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BLACK EAGLE *AQUILA VERREAUXII* PREDATION ON ROCK HYRAX *PROCAVIA CAPENSIS* AND OTHER PREY IN THE KAROO

PhD **UP** **1994**

BLACK EAGLE *AQUILA VERREAUXII* PREDATION ON ROCK HYRAX *PROCAVIA CAPENSIS* AND OTHER PREY IN THE KAROO

by

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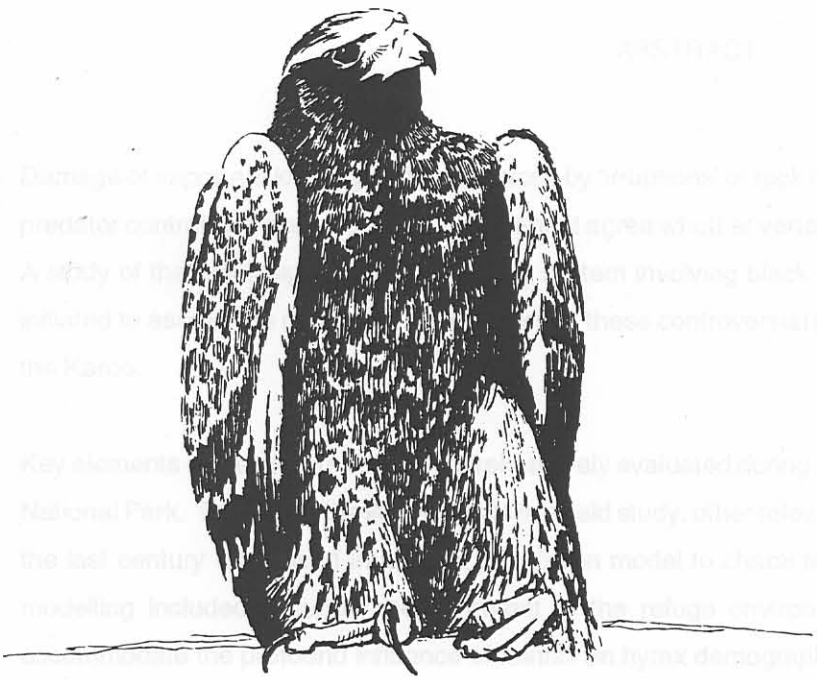
submitted in partial fulfilment of the
requirements for the degree of

Ph.D.

in the Faculty of Science
UNIVERSITY OF PRETORIA
PRETORIA

March 1994



to my parents, and everybody else who has helped with this research, especially Samburu

Black eagle *Aquila verreauxii* predation on rock hyrax *Procavia capensis* and other prey in the Karoo

by

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ABSTRACT

Damage of important karoo grazing resources by 'irruptions' of rock hyrax *Procavia capensis* has been blamed on predator control, but many ecologists still cannot agree whether vertebrate predators limit/regulate vertebrate prey. A study of the highly specific predator-prey system involving black eagles *Aquila verreauxii* and rock hyrax was initiated to assess the demographic influence of these controversial predators on their prey, including livestock, in the Karoo.

Key elements in the system were comprehensively evaluated during a five year field study in and around the Karoo National Park. To escape the limitations of this field study, other relevant field research and karoo climatic data over the last century were used in a hyrax population model to characterise the long-term action of predation. This modelling included accurate measurement of the refuge environment and a simple lower trophic model to accommodate the profound influence of rainfall on hyrax demography in this water-limited environment.

The system differed from other typical predator-prey systems. Unlike cyclic prey, hyrax populations are not regularly destabilised by delayed specialist predation. They fluctuate irregularly in response to climate, but unlike other environmentally-modulated predation systems, hyrax populations do not naturally escape 'regulation' by their predators. These characteristics can be attributed to a permanent, patchy refuge resource which confers a high degree of stability on the system: hyrax are effectively protected within rocky habitat, and vulnerable to efficient predation beyond it.

The 'safe feeding area' available to hyrax is fixed, and was evident as a distinct vegetation zone around rock outcrops. But the number of hyrax supported within this safe habitat varies with climate, and greater protection offered to growing populations after rains is another unusual feature of this system.

Unlike sympatric generalist predators, black eagles pursued hyrax prey despite low availability. By removing a substantial number of hyrax which were otherwise unlikely to die, black eagles limited hyrax population growth during the study period, and they exerted hard selection on adult hyrax. Coevolution between eagles and hyrax was indicated from certain reciprocal behavioural and morphological traits.

The population model indicated that a recent widespread decline in hyrax populations was caused by enrichment of hyrax food supplies during the 1970's, followed by sudden, severe drought. Exhaustion of pasture in arid environments may occasionally drive hyrax from their refuge habitat, and this behaviour change was probably perceived as population increases or 'irruptions' in the past.

