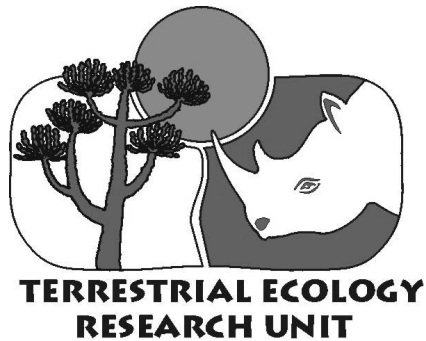


# **TERRESTRIAL ECOLOGY RESEARCH UNIT**

## **ANNUAL REPORT 2005**

Nelson Mandela Metropolitan University



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## INTRODUCTION

The formation of the Terrestrial Ecology Research Unit (TERU) was approved by the Council of the University of Port Elizabeth in 1991, in response to a need for terrestrial ecology training opportunities for postgraduate students and for terrestrial ecological research by conservation and environmental management agencies. TERU began operating in 1992, within the Zoology Department, and in 1997 it received Council recognition as a research unit within the Faculty of Science. In 2005, TERU was registered as a Centre within the Faculty of Science of the Nelson Mandela Metropolitan University.

TERU comprises staff and postgraduate students of the Zoology, Botany and Geography Departments, with an Advisory Board comprising representatives of State, NGO and private conservation and environmental management interests.

This is the fourteenth Annual Report and deals with the activities of TERU during 2005.

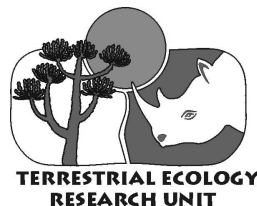
### VISION

The Vision of TERU is to achieve, by 2006, national and international recognition as a terrestrial ecology research and postgraduate training unit of excellence.

### MISSION

The Mission of TERU is to develop scientific knowledge of the ecology and conservation of terrestrial ecosystems, especially in the Eastern Cape and adjacent regions of high biodiversity, which will enable communities to make wise environmental management decisions. In achieving its Mission TERU will build human capacity through postgraduate training.

The mission and vision of the Terrestrial Ecology Research Unit is aligned with the Nelson Mandela Metropolitan University's mission and strategic directions, in the context of the fields in which TERU operates.



## DIRECTOR' S REPORT

As a university-based research and post-graduate training entity, TERU's achievements are measured in terms of research outputs, student training and the contribution towards achieving the University's vision to serve as an engaged institution. I am pleased to report that TERU has made a significant contribution towards achieving its and the University' goals in 2005. Outputs include 7 refereed scientific articles, 2 contributions in conference proceedings, 5 reports, and 3 popular articles, with 29 conference presentations being delivered. Furthermore, 9 Honours students, 11 MSc students and 2 PhD students participated in TERU research programmes during the year. I am also very pleased to report that 2 MSc students and 2 Phd students graduated in 2005. Congratulations to them on the successful outcomes of their hard work. The above figures may suggest an overemphasis on producing conference presentations rather than (subsidisable) scientific articles, but the value of conference presentations in disseminating ideas and building student confidence can not be overemphasized. We in TERU do however need to take up the challenge of converting conference presentations to published articles.

Funding is still moderate compared to the peak years when considerable Global Environment Facility funding was flowing into TERU. However, the current levels of funding are probably more realistic and sustainable, and do not seem to be reflected in a downturn in student numbers or research outputs. As always however, finding funds to operate TERU (as opposed to project funds) remains a challenge.

The growth of TERU has seen a corresponding growth and increased turnover of staff. Michelle Hearne (administrative assistant) left TERU at the end of 2004 to pursue other interests, and she has been replaced by Tracey Milne, who is an MSc student. Tracey's understanding of scientific issues has proved invaluable in this position, as she has been able to make a substantial contribution to TERU's operation at an administrative and research level. Margot Collett has joined TERU as project manager for the 21<sup>st</sup> Meeting of the Society for Conservation Biology, and is embracing this rather daunting task. Anthony Uithaler has completed his contract as field research assistant for the springbok project. Unfortunately Richard Cowling has elected to continue his research outside the auspices of TERU, and I would like to take this opportunity to thank him for the significant role that he has played in the last couple of years.

The strategy of attracting post-doctoral fellows continues, and is supported by the high levels of research output achieved by our postdocs. I would like to welcome Dr Adrian Shrader who joined TERU in June and promptly headed to the field for six months to collect masses of data. On a more personal note, I would like to congratulate Matt Hayward (Postdoc – Predator project) and Gina Dawson (volunteer - Predator project), who got married in November.

