

Preface

Humans have always been fascinated by marine life, from extremely small diatoms to the largest mammal that inhabits our planet, the blue whale. However, studying marine life in the ocean is an extremely difficult proposition because an ocean environment is not only vast but also opaque to most instruments and can be a hostile environment in which to perform experiments and research. The use of acoustics is one way to effectively study animal life in the ocean. Acoustic energy propagates in water more efficiently than almost any form of energy and can be utilized by animals for a variety of purposes and also by scientists interested in studying their behavior and natural history. However, underwater acoustics have traditionally been in the domain of physicists, engineers and mathematicians. Studying the natural history of animals is in the domain of biologists and physiologists. Understanding behavior of animals has traditionally involved psychologists and zoologists. In short, marine bioacoustics is and will continue to be a diverse discipline involving investigators from a variety of backgrounds, with very different knowledge and skill sets. The inherent inter-disciplinary nature of marine bioacoustics presents a large challenge in writing a single text that would be meaningful to various investigators and students interested in this field. Yet we have embarked on this challenge to produce a volume that would be helpful to not only beginning investigators but to seasoned researchers. Most of the material comes from the vast number of combined years of research in this field.

Investigators in the field of marine bioacoustics should have some knowledge of the mathematical concepts of acoustics starting with the wave equation and how acoustic waves and signals propagate in an oceanic medium. Knowledge of how sounds are produced by the conversion of electrical energy into mechanical energy by transducers and how sounds are detected by hydrophones is necessary. Knowledge of some elementary electronics, especially on how acoustic signals are converted from the analog into digital domain so that meaningful and useful information can be stored and analyzed by computers is needed as well. It is also important to understand how digital signals from a computer can be transformed into analog signals that can drive a sound projector. Knowledge of basic signal processing is also

important in order to gain understanding of the properties and characteristics of sounds used by marine animals. Finally, the hearing and sound production capabilities of marine animals are important areas in marine bioacoustics. Unfortunately, whole volumes have been devoted to the various areas of knowledge that a good bioacoustician should master. We have attempted to “cut through the chase” in writing this text and hopefully we have been successful and this book will be a good contribution to this marvelous field.

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