

Cambridge University Press
978-0-521-41528-6 - Analysis of Vertebrate Pest Control
Jim Hone
Frontmatter
[More information](#)

How do we decide whether a particular vertebrate species can be classified as a pest? What is achieved by control of such pests? The approach advocated by Jim Hone uses statistical and economic analyses as well as mathematical modelling to determine the pest status of species and to analyse the effects of control on pest abundance and on the damage caused by pests. To do this the book reviews critically the literature on damage assessment and control evaluation. Links are then made to relevant topics in ecology, epidemiology, fisheries management and economics, showing how analyses in other scientific fields can be used in the analysis of vertebrate pest control.

The scope of the book is worldwide and many mammalian and avian pests are described using case studies. The emphasis is on the evaluation of data, rather than on specific control methods.

Cambridge University Press
978-0-521-41528-6 - Analysis of Vertebrate Pest Control
Jim Hone
Frontmatter
[More information](#)

Analysis of vertebrate pest control

Cambridge University Press
 978-0-521-41528-6 - Analysis of Vertebrate Pest Control
 Jim Hone
 Frontmatter
[More information](#)

Cambridge Studies in Applied Ecology and Resource Management

The rationale underlying much recent ecological research has been the necessity to understand the dynamics of species and ecosystems in order to predict and minimise the possible consequences of human activities. As the social and economic pressures for development rise, such studies become increasingly relevant, and ecological considerations have come to play a more important role in the management of natural resources. The objective of this series is to demonstrate how ecological research should be applied in the formation of rational management programmes for natural resources, particularly where social, economic or conservation issues are involved. The subject matter will range from single species where conservation or commercial considerations are important to whole ecosystems where massive perturbations like hydro-electric schemes or changes in land use are proposed. The prime criterion for inclusion will be the relevance of the ecological research to elucidate specific, clearly defined management problems, particularly where development programmes generate problems of incompatibility between conservation and commercial interests.

Editorial Board

Dr S. K. Eltringham. Department of Zoology, University of Cambridge, UK
Dr J. Harwood. Sea Mammal Research Unit, Natural Environment Research Council, Cambridge, UK
Dr D. Pimentel. Department of Entomology, Cornell University, USA
Dr A. R. E. Sinclair. Institute of Animal Resource Ecology, University of British Columbia, Canada
Dr M. P. Sissenwine. National Marine Fisheries Service, Maryland, USA

Also in the series

Graeme Caughley, Neil Shephard & Jeff Short (eds.) *Kangaroos: their ecology and management in the sheep rangelands of Australia*
 P. Howell, M. Lock & S. Cobb (eds.) *The Jonglei canal: impact and opportunity*
 Robert J. Hudson, K. R. Drew & L. M. Baskin (eds.) *Wildlife production systems: economic utilization of wild ungulates*
 M. S. Boyce *The Jackson elk herd: intensive wildlife management in North America*
 Mark R. Stanley Price *Animal re-introductions: the Arabian Oryx in Oman*
 R. Sukumar *The Asian Elephant: ecology and management*
 K. Homewood & W. A. Rodgers *Maasailand ecology: pastoralist development and wildlife conservation at Ngorongoro, Tanzania*
 D. Pimentel (ed.) *World soil erosion and conservation*
 R. J. Scholes & B. H. Walker *An African savanna: synthesis of the Nylsvley study*
 T. D. Smith *Scaling fisheries: the science of measuring the effects of fishing 1855–1955*

Cambridge University Press
978-0-521-41528-6 - Analysis of Vertebrate Pest Control
Jim Hone
Frontmatter
[More information](#)

ANALYSIS OF VERTEBRATE PEST CONTROL

Jim Hone

Applied Ecology Research Group, University of Canberra, Australia



CAMBRIDGE
UNIVERSITY PRESS

Cambridge University Press
 978-0-521-41528-6 - Analysis of Vertebrate Pest Control
 Jim Hone
 Frontmatter
[More information](#)

Published by the Press Syndicate of the University of Cambridge
 The Pitt Building, Trumpington Street, Cambridge CB2 1RP
 40 West 20th Street, New York, NY 10011-4211, USA
 10 Stamford Road, Oakleigh, Melbourne 3166, Australia

© Cambridge University Press 1994

First published 1994

Printed in Great Britain at the University Press, Cambridge

A catalogue record for this book is available from the British Library

Library of Congress cataloguing in publication data

Hone, Jim.

Analysis of vertebrate pest control / Jim Hone.

p. cm. – (Cambridge studies in applied ecology and resource management)

Includes bibliographical references (p.220) and index.

ISBN 0 521 41528 4 (hardback)

1. Vertebrate pests – Control – Evaluation – Statistical methods. 2. Vertebrate pests – Control – Mathematical models. 3. Vertebrate pests – Research – Statistical methods. 4. Vertebrate pests – Mathematical models. I. Title. II. Series.