The company that you keep is a useful measure of quality, and in this respect the collaborative partners with whom TERU staff and students work reflect well on TERU, in addition to adding considerable depth to our capacity. Current collaborators include: Prof. Burt Kotler (Ben-Gurion University of the Negev, Israel), Prof. Joel Brown (University of Illinois, Chicago, USA), Prof. Shane

Malony (university of Western Australia) and Prof. Duncan Mitchell, Dr. Andrea Fowler, and Prof. John Maina (University of Witwatersrand).

TERU achieved another first during 2005, in attracting Fullbright Scholar Dr Jeff Langholz to spend a year at TERU, starting midyear. Jeff's interests revolve around private game reserves and he is taking the opportunity to research these here in the Eastern Cape, while writing a book on private reserves. Jeff's global perspective has certainly broadened our understanding of private reserves.

The Nelson Mandela Metropolitan University undertook a rigorous process to evaluate and categorise all non-academic research entities during 2005. This process required considerable input in terms of information regarding structure, staffing, governance and productivity of each entity. I am very please to report that TERU was unconditionally recognized as operating at the level of a "center", with the only recommendation that a name change to suite this elevated status may be considered. This evaluation therefore clearly recognized the value of TERU's outputs as well as the strength of its governance and structures. I would like to thank Prof. T Ogude, Deputy Vice Chancellor of NMMU and her evaluation team for the advice and feedback provided in this process, as well as their expression of confidence in TERU.

As always TERU's successes have been a team effort and I would like to thank all of the staff and students for the positive roles that they have played in this last year. The TERU team is far broader than this as it also encompasses our funding partners. A special thanks to our funding agencies, particularly the Nelson Mandela Metropolitan University, that supported TERU's training and research activities and facilities over the last year.

**Prof. G I H KERLEY**  
**DIRECTOR: TERRESTRIAL ECOLOGY RESEARCH UNIT**

## RESEARCH ACTIVITIES

Research activities are grouped into themes, and are reported within these on a biome or project specific basis.

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### CONSERVATION BIOLOGY

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*This theme seeks to identify priorities in terms of areas and implementation options for the efficient and effective long-term conservation of populations, species, habitats, and the ecological and evolutionary processes that maintain them.*

**Elephant:** Katie Gough (MSc student) has continued her data collection on the interactions among the Addo elephants, looking primarily at inbreeding avoidance and competition levels between individuals. The population demographics and the influence of density dependence on the population were also investigated by examining the long term records. A key finding is the lack of density dependence exhibited by this elephant population. This has important implications for the conservation management of this growing population and its impact on the park's vegetation and Katie has submitted a manuscript to *Oryx* on this work. She was invited to present her findings at the 6th International Student Conference on Conservation Science in Cambridge, and is in the process of applying to upgrade her studies to that of PhD level.

**Black rhinoceros:** Marietjie Landman (PHD student) is continuing her study on the foraging ecology of black rhinoceros. She has shown that black rhinoceros have a broad diet that reflect the variations in food availability; their foraging does not reflect browse availability on a landscape-level, and that black rhinoceros foraging opportunities are compromised by elephant and goat foraging. She is currently preparing her work for publication.

**Bontveld phytosociology:** Eileen Campbell has shown that this vegetation type is distinct from Eastern Cape Bushclump savannas. Furthermore, distinct associations of plant species are found where Bontveld occurs on calcrete. Indicator species have been identified and this will enable the development of a conservation plan for this previously poorly recognized landscape-level component of biodiversity.

**The Baviaanskloof Mega-reserve project:** This is a multi-year initiative to establish a mega-reserve in and around the biodiversity-rich Baviaanskloof Nature Reserve, some 80 km to the NW of Port Elizabeth. This reserve is a proclaimed World Heritage Site. The aim of the mega-reserve is to create an environmentally, socially and economically sustainable biodiversity-based conservation and development opportunity. The project entered its second year of existence in early 2005 and TERU was commissioned by the Baviaanskloof Project Management Unit to compile a high quality colour publication to mark this milestone. This document, compiled by André Boshoff, covered the following aspects of the project: the steps leading up to the establishment of the mega-reserve, the natural and cultural diversity of the area, opportunities provided by the mega-reserve, the environmental, institutional and socio-economic pressures facing the mega-reserve, the conservation strategy being

followed, and progress to date. The document was successfully used by the PMU to report progress to funders, create links with new funders and engage with neighbours and a wide range of other stakeholders.

**The Cape vulture:** *Gyps coprotheres*, a South African near endemic, is listed in the SA Red Data Book - Birds as a threatened species. It was once common and widespread in the Eastern Cape but a number of pressures over the years has significantly reduced the species' range and numbers there. The Eastern Cape Parks Board (ECPB) is exploring ways that it can contribute to the conservation of the species in the province. Towards this end, the ECPB commissioned TERU (André Boshoff) to research and report on the status of the species in the province, on the factors impacting on the population, and on recommended actions by the ECPB to maximise the contribution of its reserves to stabilising, and possibly increasing, the regional population.

