

Reviews

ANTARCTIC SEALS: RESEARCH METHODS AND TECHNIQUES. R.M. Laws (Editor). 1993. Cambridge: Cambridge University Press. xxii + 390 p, illustrated, hard cover. ISBN 0-521-44302-4. £50.00; US\$84.95.

There has long been a need for a comprehensive, easily accessible guide to the field techniques used in collecting data on seals. Although *Antarctic seals: research methods and techniques*, as its name implies, essentially uses data and methods tried and tested on southern species, its value goes beyond this. Much of the extensive and carefully presented information can be equally well applied to studies of pinnipeds anywhere in the world.

R.M. Laws' edited volume is far more than a simple field guide, however. It includes an analysis of state-of-the-art technical advances for assessing pinniped biology, ecology, and physiology by means of, for example, radio tracking and telemetry, time-depth recorders, and satellite-linked instruments (chapter 5); it outlines recent advances in the study of heavy metals and organochlorines in pinnipeds (chapter 10); and it contains up-to-date reviews on some of the recent advances in pinniped biological research written by some of the most prominent authorities in the field. It also includes a well-considered review of future research needs and the development of appropriate techniques for dealing with them (chapter 15), and a series of helpful appendices on pinniped nomenclature and those parts of the Antarctic Treaty that pertain to pinnipeds (such as the Convention for the Conservation of Antarctic Seals). The book was initiated by the Scientific Committee on Antarctic Research (SCAR) Group of Specialists on Seals, and authors are Sheila Anderson, John Bengston, Marthan Bester, Nigel Bonner, Wesley Brown, Dan Costa, John Croxall, Thomas Dowling, Al Erickson, Mike Fedak, Roger Gentry, John Harwood, Bob Hofman, Seamus McCann, Peter Shaughnessy, Akhaura Sinha, Don Siniff, and Ian Stirling.

Although book reviews that describe each chapter individually risk being tedious, in this case, given the wide range of topics covered in *Antarctic seals* by different authorities in the subject, it seems appropriate to single out some of the chapters for discussion. The first chapter is a valuable guide to the identification of the seven different species of Antarctic and sub-Antarctic seals, including diagrams showing characteristic poses and information on size, pelt colour at varying ages, and reproductive and behavioural data. This chapter sets the tone for the rest of the book, in that information is presented not just on one species, but in such a way as to facilitate easy comparisons. The second chapter reviews methodology for estimating population sizes, including how to design a survey based on the constraints on the survey team, the biology of the species to be assessed, and the reasons for the survey. Since population surveys can be used to enable decisions

to be made on issues such as the status of potentially endangered species, or for designing long-term management plans, it is important that such studies yield accurate results. Following the guidelines of this chapter will allow separate surveys to be more easily compared with each other, and therefore have a more-lasting value in assessing population sizes through time.

The third chapter contains 20 pages of tables listing the various immobilizing agents and dose rates for anaesthetizing pinnipeds from studies published since 1963. These tables include which agent was used on which species, the method by which the drug was administered, the age and sex of the animals used, the dose rate of the drug and the antidote (that is, dose given in relation to the animal's body mass), and the comments made by the individual authors on the effectiveness of the drug and observed side-effects. This list is not confined to the seven Antarctic and sub-Antarctic species, but includes studies on another 14 species, both phocid and otariid, from both hemispheres. To my knowledge, this is the only such list currently published, and will be of value to any researcher wanting information on the dose rate of a specific drug and its antidote for a particular species, the time-lag before the drug takes effect, and the potential risks to the animal.

Chapter 4 summarizes the different methods of marking animals. Again, an important consideration is the standardization of marking, so that marked animals may be easily recognized by other researchers, and information relayed back to the originator. The Group of Specialists on Seals proposes that each country should use a specific prefix letter in all tagging, in order to simplify the process of identification, and also suggests contacts in organizations that are able to decipher worn or illegible tags.

The chapter on behaviour notes the temptation to collect behavioural data in the field without prior forethought, which can often leave researchers with a mass of information in which it is difficult to see patterns. The authors stress the importance of designing a study beforehand, rather than developing hypotheses in the field. They note that behavioural observations (such as interactions with other animals or humans, or vocalizations) need to be set in the context of the specific climatic conditions of the time (cloud cover, temperature, wind speed, etc), and that these data should always be collected as a basic minimum. Some behavioural observations will relate to feeding patterns, and diet is the subject of chapter 13. Much remains uncertain about pinniped diets because of the difficulty in obtaining data — seals feed underwater, often a long way from shore, and stomach and fecal samples tell only what the seal's last meal comprised, not its general preferences or variation. The available methods of assessing pinniped diets are described, and the major standard works that should be used to identify stomach or fecal contents are provided.

