Top Predators in Marine Ecosystems
Their Role in Monitoring and Management

The sustainable exploitation of the marine environment depends upon our capacity to develop systems of management with predictable outcomes. Unfortunately, marine ecosystems are highly dynamic and this property could conflict with the objective of sustainable exploitation. This book investigates the theory that the population and behavioural dynamics of predators at the upper end of marine food chains can be used to assist with management. Since these species integrate the dynamics of marine ecosystems across a wide range of spatial and temporal scales, they offer new sources of information that can be formally used in setting management objectives. This book examines the current advances in the understanding of the ecology of marine predators and will investigate how information from these species could be used in management.

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Edited by
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Preface

This book began its evolution in 1999 when the British Antarctic Survey, where I worked at the time, began a new research programme on the management of marine ecosystems. This programme concentrated upon the krill-based ecosystem at South Georgia which has been the subject of almost continuous study since the Discovery Expeditions in the 1920s. Latterly, international efforts to understand the dynamics of this ecosystem and the wider Southern Ocean have been coordinated by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). The daunting task of describing ecosystem dynamics over such a large oceanic area with relatively limited resources led to the establishment of the CCAMLR Ecosystem Monitoring Programme, an internationally coordinated effort at data collection. Among other things, this contained a major component of monitoring the seal and seabird populations in the region. The logic for their inclusion was that they foraged over most of the regions of interest but returned to breed at very well defined locations. By undertaking a series of measurements of these predators at these locations, it was then argued that aspects of the ecosystem dynamics should be reflected by variability in the measurements of the predators. It was hoped that appropriate choices of the predators and measurement variables would provide indicators of the dynamics of their prey at different spatial and temporal scales.

The same concept has been developed in parallel within other ecosystems during the past 20 years. The North Sea, California Current, northwest Atlantic, Bering Sea, Gulf of Alaska and Barents Sea are regions in which long-term monitoring studies of seabirds and seals are recognized as providing insights into ecosystem processes that can then be fed into the process of management. Even though the implementation and use of measurements has differed between regions, there has been a strong recognition that the interpretation of data about predator dynamics in the context of ecosystem dynamics can only be achieved on the back of basic research into the ecology of the species concerned. This book is, therefore, an effort

to synthesize across a range of studies that have examined the ecology of predators within the context of ecosystem approaches to management.

It is well recognised that people cannot manage ecosystems but can only manage their own activities within ecosystems. The concerns about the impacts of human activities upon ecosystems made this an appropriate subject for a symposium sponsored and hosted by the Zoological Society of London, and this took place in April 2004. At the same time, there was an opportunity to build upon two major programmes of research: one involving the Southern Ocean predators, mainly of krill, and being led by researchers at the British Antarctic Survey, and one on North Sea predators, mainly of sandeels, being undertaken by a consortium of researchers under the IMPRESS programme. The content of the book therefore reflects the interest in these two contrasting ecosystems but also includes representations from other ecosystems.

Production of this book would not have been possible without the interest and willing participation of the authors of each of the chapters and I am grateful to them for their efforts to share their research results and ideas and for delivering their manuscripts within the time and word limits. Since my background is in Antarctic research, it was essential also to include leadership in the project from the North Sea research community and I was fortunate to have the support of Sarah Wanless and Kees Camphuysen as co-editors of the book. I am grateful to Georgina Mace, Director of the Zoological Society of London, for supporting the proposal that developed into the symposium and this book, and to Deborah Body from the Zoological Society of London for all the assistance she provided in organizing the symposium and in the early stages of the production of the book. I am also grateful to Alan Crowden and others at Cambridge University Press for their encouragement and diligence during the production of the book.

I. L. Boyd