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## **ANIMAL-PLANT INTERACTIONS**

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*This theme seeks to develop an understanding of the nature of the interactions between animals and plants, and a predictive understanding of perturbations associated with animal impacts on communities and ecosystems.*

**Comparative feeding behaviour of domestic animals (sheep and goats):** Mpumzi Mayekiso completed his MSc thesis comparing feeding behaviour of sheep and goats, and his findings supported the hypothesis that body size alone is not a suitable predictor of the feeding impacts of domestic stock. He demonstrated that different breeds and species varied extensively in feeding impacts. His thesis has been submitted for examination.

**Seed dispersers and the impacts on seeds:** Shavaughn Davis (MSc student) is extending our understanding of the interactions between seed dispersers and seeds, focusing largely on the effects of ingestion by herbivores on the viability and germinability of thicket seeds. She has also investigated the role of jackal as seed dispersers and her analysis of a large scat collection has shown that jackal disperse few seeds, despite their omnivorous diet.

**Feeding impacts of elephants:** Joan Lessing (MSc student) has been measuring feeding impacts of elephants, both in controlled availability experiments as well as in the field. Her findings clearly demonstrated that elephants prefer to feed at lower levels, probably reflecting their evolutionary background as grazers.

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## **RESOURCE ECOLOGY**

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*This theme seeks to develop a predictive understanding of the responses of biota to different forms of utilization, and of how these natural resources are utilized.*

Many of the projects listed under other themes also contribute towards the goals of this theme.

**Survival of spekboom seedlings:** Neels de Ridder (MSc student) has completed his study on the survival of spekboom seedlings. His findings show

that pastoralism appears to be incompatible with vegetation sustainability in Xeric Succulent Thicket, and game farming is the only land use where regeneration of this keystone species is successful. Investigations into the recruitment and survival potential of spekboom seedlings showed that suitable conditions for *P. afra* seedling survival were in moderately dense bush (with moderate plant competition and exposure); close to parent plants; non-drought conditions; and the absence of goats. Overall, seedlings had low survival rates (most trials had a median seedling number of 0 after 4 years although maximum seedling numbers were always greater than 0). It is therefore recommended that the re-establishment of spekboom by means of seedlings, within degraded Thicket areas is to be relied upon.

**Wildlife-based venture in Tyefu:** Phozisa Mamfengu (Msc student) is investigating the potential to establish a community run wildlife based venture in the Tyefu area of the Ngqushwa (Peddie) district. She is using GIS to integrate data on vegetation, transformation, human settlement and potential wildlife communities, and has made excellent progress with collecting and analyzing her data.

**Feeding dynamics of goats in the semi-desert Riemvasmaak:** Adrian Shrader (Postdoc) is working on the factors influencing the foraging of goats in the semi-desert Riemvasmaak in the Northern Cape. The factors tested included time of day (i.e., stomach fill), distance from kraal, availability of water, social information and fear. This is a novel and exciting approach to understanding resource use and foraging decisions by domestic herbivores using quitting harvest rates. Adrian completed his fieldwork over the second half of the year with the help of four workers from the Riemvasmaak community. Presently, Adrian is analysing and writing up a series of manuscripts. The first of these addresses the use of social information by goats and the effect that the resulting competition has on intake rate.

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## **PREDATOR PREY INTERACTIONS**

*This theme seeks to understand the nature and consequences of predator prey interactions, to provide guidelines for the management of predators and their prey.*

**Impacts of reintroduced predators in Thicket:** Matt Hayward, has been leading this project as part of his postdoctoral research. He has been monitoring the reintroduced lion, spotted hyaena and leopard populations in Addo Elephant National Park and amassing considerable information on their diet, resource use, hunting success, home range, habitat use and intra- and inter-specific interactions. He has also analysed published information on prey preferences of Africa's large predator guild and has one paper accepted and another eight manuscripts on this topic submitted for publication to date. He has applied the results of these review studies to predict and test the diet of lions in other national parks and nature reserves, and to predict and test the carrying capacity of Africa's large predators.

**Spotted hyaena diet:** David Franklin (BSc Hons) used faecal analysis to investigate the diet of spotted hyaenas in the Addo Elephant National Park. Spotted hyaena scats were collected by Matt Hayward and Gina Dawson in Addo

Elephant National Park. A manuscript is in the final stages of preparation comparing the diet of large predators determined by faecal analysis, incidental observations and continuous follows.