SB993.4.H66 1994

632'.66–dc20 93-49727 CIP

ISBN 0 521 41528 4 hardback

CONTENTS

<i>Preface</i>	xi
1 Introduction	1
2 Statistical analysis of damage	8
2.1 Types of damage	9
2.2 Spatial and temporal variation	9
2.3 Evaluation of damage	12
2.4 Predation of livestock	22
2.5 Infectious diseases	29
2.6 Rodent damage	33
2.7 Bird strikes on aircraft	37
2.8 Bird damage to crops	40
2.9 Rabbit damage	45
2.10 Conclusion	47
3 Statistical analysis of response to control	49
3.1 Effect of control on damage and pests	50
3.2 Effect of pests on control	51
3.3 Spatial and temporal aspects	52
3.4 Evaluation of control	53
3.5 Poisoning	58
3.6 Trapping	64
3.7 Fencing	67
3.8 Aversive conditioning	69
3.9 Chemical repellents	71
3.10 Sonic devices	71

viii	<i>Contents</i>	
3.11	Biological control	72
3.12	Shooting	76
3.13	Chemosterilants	77
3.14	Multiple evaluations	77
3.15	Predation control	78
3.16	Control of infectious diseases	80
3.17	Rodent damage control	85
3.18	Control of bird strikes on aircraft	88
3.19	Control of bird damage to crops	89
3.20	Rabbit damage control	91
3.21	Control of predation of rock-wallabies by foxes	93
3.22	Non-target effects of control	96
3.23	Conclusion	99
4	Economic analysis	102
4.1	Objectives	103
4.2	Types of analysis	103
4.3	Spatial and temporal aspects	110
4.4	Predation control	112
4.5	Control of infectious diseases	114
4.6	Rodent damage control	115
4.7	Control of bird strikes on aircraft	117
4.8	Control of bird damage to crops	117
4.9	Rabbit damage control	119
4.10	Conclusion	121
5	Modelling of populations and damage	123
5.1	Uses of models	124
5.2	Types of model	124
5.3	Modelling pest population dynamics	125
5.4	Modelling damage	142
5.5	Predation of livestock	149
5.6	Infectious diseases	149
5.7	Rodent damage control	163
5.8	Bird strikes on aircraft	164
5.9	Bird damage to crops	164
5.10	Rabbit damage	165
5.11	Erosion and vertebrate pests	165
5.12	Conclusion	168

Cambridge University Press
978-0-521-41528-6 - Analysis of Vertebrate Pest Control
Jim Hone
Frontmatter
[More information](#)

<i>Contents</i>	ix
6 Modelling of control	170
6.1 Models of the response of pest populations to control	171
6.2 Spatial and temporal aspects of control	179
6.3 Poisoning	182
6.4 Biological control using pathogens	193
6.5 Shooting	195
6.6 Fertility control	201
6.7 Predation control	205
6.8 Control of infectious diseases	205
6.9 Rodent damage control	212
6.10 Control of bird strikes on aircraft	213
6.11 Control of bird damage to crops	213
6.12 Rabbit damage control	213
6.13 Non-target effects of control	213
6.14 Conclusion	214
7 Conclusion	216
<i>References</i>	220
<i>Author index</i>	247
<i>Subject index</i>	254

PREFACE

The idea for this book developed out of my interest into how other scientists had estimated the damage by vertebrate pests and the effects of vertebrate pest control. How did scientists obtain data and how did they analyse it? Was it of any use? In writing this book I have attempted to collate and critically comment on information on a variety of topics in vertebrate pest control. The collation is not exhaustive. Many good studies have not been used simply because of limited space.

I thank many people for assistance with discussions and comments on draft manuscripts. Graeme Caughley and Tony Sinclair of the editorial board of the books in this series assisted with discussions and negotiations. Roger Pech, Peter O'Brien, Glen Saunders, David Choquenot, John Parkes, Graham Nugent, Chris Frampton, Clem Tisdell, Peter Whitehead, Mary Bomford, Mike Braysher, George Wilson, Peter Brown, Chris Cheeseman, Stephen Harris and Astrida Uptis provided useful comments. The ideas and details are, however, mine, so blame me for any errors or omissions. Fellow staff and students at the University of Canberra tolerated my occasional absences to write the book. Staff at the Central Science Laboratory, Worplesdon, Surrey, provided discussions and facilities. I am grateful to them all. I also thank Alan Crowden and Alison Litherland of CUP for editorial assistance.

Finally, I am an ecologist, not a biometrician, economist or mathematician. I have attempted to bring their fields of study a bit closer to my own and that of my fellow ecologists. I hope that fellow ecologists can, and do, use the results, though they should not expect to be spoon-fed. In the words of a much greater author, 'I should not like my writing to spare other people the trouble of thinking. But, if possible, to stimulate someone to thoughts of his own' (Wittgenstein, 1967).