Although research on the basic anatomy of pinniped reproductive systems is reasonably well-understood, variation within and between species is less well-documented. Further, recent years have seen advances in reproductive biology that enable a more in-depth knowledge to be gained. Chapter 12 begins with a summary of the reproductive cycles of the seven Antarctic and sub-Antarctic species, and goes on to describe recent developments in DNA fingerprinting that enable a pup's parents to be identified. These data will allow the genetic structure of a population to be determined. Similarly, enzyme immunoassays are now readily available, and diagnostic kits are produced that allow accurate and simple measurement of hormones in the field. Other recent research has suggested that there are several relatively discrete populations within some species of seal, which is important to bear in mind when devising strategies for the effective management and conservation of Antarctic pinnipeds. Various methods available to assess the genetics of populations are listed in chapter 9, including electrophoresis of proteins, amino-acid sequencing, and immunochemical comparisons.

The study of the bioenergetics of a species can enable quantification of many aspects of its life history. Methods available include assessing changes in the weight and structure of the body over time, changes in the rate at which substances are turned over within the body, and the amount of oxygen used and carbon dioxide produced by aerobic metabolism. Pinniped bioenergetics is a fairly new field, but can provide answers to a variety of questions pertaining to their basic biology: what is the resting metabolism of animals of different ages? what are the costs of reproduction for males and females in terms of energy used to defend beaches and harems or in lactation? what is the level of parental investment? how much energy is used for feeding and foraging? do these change with seasons? Different methods and techniques that are available to answer these questions are evaluated.

The morphometric analysis of a species can yield information on areas such as age determination, reproductive status, and general population ecology. Chapter 8 details some of the measurements that can be taken with a view to standardizing collected data. This has been a problem in pinniped biology – especially in taxonomic studies – since many of the older papers do not define their datum points. So, for example, 'skull length' can mean condylobasal length, or the basilar length of Hensel, or even another measurement known only to the author. These discrepancies mean that data presented in the literature have limited value for comparative studies and are potential causes of taxonomic chaos. In 1967 the Committee on Marine Mammals defined some body and skeletal measurements in an attempt to standardize data collection (Scheffer 1967); although many researchers adhere to these standards, they are by no means used universally. Hopefully, the importance of the standardization of data collection stressed throughout *Antarctic seals* will yield more favourable results for the future.

The determination of the age of pinnipeds was developed independently by Scheffer (1950) and Laws (1952), and is essential in assessing pinniped population structures. Chapter 11 provides comprehensive information on the different dental structures of the seven species of Antarctic seals, as well as useful comparative data on the choice of tooth to be used for age determination and the variation in dental microstructure, both of which differ between species. It also discusses the reliability of the aging of cementum and dentine from different species at different ages. For example, counting canine cementum lines is adequate to age Weddell seals, but cementum is poorly developed in Ross and crabeater seal canines.

In conclusion, the great value of *Antarctic seals* lies not only in the vast amount of information it contains, all presented in a scholarly, comprehensive manner, but also in the fact that, for the first time, guidelines are presented so that data on pinnipeds may be collected systematically. Adherence to the suggestions and outlines presented by the various authors in their capacity as members of SCAR's Group of Specialists on Seals will allow comparisons between studies to be made, and open the way for more collaborative research between countries and individuals. It is impossible to over-emphasize the importance of this book, not only to the study of seals in the Antarctic and sub-Antarctic but to marine mammal research in general. (E. Cruwys, Department of Zoology, University of Cambridge, Downing Street, Cambridge CB2 3EJ.)

References

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SILAS: THE ANTARCTIC DIARIES AND MEMOIR OF CHARLES S. WRIGHT. Colin Bull and Pat F. Wright (Editors). 1993. Columbus: Ohio State University Press. xxx + 418 p, illustrated, hard cover. ISBN 0-8142-0548-8. US\$59.50.

Few polar expeditions can lay claim to so great a wealth of literary talent as Scott's last. The leader's own posthumously published journals along with Cherry-Garrard's *Worst journey in the world* are both classics. Other members were likewise not wanting in this faculty; Priestley, Lieutenant Evans, Ponting, and Griffith Taylor all published narrative accounts. The subsequent publication of Edward Wilson's journals edited from the originals heralded a new genre exemplified in recent years by the edited diaries of Victor Campbell and Frank Debenham, neither accomplished literary gems but both valuable for their historical immediacy.

It is particularly gratifying to welcome to this growing library the diaries of Scott's talented and versatile young scientist, Charles (later Sir Charles) Seymour Wright. The editors are Dr Colin Bull (Dean Emeritus of Ohio State University and, like Wright, an experienced polar geo-