**Jackal diet and mesopredator release:** Christelle de Klerke (BSc Hons) compared the diet of jackals in the Nyathi and Main Camp sections of Addo Elephant National Park. She used faecal analysis of the scats of black-backed jackals collected by Matt Hayward and Gina Dawson and showed clear dietary shifts between Nyathi (lion absent) and the Main Camp sections (lion present). She found no evidence for mesopredator release, but did show that in the presence of lions, jackal diet expanded to include large herbivores, such as buffalo. This probably reflects increased opportunity to scavenge in the presence of lions.

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## **TRANSFORMATION AND RESTORATION ECOLOGY**

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*This theme seeks to understand the causes and consequences of ecosystem transformation across all levels of integration, to provide guidelines for the restoration of biodiversity and ecosystem function.*

**Impacts of introduced species on Subtropical Thicket:** Evert Jacobs (MSc student) has been investigating the diet and feeding impacts of giraffe in thicket vegetation as part of his MSc. He has completed data collection, but unfortunately has elected to continue with his studies on a part time basis. This has slowed this project down considerably.

**Effect of impala on Thicket:** Johan Gerber (MSc student) is investigating the impacts of impala in the Shamwari Private Game Reserve. Animals were placed in a Thicket enclosure at recommended stocking rates in order to determine what their impact will be on Thicket if confined to this vegetation type, specifically in terms of what trampling effects as well as physiognomic alterations occur. Richard Fenwick (BSc(Hons) student) focused on their diet preference for grass.

**Thicket rehabilitation:** Craig Weatherall-Thomas (BSc(Hons) student) re-assessed a chronosequence of Thicket rehabilitation in the Gamtoos River Valley and showed that there was no advancement of the vegetation on the rehabilitation site towards Thicket. Alternative endpoints for succession were investigated and the vegetation of Eastern Province Thornveld near Paterson (closest site of this Vegetation Type) was indistinguishable from 21-year-old revegetated Thicket in ordination space.

**Rehabilitation of Bontveld:** Eileen Campbell is monitoring the rehabilitation of Bontveld following calcrete mining and alternative approaches for restoring patchiness to rehabilitated landscapes are showing promise. A comparison of summer and winter plant biomass showed that seasonality is important in assessing rehabilitation, as there are substantive differences in, particularly grass biomass and cover abundance in rehabilitated landscapes.

**Rehabilitation of eroded grasslands:** Vincent Kakembo has been testing rehabilitation options for severely eroded, dysfunctional (sensu Ludwig and Tongway 1999) hillslopes in the Ngqushwa (Peddie) district. These areas have



been invaded by *Pteronia incana* (Blue bush), an unpalatable invader shrub indigenous to the dry Karoo region. Rehabilitation of hillslopes with wide bare areas takes the form of laying brush piles across contours. Mulching is also used on hillslope sections with high *P. incana* density, but with narrow bare areas. The idea is to enhance the reestablishment of grass species and possibly restore lost grazing land.

**Patterns of transformation in the former Ciskei:** Vincent Kakembo is using remote sensing (aerial photography and satellite images) to undertake an assessment of changes in thicket condition and land use change since the expropriation of the former white commercial farms in the 1980s. These areas in the Keiskamma catchment, have undergone a change of landuse to communal farming with altered processes of resource extraction.

**Physiological responses of ungulates to transformation:** Robyn Hetem (PhD student, Wits) is investigating the physiological responses of ungulates (kudu and Angora goats) to desertification, as a possible global change effect. This team collaboration (Duncan Mitchell, Andrea Fowler - University of Witwatersrand, Shane Malony - University of Western Australia, & Graham Kerley) represents cutting edge physiological research using sophisticated, implanted technology. The recovery of the data after a year is eagerly anticipated.

**Herbivore responses to transformation:** Tracey Milne (MSc student) is testing the hypothesis that desertification will lead to a shift in the diet of herbivores and a decline in dietary quality, by comparing the diet of goats in transformed and untransformed thicket, using the same animals as Robyn Hetem. She is collecting material for faecal analysis of the diet, and has also measured forage availability at both sites.

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## **BIODIVERSITY**

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*This theme seeks to gain a predictive understanding of the patterns, determinants and functions of biodiversity.*

**Developing habitat suitability indices for mammalian herbivores at Augrabies Falls National Park:** This project uses an animal's assessment of patch specific opportunities and risks, based on optimal foraging theory, to develop habitat suitability indices. This is being undertaken for springbok by Caroline Reid (MSc – completed and graduated) and for klipspringer and rock hyrax by David Druce (PhD, registered at the University of KwazuluNatal), Dave has now completed his thesis and submitted it for examination, and has three manuscripts in preparation.

**Impacts of elephants on biodiversity:** Graham Kerley was invited to synthesize the information on the impacts of elephants on subtropical thickets for a national meeting on the impacts of elephants on biodiversity. This synthesis clearly shows that at every level of biodiversity investigated elephants have a substantial effect on biodiversity, although the significance of these conclusions are somewhat limited due to the unknown effects of confounding factors. A manuscript detail these findings is in preparation.

