

Between conservation and catches

T.J. Pitcher

Marine Mammals and Fisheries. Edited by J.R. Beddington, R.J.H. Beverton and D.M. Lavigne. *Allen & Unwin: 1985.* Pp.354. £40, \$55.

INVASION of Earth by powerful, opportunistic and intelligent competitors for its fishery resources would immediately bring calls for their extermination. Yet in this role of conflict with our own species we already have marine mammals, native creatures evolved as part of the delicate balance of ocean ecosystems. Can the management and conservation of marine mammals, many of which by virtue of recent exploitation are rare and endangered species, be reconciled with the optimal control of fisheries? The 20 papers in this timely, readable and well-edited volume arose from a 1981 workshop in La Jolla which addressed the scientific basis of the question, mainly for seals and whales.

Two of the founders of quantitative resource assessment, Sidney Holt in a foreword, and Ray Beverton in Chapter 1, introduce the key issues. Marine mammals may affect catches by eating fish and squid; they may act as intermediate hosts to economically damaging parasitic nematode worms in fish; and they themselves may become lethally entangled in, and damage, fishing gear. Fishery/mammal conflict often brews up despite inconclusive evidence one way or the other, but it is difficult to produce unequivocal scientific analyses because our understanding of the population dynamics of marine mammals is limited: the complex social behaviour of marine mammals makes reproductive and feeding rates hard to predict. Holt considers that this book sets out "where we now are" in this field. I agree, and it does so with admirable clarity.

Beverton looks to technology to solve the entanglement problem, and sets the scene for many of the case studies later in the book. His main contribution, however, is cleverly to modify conventional fishery equations to show how fish stocks are affected by various levels of control imposed on the mammal population, and vice versa. Where the mammal is itself not exploited, his conclusion is that there is no optimal solution allowing coexistence and so the trade-off between fish yields and mammal conservation must be decided using other criteria. Beverton's analysis offers predictions of the consequences of decisions, but not the means for making them.

This theme is taken up in the second chapter by Colin Clark, a leading analyst of resource economics, who concurs that no conventional optimal management criteria favour mammal/fishery coexistence. Clark searches for a pragmatic solution reminiscent of John Pope's "minimum sustainable whinge" fishery strategy, which aims to produce the least dissatisfaction among the interest groups concerned. Maintenance of ecosystem integrity is also one of Clark's goals, although I wonder if ecologists could ever agree how to measure it.

Some time ago, Clark demonstrated how strongly-shoaling fish such as mackerel are easily overexploited because fishermen maintain good catches right up to the last shoal in the sea. Likewise, it pays marine mammals to prey upon these profitable food patches, exacerbating depletion of both mammal and fish populations. Clark advocates careful spatial partitioning of fishery quotas as the only solution.

Both of these opening chapters covering fundamental issues are stimulating and challenging. Twelve case studies, ranging geographically from California to Kerguelen, follow, and although they inevitably vary in approach the net is cast sufficiently wide for the general reader to find something of interest. Three chapters

particularly caught my attention.

Beddington and de la Mare critically describe models aimed at limiting the impact of Southern Ocean krill fisheries on the recovery of Antarctic whales. The role of such strategic simulation models is seen as guiding the acquisition of relevant information, thereby producing insight rather than mere data. Such laudable goals for ecological modelling are rarely achieved and the perceptive review in this chapter could help us get there more often.

Harwood and Greenwood examine dispassionately and in detail the scientific basis of the recent controversial government cull of Scottish grey seals: this chapter will be essential reading for conservationists. The cull had unanticipated and damaging consequences for the seals. Although killing them should increase fish catches, it has so far proved impossible accurately to quantify this effect, whether in numbers, weights or economic terms.

When pole and line capture for tuna changed to mechanized purse seining in the 1950s, dolphins often associated (for unknown reasons) with tuna schools began to be slaughtered in large numbers. Allen discusses the East Pacific yellowfin tuna fishery where one dolphin dies for every three tonnes of tuna landed. He analyses the costs of concentrating on tuna schools not accompanied by dolphins.

The final section of the book contains six reviews of methods of estimating fish consumption by marine mammals. These, I think, would have been more appropriately published in the specialized literature.

Marine Mammals and Fisheries will be indispensable for biologists working on the management of marine resources. It should also attract a wider readership among those concerned to resolve conflicts arising from our exploitation of other species with which we share this planet. □

T.J. Pitcher is a Senior Lecturer in the School of Animal Biology, University College of North Wales, Bangor, Gwynedd LL57 2UW, UK.

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Detail of a model of the Cap-Ferret submarine fan, a complex sedimentary body located in the south-eastern part of the Bay of Biscay. (Bathymetric curves are 50m equidistant, scale is c. 12.25km cm⁻¹; the numbers refer to features identified in the original.) The illustration is taken from *Submarine Fans and Related Turbidite Systems, the first volume in a new series, Frontiers in Sedimentary Geology, published by Springer-Verlag. Editors of the book are A.H. Bouma, W.R. Normark and N.E. Barnes, price is DM 220.*