those with no geology background to visualise and understand.

The three following chapters, which focus on the three types of landforms, form the bulk of the book. Each of the three central chapters begins with an extensive introduction to the landform characteristics, which is especially interesting and complete for readers keen to broaden their geological knowledge. And they all conclude with a summary of reported roosts for each bat species in the relevant landform. The following section provides a copy of the proposed record form for documenting measurements of the potential bat roosts - the book's pearl. The required fields to be completed are well explained in each subsection, with clear and extensive descriptions of how to measure the different characteristics. These chapters may be challenging to understand without dedicating the time to read them thoroughly. However, while this may seem confusing at first glance, once you assimilate the book's structure, this will become an invaluably helpful tool for any reader aiming to assess the characteristics of roosts and contribute to the growing online database.

Bat Roosts in Rock is a very descriptive book with broad and detailed descriptions of the geology of the UK. It is helpful when learning the terminology of many morphological and physical characteristics, from rock faces and loose rocks to subterranean rocks, as it always combines theoretical aspects with illustrations and excellent photos to help the reader follow along. In this sense, the book is a valuable tool for consultants as it provides a detailed methodology for surveying and improving the protection of potential bat roosts in rocks. Readers with other scientific backgrounds or more naturalist interests, with a biased perspective towards bats and their biology, will probably miss some sections in the book regarding the biological use of the roosts by different bat species. It would be highly appealing to add some information about roost characteristics from the literature to complement the data provided in the book.

Diving into this book sparked an interesting debate between us about what we understood as a "rock roost" from a chiropterologist perspective. From our point of view, we expected that a "rock roost" would refer to the roosts used by those species specialised in crevices, such as *Pipistrellus spp.* or *Eptesicus spp.* We commonly separate these species from the cave-dwelling species, which roost in underground structures (e.g. caves or human-made structures like mines and cellars), such as *Rhinolophus spp*. However, the authors do not use this classification and merge both types of bats. The book highlights how little data is currently compiled and available for the described landforms, mainly rock wall faces and loose rocks, as potential bat roosts. When we worked on the roosting ecology of the Alpine bat (*Plecotus macrobullaris*) using radiotracking, it would have been very beneficial to have a thorough guide like this book to survey the species in loose rocks (Alberdi et al. 2012, 2013, 2015)

The final chapter uses the author's experience in environmental consultancy to advise anyone looking to conduct roost surveys or environmental impact assessments regarding rock structures that potentially house bat colonies. It is probably the most subjective chapter in the book, clearly stating at the beginning that all the content of the chapter is based on the author's personal experiences and mistakes and that these should not be taken as a "one-size fits all" kind of information. Covering the largest variety of themes and topics, this chapter provides a vast array of resources and ideas about how to conduct monitoring or surveillance (which are not the same, as explained in this chapter) of bat roosts with different techniques, materials used, and online resources. All in all, this is likely to be the chapter most frequently referred by readers.

In summary, there are two reasons why you would likely enjoy this book: 1) you are a bat biologist, and you wish to know more about the geological aspects and characteristics of rocks that bats could use, and 2) you want to learn and apply a standardised methodology for assessing the characteristics of bat roosts and Potential Roost Features. The book provides an extensive methodology that requires attention to read and absorb all the concepts. However, this detailed information, complete with advice and experience, as well as easy-to-read explanations for complex geological concepts, makes the book an invaluable tool for studying different rock roost features. Not being a bat biology book, it offers a new and refreshing view of the way conservationists study bat roosts, and it will surely ignite new curiosity in both junior and senior bat researchers. Finally, we would strongly encourage everyone to use the online database established by the authors to report bat roosts and help further our knowledge moving forward so that, collectively, we can fill one of the most significant gaps in bat ecology.

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