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## FUNDAMENTAL RESEARCH

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*This theme seeks to encourage research on any intellectually interesting ecological or evolutionary question.*

**Physiological consequences springbok colour:** Graham Kerley has been collaborating with Duncan Mitchell, Andrea Fowler (University of Witwatersrand) and Shane Malony (University of Western Australia) on a project investigating the physiological responses of the three different colour morphs of springbok (white, black and normal). Animals were implanted with temperature loggers and have spent the year ranging free on a farm in the Steytlerville Karoo, where it is hoped that they will be exposed to extremes of heat and cold. The animals are doing well and have all produced kids. The dataloggers will be recovered in 2006.

**Nasal turbinate structures as predictors of response to global climate change:** Michelle Kietzmann (MSc student), in a project with Graham Kerley, Duncan Mitchell and John Maina (University of Witwatersrand) and Shane Malony (University of Western Australia), has been asking whether we can use nasal turbinate structures in ungulates to predict which species will be able to tolerate increased temperatures predicted under global change. She has accumulated a large sample size of ungulate heads from six species and successfully scanned these using NMR scanning at Wits Medical School. She now needs to complete her sampling and develop analytical techniques to measure the turbinate structures and relate these to physiological adaptations of the species.

## CONTRACT RESEARCH

André Boshoff and Sharon Wilson were part of an SRK Consulting team that compiled a Strategic Environmental Assessment for the Wild Coast, for the Wilderness Foundation and the Department of Economic Affairs, Environment & Tourism, Eastern Cape Provincial Government. Sharon Wilson, Graham Kerley and André Boshoff provided specialist advice to the Baviaanskloof Conservancy for an assessment on the viability of a switch from pastoralism to game-based venture.

## SCIENCE MANAGEMENT

- Graham Kerley was invited by the Board of Governors of the Africa Section of the Society for Conservation Biology to lead a bid to host the 21<sup>st</sup> Annual Conference of the Society for Conservation Biology 2007. This bid was successful in July 2005, and subsequently Graham has been acting as host and convenor of this prestigious international conference.
- Graham Kerley served on the editorial board of the *Journal of Arid Environments* and as Associate Editor of *African Zoology* and *African Journal of Range and Forage Science*.
- TERU members are actively involved in the review of scientific papers, this being critical to the maintenance of high standards of science, and also reflects the recognition of the members of TERU by these journals. To this end TERU members provided one or more reviews for the following journals: *African Journal of Range and Forage Science*, *African Zoology*, *Biological*

*Conservation, Journal of Applied Ecology, Journal of Zoology (London), Journal of Arid Environments, Ostrich, South African Journal of Wildlife Research.*

- TERU members provided project, proposal and personnel reviews to the following organizations: Critical Ecosystem Partnership Fund, National Research Foundation, Wilderness Foundation, WorldWide Fund for Nature – South Africa.
- TERU staff and students participated in over 30 workshops and working group meetings, and made presentations and provided advice on a wide range of scientific and related matters.

## **COMMUNITY SERVICE**

- Graham Kerley served on the Nelson Mandela Metropolitan University Safety, Health and Environment Committee and as manager of the Grysbok Environmental Education Trail on the NMMU South Campus: over 6000 school children have now participated in this trail since its inception in 1996. The Trail was the sole NMMU representation at the 2005 Sasol Scifest. Graham was appointed as a non-executive director of the Eastern Cape Parks Board and chairs the Conservation and Marketing Committee of the board. In addition, he was appointed to the National Advisory Committee of the Sasol Scifest.
- André Boshoff, Sharon Wilson and Graham Kerley provided specialist advice to the Eastern Cape Parks Board.
- André Boshoff served on the Project Advisory Group of the Fish River Biodiversity Initiative, managed by the South African National Biodiversity Institute.
- Public presentations by TERU members included talks to SAN Parks Honourary Ranger Indaba 2005 (Addo), Wildlife and Environment Society of Southern Africa, Royal Zoological Society of New South Wales.
- TERU staff and students provided specialist advice for Samara Private Nature Reserve.
- TERU is represented as an *ex officio* member of the Steering Committee of the Baviaanskloof Mega-reserve Project and on the Addo Planning Forum.

## **External Student Supervision**

Graham Kerley served as supervisor for students registered at universities besides the Nelson Mandela Metropolitan University, reflecting the levels of collaboration being achieved. These students are:

- DRUCE, D. Developing habitat suitability indices for klipspringer and hyrax in the Au-grabies Falls National Park: contrasting patch uses by syntopic browsers. PhD thesis, University of Natal, with co-supervision by Graham Kerley.
- HETEM, R. Physiological responses of free ranging ungulates to transformed habitats. PhD thesis, University of Witwatersrand, with co-supervision by Graham Kerley.