The model demonstrated that the full complement of predators can remove surplus hyrax not supported by the refuge habitat, and 'regulate' hyrax numbers around the number of protected prey (this number varied stochastically with climate, so the predation response was 'availability dependent' not density dependent). Intense predator control probably severely hindered the removal of surplus hyrax during the 1940's drought.

The cost of hyrax surpluses predicted in the absence of predation by black eagles outweighed the overall cost of lamb-killing by black eagles by 150 times. Tolerance of such compatible predators should help restore the ecology on karoo farmland to some of its former diversity and stability.

ACKNOWLEDGEMENTS

In 1986 I approached Professor John Skinner of the Mammal Research Institute at the University of Pretoria with the idea of initiating a study on the predation of rock hyrax in the Karoo. Prof. Skinner has helped me carry out this project unfailingly ever since, by endorsing, supervising and administrating the project and by contributing financially from his own private research funds at the University. I thank him for making this research possible, and for all the advice, friendship and interest that I received from him and from his wife Patsy.

Most of the running costs of this project were covered by an extremely generous sponsorship from South African Eagle Insurance Co. Ltd., which was facilitated by Dr. John Ledger. This company has taken a very active role in eagle conservation, and they showed a particularly genuine concern that the present research should clarify the role of large eagles on farmland. I thank Fred Hasslett and Peter Martin for seeing fit to making this donation, and especially Ann Marklew for organising it all, and for the special interest that she and through her, many others at S.A. Eagle, took in Samburu's early adventures. Other financial contributors to the project were the Mammal Research Institute, the National Parks Board who sponsored the development of a geographical information system of the study area, and the African Raptor Information Centre who contributed to expenditure on one of the later field trips. I thank the Foundation for Research Development for supporting me with a doctoral bursary throughout the field work.

Many others contributed to this project by helping with equipment. Geographical Information Management Systems (GIMS) in Midrand allowed me the use of sophisticated GIS software which proved invaluable for analyses and presentation in this thesis - I especially appreciated the interest that Steve Hine, Richard Lees, Shane Clarke, Vasco Nunes, Jillian Muller & Colin Childs of GIMS showed in this particular application of their software. I also received help from GIMS and from the GIS lab at the University of Pretoria (see later) in use of the software. Other computer hardware and software used in this project were supplied at a very reduced rate by Keith Musgrave of Diginet Systems and Paul Moses of Software Connection. Climbing equipment was kindly loaned to me by Richard Wilmot, and supplied at low cost by Camp and Climb (Pty Ltd.). Kevin Deutchman at Agfa enthusiastically organised all the super-8 mm cine film for time-lapse photography at eagles' nests and this represented a huge saving. Many private cine owners let their cameras go 'for a song' for the project, including Keith Musgrave of Diginet Systems who donated many hours of his precious time to design and construct a time-lapse circuit and weather-proof housing for the cameras. The Wildlife Society of southern Africa provided a motorbike for a year. Leon Fourie allowed me the use of his hyrax traps, and Lucius Moolman (National Parks Board) and Dr. Dirk Brand (Cape Nature Conservation) helped by loaning cage traps for caracals. Dr. Neil Fairall (Cape Nature Conservation) supplied four radio collars for caracals. Gerrit van Urk and Chris Heunis of Potchefstroom University took great interest in developing a possible remote tracking system for black eagles. All who contributed with equipment expressed sincere interest in the success of the project and I thank them for that.

In the Karoo I experienced friendship and hospitality from many landowners - I am especially grateful to Richard Wilmot, Christie Mocke, Dantjie Nel, Oom Piet de Villiers, Jannie Swiegers and Danie Conroy for allowing me to study eagles on their properties and for their weakly-concealed love of these birds; and thanks to all the other farmer friends who boasted to me how many eagles they had shot today but in reality wouldn't ever dream of it. Verner and Moira Coster took such care of their eagles that it was sometimes difficult, even as an eagle biologist, to get anywhere near them! I would also like to thank those farmers who held judgement with regard to 'problem' eagles on their properties and offered me the opportunity of investigating these situations. Rory Allardice, Rob Erasmus and Dr. Morné du Plessis helped me with two such investigations. But the landowners or custodians I owe the most to are the National Parks Board for allowing me the privilege of working in the spectacular Karoo National Park, and for providing me with wonderful on-site accommodation for the first three years of fieldwork. The staff of the Karoo National Park were great to work with and all took a very active interest in this research, but I would especially like to thank the warden, Harold Braack, his wife Toni and their two sons Joe and Michael for making the park such a very fascinating and very friendly place to work in and for helping me in so many ways. I am also grateful to Nick Geldenuys, Dr. Anthony Hall-Martin, Dr. Rod Randall, Peter Retief and Francine

van Heerden for supporting this research in a National Park. I would also like to thank Dries Engelbrecht (current warden of the KRNP) for allowing me to complete my research, and Henriette Engelbrecht for making sure all visitors to the park learned about their raptors. For the last year of fieldwork I thank the Beaufort West Municipality for allowing me to live in the palatial departure lounge of the Beaufort West airport and for allowing Samburu to live in the control tower.

