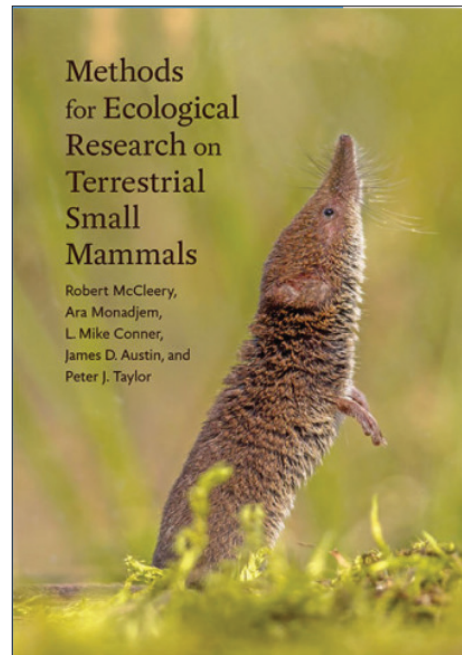


Methods for Ecological Research on Terrestrial Small Mammals, by Robert McCleery, Ara Monadjem, L. Mike Conner, James D. Austin, and Peter J. Taylor. 2021. Johns Hopkins University Press, Baltimore, Maryland, USA. 368 pages. \$59.95 (hardcover). ISBN: 978-1-4214-4211-2.

Small mammals are used in ecological studies throughout the world, yet the subject has lacked a clear reference that included up-to-date methods pertaining to passive detection, molecular, and statistical approaches. In *Methods for Ecological Research on Terrestrial Small Mammals*, McCleery and his coauthors build on previous research references (Braun 2005, Sutherland 2006, Krebs 2014, Silvy 2020) and present methodologies specific to the study of small mammals that are applicable globally.

Written as an asset for novice and experienced small mammal researchers alike, *Methods for Ecological Research on Terrestrial Small Mammals* is organized in a logical format, providing readers with an overview of available detection and capture methods before introducing study design. Beginning with detection techniques, the authors first describe benefits and challenges of passive-detection methods, such as hair sampling tubes or owl pellets, and then move into an analysis of active detection methods, including live box traps and snap traps. Additionally, the authors discuss the types of data that can be collected from these methods. Pictures and descriptions of trap types, placement, and drift fences used to funnel small mammals to traps help clarify methods that can be used. Readers will appreciate the succinct table outlining each trap type, the environments in which the traps are commonly used, and the strengths and challenges of the methods.

Following the chapters on types of detection, the authors include next chapters that outline collection of blood, tissue, or whole specimens for genetic analysis, disease studies, or curatorial collections. The authors outline extraction steps and protocols for tissue storage buffers and body measurements of live captured animals or specimens taken for curation. Readers will appreciate the detail the authors relay toward handling and processing small mammal specimens. Processing site selection, common equipment used, sample storage, general safety, ethics, and permits are all dutifully covered. While this section is thorough, readers who are looking to collect small mammal endo- or ectoparasites would benefit from referring to a resource specific to that topic. Additionally, in the interest of having a sound data management plan, I would encourage readers to be attentive to their record-keeping strategies (e.g., data sheets, specimen labels, notebooks) when conducting these types of studies, such as strategies illustrated in Wilson's (1996) *Measuring and Monitoring Biological Diversity: Standard Methods for Mammals*.



Book Review Editor: Lawrence D. Igl (lgl@usgs.gov).

The chapter on the design of trapping studies is thorough and discusses trap arrangement, bait, length of study, time between trapping sessions, and robustness needed for statistical analysis. Three trap arrangements are covered, including line, grid, and web designs, and the strengths and challenges of these arrangements are discussed. This discussion segues into tracking, movement, home range, population demographics and size, and habitat associations. Descriptions of open-source software packages for data analysis and modeling of movement or habitat provide the reader with a foundation of how the data collected can be analyzed and presented. Readers will appreciate another useful table in this section that covers open-source or commercial software and URLs of where to find more information about the software. However, as always, readers should consult a statistics-specific resource before making a software decision.

Progressive methods and technologies involving DNA or other molecular methods have advanced genetic studies on small mammal ecology. The authors discuss nuanced methods associated with diet including the traditional microhistological approach and moving into newer methods of stable isotope analysis, near infrared reflectance spectroscopy, and sequencing of DNA (both barcoding and metabarcoding). Similarly, the authors cover morphometrics and newer methods involving three-dimensional imaging to aid in ecomorphology, taxonomy, and methods to study small mammal behavior. The readers will benefit from another concise table outlining genetic approaches to address questions pertaining to ecology and evolution with examples from previous literature that have used those approaches.

A major strength of *Methods for Ecological Research on Terrestrial Small Mammals* is the discussion of benefits, challenges, and limitations of all research methods. Within the book, the authors furnish considerable lists of references that provide a comprehensive synopsis of the methods used in small mammal research. The numerous illustrations, photos, figures, and tables improve the interpretation of the methods and provide a summarization for a quick reference. The authors also present challenges and the effectiveness of using the same methods in different habitats. The breadth of techniques and methods presented from multiple habits allows for *Methods for Ecological Research on Terrestrial Small Mammals* to be relevant globally.

I recommend *Methods for Ecological Research on Terrestrial Small Mammals* to anyone starting a small mammal study or for primary investigators, managers, or practitioners who want a better understanding of the methods used during small mammal research. The enthusiasm of the authors for small mammal research is evident and, combined with subtle hints of humor, makes this book an enjoyable and understandable reference. Whether the research is to identify small mammal community richness, diet, or which small mammals are being eaten by raptors and meso-mammals, *Methods for Ecological Research on Terrestrial Small Mammals* includes methods and study designs aimed at answering those questions. I highly recommend using *Methods for Ecological Research on Terrestrial Small Mammals* as a primary reference for future small mammal studies.

Book Reviewer: Lynda R. LaFond, Wildlife Biologist, University of North Dakota, Grand Forks, ND 58202, USA. lynda.lafond@und.edu.

Literature Cited

- Braun, C. E. (Ed.). 2005. *Techniques for Wildlife Investigations and Management*. Sixth edition. The Wildlife Society, Bethesda, MD, USA. 974 pp.
- Krebs, C. J. 2014. *Ecological Methodology*. Third edition. Addison-Wesley Educational Publishers, Menlo Park, CA, USA. Available online at <https://www.zoology.ubc.ca/~krebs/books.html>. Accessed 16 June 2022.

- Silvy, N. J. (Ed.). 2020. *The Wildlife Techniques Manual*. Eighth edition. Johns Hopkins University Press, Baltimore, MD, USA. 1400 pp.
- Sutherland, W. J. (Ed.). 2006. *Ecological Census Techniques: A Handbook*. Cambridge University Press, Cambridge, England. 446 pp.
- Wilson, D. E., R. F. Cole, J. D. Nichols, and M. S. Foster. 1996. *Measuring and Monitoring Biological Diversity: Standard Methods for Mammals*. Smithsonian Books, Washington D.C., USA. 409 pp.