## 2005 PRODUCTS

### REFEREED SCIENTIFIC PUBLICATIONS

1. LECHMERE-OERTEL, R. G., KERLEY, G.I.H. & COWLING, R.M. 2005. Patterns and implications of transformation in semi-arid succulent thicket, South Africa. *J. Arid Env.* 62:459-474.
2. BERRY, M.G., ROBERTSON, B.L. AND CAMPBELL, E.E 2005. Impact of cutting and collecting of firewood associated with informal settlement in the south-eastern Cape coastal zone. *South African Journal of Botany* 71:179-190.
3. MIDGLEY, J.J., BALFOUR, D. & KERLEY, G.I.H. 2005. Why do elephants damage savanna trees? *S.Afr. J. Sci.* 101:213-215.
4. LECHMERE-OERTEL, R. G., COWLING, R.M. & KERLEY, G.I.H. 2005. Landscape dysfunction and reduced spatial heterogeneity in soil resources and fertility in semi-arid succulent thicket, South Africa. *Austral Ecology* 30:615-624.
5. HAYWARD, M.W. & KERLEY, G.I.H. 2005. Prey preferences of the lion (*Panthera leo*). *J.Zool., (Lond)*. 267:309-322.
6. MILLS, A.J., COWLING, R.M., FEY, M.V., KERLEY, G.I.H., LECHMERE-OERTEL, R.G., SIGWELA, A., SKOWNO, A. & RUNDEL, P.W. 2005. Effects of goat pastoralism on ecosystem carbon storage in semi-arid thicket, Eastern Cape, South Africa. *Austral Ecology* 30:797-804.
7. VAN CAUTER, A., KERLEY, G.I.H. & COWLING, R.M. 2005. The consequence of inaccuracies in remote-sensed vegetation boundaries for modelled mammal population estimates. *S. Afr. J. Wildl. Res.* 35:155-161.

### REPORTS

1. BOSHOFF, A.F. 2005. The Baviaanskloof Mega-reserve: An environmentally, socially and economically sustainable conservation and development initiative. *Terrestrial Ecology Research Unit Report* No. 52. 52 pp.
2. KERLEY, G.I.H. & LANDMAN, M. 2005. Gardeners of the gods? the role of elephants in the Eastern Cape Subtropical Thickets. In: *Elephant effects on biodiversity: an assessment of current knowledge and understanding as a basis for elephant management in SANParks*. Compiled by Grant, C. C. Skukuza: Scientific Services. Scientific Report 3/2005.
3. BOSHOFF, A F. 2005. The Cape vulture *Gyps coprotheres* in the Eastern Cape Province: I – Distribution and status; II – Recommended conservation actions on and around protected areas. *Terrestrial Ecology Research Unit Report* No. C107. 39 pp.
4. BOSHOFF, A.F. 2005. An assessment of the potential impacts of the proposed Ingleside River and Wildlife Estate on the terrestrial fauna of the development site. *Terrestrial Ecology Research Unit Report* No.C108. 9 pp.
5. WILSON, S.L., KERLEY, G.I.H. BOSHOFF, A.F. 2005. Baviaans Conservancy Feasibility Study: the estimated spatial requirements and population sizes of the medium-to large-sized mammals of the Baviaans Conservancy. *Terrestrial Ecology Research Unit Report* C109.1-63.

### POPULAR ARTICLES

1. PIERCE, S., COWLING, R., LOMBARD, M., ROGET, M., WOLF, T., VLOK, J., KNIGHT, A., BOSHOFF, A. & WILSON, S. 2005. A STEP forward: Safeguarding the biodiversity of the south-eastern Cape region. *Veld & Flora* June 2005. pp 86-89.

2. HAYWARD, M.W. & DAWSON, G.J. 2005. Restoring Addo's Pride. *Africa Geographic* 13(9): 52-58.
3. HAYWARD, M.W. 2005. Lessons from South Africa: Is Australia missing the conservation dollar? *Nature Australia* 28(6): 80.

#### CONFERENCE PROCEEDINGS

1. BOSHOFF, A.F. 2004. Seven years hence – what have we been up to ? A summary and review of progress made since the 1997 workshop. In: MONADJEM, A., ANDERSON, M.D., PIPER, S.E. & BOSHOFF, A.F. (eds). *The Vultures of Southern Africa - Quo Vadis?* Proceedings of a Workshop on Vulture Research and Conservation in Southern Africa. Kimberley, South Africa. Birds of Prey Working Group: Johannesburg. pp 229-239.
2. MONADJEM, A., ANDERSON, M.D., PIPER, S.E. & BOSHOFF, A.F. (eds). 2004. *The Vultures of Southern Africa - Quo Vadis?* Proceedings of a Workshop on Vulture Research and Conservation in Southern Africa. Kimberley, South Africa. Birds of Prey Working Group: Johannesburg.