I had a tremendous amount of help with many aspects of this project, and the chapters on red rock rabbits and caracals in this thesis simply would not have been possible without field assistance. I am very grateful to Elsabe Aucamp who did most of the field work on red rock rabbits which involved arduous line transects through treacherous terrain, and many cold, dark nights chasing bunnies with spotlights, nets and sprained ankles. Richard Wilmot and Esme Loubser helped to make this fun, and Esme spent many hours looking for drollejies that glow in the dark! Dave Pepler, Andrew Duthie, Dr. Andrew McKenzie and Dr. George Ellison all helped with advice on this rabbit research. Sascha Klemm, assisted by Bennet Smith, set the cage traps for caracal in the park and diligently checked these every morning until we had captured two cats. Dr. Dirk Brand from Cape Nature Conservation provided useful advice throughout and made a special trip up to the park to help us catch two more cats. We then spent many hours walking around the park at night to try and radio-locate these animals. Colin Valet, Ken Findlay and Mike Musgrave helped us with this task. The radio-tracking was unsuccessful but I would like to thank Sascha for his efforts, for still providing very useful data on trapping success, and especially for his good company. Gus van Dyk at the Mammal Research Institute very kindly and competently analysed the prey contents of caracal scats collected in the park.

I was very fortunate to be able to call on expert advice and assistance in other crucial aspects of this research. Brigitte Randall and Katryn van Heerden helped me to conduct analyses of the vegetation zones surrounding hyrax colonies, even to the extent of counting 'dassie drollejies'. David Shearing helped us to identify the plants that we found. At the South African Museum in Cape Town Dr. Graham Avery shared his great archaeological knowledge and showed immense patience by painstakingly helping me to identify and match up literally thousands of bone fragments collected from eagle feeding sites. Esme Loubser helped me work through mountains of decomposing dassie skulls, with only occasional exclamations of disgust. Dr. Margaret Avery supplied relevant literature and also helped identify smaller prey items. Dr. André Boshoff and Guy Palmer generously allowed me access to their data and to their extensive collections of black eagle prey remains from around the Cape for the purpose of age-classification of hyrax material. Dr. J. C. Vogel of the CSIR in Pretoria determined the age of some black eagle nest material by radiocarbon dating. Drs Hector Dott and Willem Ferguson, with their great computing skills, helped take the mystery out of computer modelling for me. Willem in particular gave me an enormous amount of his precious time and thoughtfully contributed to the biological rationale of the model as well as to the workings of the program. Willem also kindly translated the summary of this thesis into Afrikaans. It was a great pleasure to work with Prof. Willem van Riet, Jan van Rensburg, Lourens du Plessis, Barend Terblanche and all the other staff of the GIS lab. at the University of Pretoria who organised the data capture for a GIS of the study area at very low cost, and who patiently helped me solve all the bugs. I would especially like to thank Jan for his time, his advice and for constructing a 'TIN' model of the KRNP (page 17), and also Stuart Slabbert and Thomas Minnie who put in the long hours digitizing contours and rock outcrops in precise detail.

In the field, I also had much help with the annual counts at hyrax colonies, especially from Marius van der Merwe and Gus van Dyk who uncomplainingly climbed mountains before dawn on many early December mornings to count the hyrax as they emerged. Esme Loubser, Mark and Tanja Anderson, Francine van Heerden, Anisca Henning, Neil and Jenny Joseph, Dr. Phil Richardson, Dr. Neil Fairall and my brother Andrew were also a great help with these counts. Another task for which I managed to enlist the help of many family and friends was the collection of prey remains from under some very inaccessible black eagle nest cliffs, and I would like to thank Andrew Davies, Colin, David, Marilyn and Ronell Forbes, Richard Wilmot, Lindy Rodwell, Mark and Tanja Anderson, Joe Braack, Jaco Loubser, David Allan, Dr. Phil Richardson, Eugene Marais, Tanja Hermann, Dr. Peter Apps, Alan Martin, Stuart Lacey and Gus Butler for all searching enthusiastically in the heat of the day for little white bone fragments on steep screes. One of the very lucky breaks in this project was finding a mountaineer, Richard Wilmot, who lived next to the park and I thank Richard for getting me safely to and from many eagle

nests. I also thank William Mafekiso and Jacobs Esau for providing such safe anchor lines. David Allan and Marius van der Merwe also helped scale some difficult cliffs. Trevor de Kok, Peter Steyn, Kevin Deutchman and Bob Bloomfield made useful observations from a hide at a black eagle nest. I would like to thank Mike Musgrave, Joe Braack, Bonnie Schoeman and Mark Pienaar for helping me track some elusive eagle pairs. Mannetjies Moolman and Pele Benadie took great care to monitor one important eagle nest site for me. I thank Mark Boobyer and ranger Morné du Plessis for helping with battery changes at some of the time-lapse cameras, and especially Conrad Wessels who put in very long hours peering into a cine viewer to record eagle behaviour on the nest in infinite detail.

