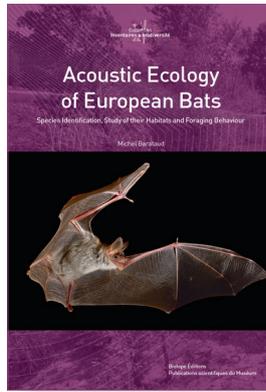


..... inventories & biodiversity



Inventaires & biodiversité, tome 8
 165 x 240 mm relié / *hardcover*
 texte en anglais / *text in English*
 352 p., 204 figures coul., 29 photos coul., 29 tableaux, DVD
ISBN 978-2-85653-771-8
Prix / Price 49€ TTC (46,45 HT)

Distribué le 15 juillet 2015
 Published on 15 July 2015

ACOUSTIC ECOLOGY OF EUROPEAN BATS

SPECIES IDENTIFICATION, STUDY OF THEIR HABITATS AND FORAGING BEHAVIOUR

Michel Barataud

THE AUTHORS

Michel Barataud has spent many years of research working on the bats of not only Europe, but also the Guianas and Lesser Antilles. He has developed a very efficient identification method and trained several hundred bat workers in ultrasound analysis. Yves Tupinier is an expert and pioneer on bat sonar.

THE BOOK

Bats, being nocturnal flying mammals, have developed a special and very efficient means of navigating in the dark: the sonar. Although the acoustic signals they emit are inaudible to the human ear, they can be perceived, recorded and analysed with appropriate equipment and software. This book is a product of the knowledge and skill acquired by its author over more than two decades of constant research on the subject of ultrasound detection. The initial, purely auditory, approach is complemented by the computed-assisted analysis of the ultrasonic signals. With the method described in this book, a bat detector and a computer, the reader will be able to identify about 85% of bat acoustic records in Europe, carry out bat inventories and other more in-depth surveys without disturbing the animals. Thirty-five of the 42 European bat species, including all the most widespread species, are covered.

Ultrasound decoding systems

Yves Tupinier **FREQUENCY DIVISION OR ZERO-CROSSING**

In order to convert ultrasonic signals into audible sounds by altering their frequency in real time, we use a signal processing system consisting of a computer and a speaker. A signal emitted at 50 kHz is thus heard at 5 kHz when the frequency is divided by 10. The latter is commonly used for frequency division for detection. An ultrasonic signal consisting of several pulses will therefore only contain a few cycles of the lower frequency. It is the number of these cycles that is used for frequency division. Figure 2 to 41. For the analysis of the original signal, it is important to distinguish between the signal on the spectrogram, it is stored in the memory, then the points where the amplitude curve reaches its maximum must be marked in the memory. These points then serve to reconstruct the modulation as a sinusoidal wave from the points, the amplitude being defined by the maximum envelope. A sequence thus processed returns its original duration and relative movements have been restored to their original form for periods where several harmonics are present (Figure 7 and 8). It covers nevertheless an idea of the most energy loaded frequencies. The method is sensitive to the knowledge of the absence of harmonics to later in real time to the spectrogram or the spectrogram, including the acoustic background of the target.

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The sonar signals of bats: classification and interpretation

Chapter 3

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DVD :
 includes numerous audio examples to illustrate the method as well as scatter diagrams for the identification of the emitting species

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