#### CONFERENCE PRESENTATIONS

1. GOUGH, K.F. & KERLEY, G.I.H. Testing for inbreeding avoidance: do bulls associate with their natal family groups? 6<sup>th</sup> International Student Conference on Conservation Science, Cambridge, UK, March.
2. CAMPBELL, E.E., HOSKING, S.G. AND DU PREEZ, M. 2005. Assessment of water use by alien plants in selected Eastern Cape catchments. South African Association of Botanists, Bloemfontein.
3. CAMPBELL, E.E. . Conserving thicket clumps in bontveld: How will it work? Oral presentation, Thicket Forum 2005, Grahamstown, May.
4. COWLING, R.M., PROCHES, S. & VLOK, J.H.J. On the origin of Southern African subtropical thicket vegetation. Oral presentation, Thicket Forum 2005, Grahamstown, May.
5. KAMINETH, A., COWLING, R.M., CAMPBELL, E.E. & DU PREEZ, D.R. Preliminary investigations into population dynamics of tree Euphorbias under different megaherbivore browsing regimes. Oral presentation, Thicket Forum 2005, Grahamstown, May.
6. KNIGHT, A., COWLING, R.M. & CAMPBELL, B. Why we need farmers, managers, and scientists to all share their knowledge for the sustainable management of Subtropical Thicket. . Oral presentation, Thicket Forum 2005, Grahamstown, May.
7. LANDMAN, M. & KERLEY, G.I.H. Elephants and important plants: Chomping or Stomping? Oral presentation, Thicket Forum 2005, Grahamstown, May.
8. SIGWELA, A., KERLEY, G.I.H. & COWLING, R.M. Implications of vegetation transformation on seed production in the Xeric Succulent Thicket. Oral presentation, Thicket Forum 2005, Grahamstown, May.
9. VAN CAUTER, A., KERLEY, G.I.H. & COWLING, R.M. Modeling mammal population estimates: How important are errors in vegetation maps? Oral presentation, Thicket Forum 2005, Grahamstown, May.
10. KERLEY G.I. H. Biodiversity based investments in the Eastern Cape – the case for ecotourism. **Invited oral presentation**, Trade & Investment Conference, Nelson Mandela Metro, May/June.
11. DAVIS, S., KERLEY G. & LANDMAN, M. 2005. Dietary shifts of elephants recently introduced into the Nyati section of the Addo Elephant National Park. Oral presentation, 32nd Conference of the Zoological Society of Southern Africa, Grahamstown, July.

12. DE WITT, B., MITCHELL, D., MALONEY, S., HETEM, R.S., KERLEY, G. & FULLER, A. 2005. Thermoregulation of free-living springbok of different pelage colours, in the Eastern Cape winter. Oral presentation, 32nd Conference of the Zoological Society of Southern Africa, Grahamstown, July.
13. GOUGH, K. & KERLEY, G.I.H. 2005. Density dependent population regulation in the elephants of Addo Elephant National Park, South Africa. Oral presentation, 32nd Conference of the Zoological Society of Southern Africa, Grahamstown, July.
14. HETEM, R., MITCHELL, D., MALONEY, S., KERLEY, G.I.H., MEYER, L.R.C., FICK, L., DE WITT, B.A & FULLER, A. 2005. Feasibility of using remote measurements to assess ecological physiology in free-living ungulates. Oral presentation, 32nd Conference of the Zoological Society of Southern Africa, Grahamstown, July.
15. LANDMAN, M. & KERLEY, G.I.H. 2005. Does elephant alteration of landscapes influence black rhinoceros foraging opportunities. Oral presentation, 32nd Conference of the Zoological Society of Southern Africa, Grahamstown, July.
16. LANDMAN, M. & KERLEY, G.I.H. 2005. Does gross browse availability drive black rhinoceros foraging across landscapes? Oral presentation, 32nd Conference of the Zoological Society of Southern Africa, Grahamstown, July.
17. LESSING, J., KERLEY, G.I.H. & WILSON, S. 2005. Elephant foraging height: implications for elephant impact on thicket vegetation and resource partitioning between thicket browsers. Oral presentation, 32nd Conference of the Zoological Society of Southern Africa, Grahamstown, July.
18. VAN CAUTER, A., KERLEY, G.I.H. & COWLING, R. 2005. Testing: taking of modeling of mammal community structure one step further. Oral presentation, 32nd Conference of the Zoological Society of Southern Africa, Grahamstown, July.
19. OTT, T., KERLEY, G.I.H. & BOSHOFF, A. 2005. Diet of leopard from conservation areas and adjacent rangelands in the Baviaanskloof. Poster, 32nd Conference of the Zoological Society of Southern Africa, Grahamstown, July.
20. ROUGET, M., R.M. COWLING, A.T. LOMBARD, A.T. KNIGHT & G.I.H. KERLEY. Designing large-scale conservation corridors for pattern, process and implementation. **Invited oral presentation**, XIX Annual Meeting, Society for Conservation Biology, Brasilia, Brazil, July.
21. KERLEY, G., BOSHOFF, A., SIMS-CASTLEY, R. & WILSON, S. 2005. Planning around wildlife as an incentive to involve private enterprise in the achievement of conservation targets. **Invited oral presentation**, XIX Annual Meeting, Society for Conservation Biology, Brasilia, Brazil, July.
22. DRUCE, D., BROWN, J., KERLEY, G., KOTLER, B. & SLOTOW, R. 2005. The application of foraging theory to community level habitat utilisation. Invited oral presentation, XIX Annual Meeting, Society for Conservation Biology, Brasilia, Brazil, July.
23. KOTLER, B.P., REID, C., BROWN, J.S., KERLEY, G.I.H., CASTLEY, G. & LANDMAN, M. Behavioral indicators of habitat suitability for herbivores at Augrabies Falls NP, South Africa: Theory and practice. 9th International Mammalogical Congress, Sapporo, Japan.
24. KAKEMBO, V. The Use of High Resolution Digital Camera Imagery to Characterise the Distribution of *Pteronia Incana* Invader Species in Ngqushwa (Formerly Peddie) District, Eastern Cape, South Africa. Oral presentation, Conference of the Society of South African Geographers Cape Town 5<sup>th</sup> – 9<sup>th</sup> September 2005.

