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Book reviews

Pinnipeds and El Niño

Edited by *Fritz Trillmich & Kathryn A Ono*
Ecological Studies 88, Springer-Verlag, Heidelberg, (1991).
293 pages, DM 198. ISBN 3 540 536345

Many cases have suggested that long-term stability of numbers is a natural state for large mammal populations. However, in changing environments carrying capacity can vary unpredictably. El Niño, in the eastern tropical Pacific, is a climatic phenomenon causing acute but transient changes in oceanic circulation patterns and disruption of normal patterns of biotic production. Although El Niño events occur on average every six years or so, they are unpredictable in both their timing and in their magnitude. The eastern seaboard of the Americas is endowed with a wide variety of pinniped species and longitudinal studies of six of these species happened to coincide with the 1982–83 El Niño, (the most severe in the last 100 years). This book is a useful and timely compilation of the information gathered from these studies which capitalizes on the opportunity to study a natural disruption of population processes in pinnipeds.

The book is divided into five parts with 26 chapters. In the Introduction the time sequence of the 1982–83 El Niño is described in oceanographic terms together with the overall biological consequences. This is followed by a section on the effects on fur seals and sea lions from Chile to the Pribilof Islands. These are useful summaries of the general and very widespread effects of El Niño on pinnipeds. For example, the worst affected species was the Galapagos fur seal which was located at the epicentre of the oceanographic changes. This species relies on food from rich upwelling regions in the vicinity of the Galapagos Islands and with the deepening of the thermocline and reduced upwelling of deep waters due to the El Niño there was a severe shortage of food. As a result, all of the cohorts from 1980–1982 and at least 30% of the adult females died. Peruvian populations of the South American fur seal might have been little better off except that, unlike the non-migratory Galapagos fur seal, many of these animals moved into richer waters off northern Chile. The effects of El Niño became less severe the further away from the tropics one moved until, amongst the northern fur seals of the Pribilof Islands, there may even have been a slight positive effect of the El Niño on juvenile survival rate.

In the third and fourth parts of the book considerable detail is provided about the behavioural, growth and reproductive responses of California sea lions and northern elephant seals to the El Niño. Two main points emerge from this, (1) that in these two sympatric pinnipeds with contrasting reproductive and feeding strategies, the northern elephant seal was influenced less than the California sea lion and (2) that different populations of California sea lions were influenced to differing degrees, presumably as a result of variation in feeding conditions between localities. Both these observations strengthen the view that otariid pinnipeds have evolved to exploit rich but localized upwelling marine systems which makes them vulnerable to both small- and large-scale shifts in their food resource, but which also mean they can effect a rapid recovery from the resultant periodic population declines when conditions return to normal. In contrast, the elephant seal is exploiting a widely dispersed food resource and has the capacity, with little or no additional cost, to adapt to spatial changes in productivity.

The fifth part of the book provides a summary which is perhaps the most interesting part of the book for the non-specialist. This book is rich in anecdotes which illustrate many of the fundamental principles of population biology, from broad generalizations about the role of unpredictable environmental perturbations in the evolution of life history strategies, to the detailed behavioural and physiological responses of individuals to changes in their food supply which are at the core of the density-dependent control of population growth.

Having read this book I am left with the impression of a job well done both by the editors and by those who contributed chapters. It would be easy to criticize many of the studies for not having been properly designed to address the main issue and a similar criticism could be levelled at the whole book, but none of these studies were set up to measure the effects of the most severe El Niño for 100 years because it was an unpredictable event. This was a natural experiment which, largely through the descriptions contained in this book, has added significantly to our knowledge of mechanisms controlling pinniped populations in environments where there is a fluctuating carrying capacity. Moreover, it illustrates the dangers of imagining that pinniped life histories and foraging strategies have evolved to cope with relatively stable environmental conditions and that population sizes should show some long-term stability.

I.L. Boyd

The petrels: their ecology and breeding systems

John Warham
Academic Press, London. 1990
440 pages. £28.50. ISBN 0 12 735420 4

This long-awaited book is the first volume of two which will encompass the whole biology of one of the most diversified group of birds, the Tubinares or Procellariiformes (albatrosses and petrels). The author is one of the world's top specialist

on seabirds having published dozens of papers, dealing successively with their ecology, anatomy, physiology, and recently, their behaviour. Warham is also an expert in finding obscure references (he is presently preparing a bibliography of Procellariiformes, covering more than 10 000 references).