I would like to thank the following for helping me with relevant data for the project: Dr. Alan Kemp for morphometric data on eagles; Dr. J.M. Thiollay for information on black eagle distribution; Dr. Neil Fairall for data on hyrax in the Karoo National Park prior to this research; Dr. André Boshoff, Guy Palmer, Graham Avery and M. Jarvis for access to their black eagle prey remain collections; Dr. Rod Randall and the National Parks Board for the Karoo National Park census data; the weather bureau, the National Parks Board, Jack Jonkers of the Beaufort West weather station, George Banfield, and Dr. Jeanette Lindesay of the Climatology Research Group for weather data; Louis du Pisani and Danie Olivier at Grootfontein Agricultural College, Richard Wilmot and Andrew and Danie Conroy for statistics on karoo veld and farming; Dr. Dirk Brand and Dr. Peter Norton of Cape Nature Conservation, and Jannie Swiegers for data on problem animal control; Fanie Bekker for his important findings from field necropsies on lamb carcasses; Lucius Moolman for information on caracals; Dr. Leon Fourie for information on hyrax. I would also like to specially thank Elna Randall and the Inter-Library Loans Dept. at the Merensky library for making such great efforts to acquire many obscure documents from remote corners of the globe.

This thesis has also benefited enormously from the many stimulating discussions or correspondences that I have had with Dr. Alan Kemp, Dr. Willem Ferguson, Dr. Neil Fairall, David Allan, Harold Braack, Dr. Phil Richardson, Dr. André Boshoff, Clive Webber, Dr. Graham Avery, Dr. Leon Fourie, Dr. Margaret Avery, Guy Palmer, Peter Steyn, Ken Ferguson, Dr. Peter Apps, Dr. Albert van Jaarsveld, Dr. Pieter Botha, George Banfield, Dr. Rod Randall, Arthur Bowland and most especially Val Gargett who shared her great knowledge of black eagles with me, unselfishly, right from the start. I'd also like to thank Val and her publisher, Eleanor-Mary Cadell of Acorn books, for granting me permission to use the sketches from 'The Black Eagle' to illustrate this thesis. Anseri Swanepoel helped by scanning many of the figures for me. Dr. André Boshoff and Clive Webber kindly took the time to comment on early drafts of certain chapters. Dr. Rudi van Aarde, Dr. Andrew McKenzie, Dr. Rafi Ben Shahar and Johan van Jaarsveld freely offered their advice on certain aspects of methodology. I would like to thank them all for helping me to unravel some of the secrets of this predator-prey system.

I am grateful to the Transvaal Provincial Administration for allowing me to remove an eaglet from a nest in which siblicide was occurring, and to the National Parks board for kindly permitting me to keep 'Samburu' in the Karoo National Park. The experience of raising and releasing this bird gave me an understanding of black eagles that I could not have gained any other way. I also owe a great deal of my happiness while staying in the park to Samburu. I would like to thank Hendrick de Bruin, Simon Bilikwa, Joe Braack, Mike Braack (sorry about the boot), Toni Braack (sorry about the tourists), Sascha Klemm, and Jaco Loubser for the great care they took of Samburu when I was away. John Varty (sorry about the scratch) contributed to Samburu's keep. The marksmanship skills of Joe Braack and Pieter Ryan supplied Samburu and myself with dassie material. That leaves Pat Wolfe and Piet Otto to thank for getting me airborne with the eagles, and Popaye Nteyi for brightening every day and teaching me Xhosa. There are still many things that I need to thank Esme Loubser, Harold, Toni, Joe and Michael Braack, and Richard Wilmot for, but I'd just like to thank them finally for all the fun and friendship, and Esme for all her warmth and laughter.

But the two I need to thank the most are my parents, Alan and Marilyn Davies, who are really the major sponsors behind this project. I would like to thank them both, from my heart, for all the encouragement and support that they have provided every single small step along the way, and for taking such a wonderful interest in what I was doing. I hope that they, and everybody else who has assisted with this project, have shared some of the great pleasure that it has given me, and that this 'team effort' will be of future value, both to eagles and to people.

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