The text is divided into two main sections. The first half of the book is introduced with a general overview of the Procellariiformes (chapter 1), followed by a detailed account of the general life history traits of each genus of the order. Chapters 2–10 all follow the same arrangement: general characteristics, genera included, life styles, distribution, feeding and foods, breeding, dispersal and migration, population and mortality, and conservation. The second half of the book is devoted to breeding biology (chapter 11), followed by chapters on the pre-egg stage, the egg, the incubation, and the chick (chapters 12–15). Two appendices complete the book: the first is a checklist of the Procellariiformes (all extant species and subspecies), and the second blood proteins used for electrophoresis.

The author and the publishing editor are to be congratulated on the quality of production which is very high. There are remarkably few printing errors, and very few mistakes or omissions. Behaviour, energetics, physiology, populations, food and feeding, etc., will be described in the second volume, although curiously all these topics are already dealt with in outline in the sections on genera.

There are two main strength in this book: first, the meticulous search for references, with the list including c.1000 titles, from 1656 to 1990. The reference list does not cover only English literature, but a particular and noteworthy effort has been made to include French, German and Russian studies. This result is an extensive and detailed survey of the Procellariiformes: the reader can expect to find reference to virtually all data that has been published, recent or not, on their biology. The second strength is the clarity of this compilation, which allows a very quick and efficient search for any particular topic throughout the book. There are, however, two gaps which could filled in the next volume. First, the author does not attempt a synthetic and comparative discussion on the breeding biology of the different species, although Procellariiformes have unique life styles which should encourage such an approach. Secondly, the systematics of Procellariiformes is under debate at the moment, both in terms of the phylogeny and the taxonomy at the species level. I would have expected John Warham to give his opinion on these matters in a book that will remain the standard text on the tubenosed petrels for a long time.

In conclusion, all seabird biologists must acquire this book, as well as many other researchers working on the Antarctic and/or oceanography: the Tubinares are major consumers in all marine ecosystems and particularly those of the southern oceans.

VINCENT BRETAGNOLLE

Proceedings of the Meeting, Earth Science Investigations in Antarctica, Sienna, 4–6 October 1989

Edited by *C. A. Ricci*

Memorie della Societa Geologica Italiana, 46 (1991), 610 pp.

When I reviewed the proceedings volumes from the first two of the Italian Antarctic earth science meetings, held in Sienna (*Antarctic Science*, **3**, 113), I mentioned that a third meeting had just been held and no doubt we might look forward to another volume of proceedings before long. Within two years of the third symposium in 1989 another very substantial volume was indeed published by the Societa Geologica Italiana. And a substantial volume it is, with 610 pages and features hard to find in the cash-limited limited journals of today. There are colour photographs that show rocks as they really are in the field, four folded maps in a back pocket, a colour fold-out map, and even some seismic sections with coloured annotations (how much better they look than the boring black and white versions we usually have to put up with). There are also plenty of geochemical tables - this volume contains data, not just interpretations.

Naturally enough, the papers nearly all address topics in the main area of Italian Antarctic research, northern Victoria Land and the Ross Sea. However, not all the contributions are by Italian authors and two papers cover investigations on the opposite side of the continent, an indication of Italy's widespread and growing influence in the field of Antarctic science.

Fifty two papers are grouped into seven sections: Paleoclimatic and paleoenvironmental evolution of northern Victoria Land since the Cenozoic (10 papers), Structure and evolution of the Paleozoic margin of Antarctica in northern Victoria land (16 papers), Tectonics and magmatism in northern Victoria Land and the Ross Sea area since the Cenozoic (9 papers), Geothermics and water surface geochemistry (3 papers), Remote sensing analysis and its contributions to regional geology and glaciology (5 papers), Geophysical exploration of northern Victoria land, marine geophysics and geology of the Ross Sea (6 papers), and Geophysical observatories and geodesy (3 papers). All papers are in English with abstracts in English and Italian, and the wide range of topics covered means there is something of interest for a wide audience of earth scientists. The Italians have been extremely generous in distributing freely this expensive volume and anyone who is interested should have little difficulty in finding a copy in their library. Would that we all could afford to produce such a lavish volume.

M.R.A. THOMSON