25. KAKEMBO, V. Topographic and Land use thresholds in gully development in Nqushwa District, Eastern Cape, South Africa, Oral presentation, British Geomorphological Research Group Conference, Southampton, UK, 19 – 21 September 2005.
26. ODINDI, J.O. Temporal and spatial trends in vegetation invasion: The case of *Pteronia incana* (Blue bush) in the Eastern Cape, South Africa. Oral presentation, Students' Conference of the Society of South African Geographers Cape Town 5<sup>th</sup> – 6<sup>th</sup> September 2005.
27. MAMFENGU, P.F. Communal Game Farming in Ngqushwa (formerly Peddie) District, Eastern Cape: A Sustainable Rural Landuse Option? Oral presentation, Students' Conference of the Society of South African Geographers Cape Town 5<sup>th</sup> – 6<sup>th</sup> September 2005.
28. KERLEY, G.I.H. Rewilding the Eastern Cape, South Africa: the contribution of private nature reserves to expanding the conservation estate. Oral presentation, 8<sup>th</sup> World Wilderness Congress, Anchorage, Alaska, October.
29. SOMDYALA, S., KERLEY, G.I.H. & MUIR, A. South Africa's Wild Coast. Featured oral presentation, 8<sup>th</sup> World Wilderness Congress, Anchorage, Alaska, October.

## POST-GRADUATE TRAINING

### Honours Projects

1. VANDREY, S. 2005. An assessment of *Pteronia incana* invasion control techniques: a pilot project. BSc Hons project, Nelson Mandela Metropolitan University.
2. MAKHANDE, E. D. 2005. The determinants of small mammal community structure in the St. Francis fynbos thicket mosaic at Nelson Mandela Metropolitan University. BSc Hons project, Nelson Mandela Metropolitan University.
3. FRANKLIN, D. E. 2005. Diet of spotted hyaena and lion in Addo Elephant National Park. BSc Hons project, Nelson Mandela Metropolitan University.
4. DE KLERK, C. 2005. The diet of the black-backed jackal [*Canis mesomelas*] in the Addo Elephant National Park, Eastern Cape Province. BSc Hons project, Nelson Mandela Metropolitan University.
5. NOHOYEKA, B. An assessment of the efficacy of clearing as a rehabilitation measure for *P. incana* invaded rangeland (upper part of Mgwalana catchment), Ngqushwa District, Eastern Cape. BSc Hons project, Nelson Mandela Metropolitan University
6. MACK, S. An assessment of the riparian vegetation condition using the Rapid Appraisal of Riparian Condition (RARC) technique in Ngqushwa (formerly Peddie) district. BSc Hons project, Nelson Mandela Metropolitan University.
7. Weatherall-Thomas, C. Secondary succession of thicket at a limestone quarry in the Gamtoos River Valley, South Africa. BSc Hons project, Nelson Mandela Metropolitan University.
8. Fenwick, R. The effect of impala (*Aepyceros melampus*) on Subtropical Thicket in the Shamwari Private Game Reserve, Eastern Cape. BSc Hons project, Nelson Mandela Metropolitan University.

## Postgraduate degrees in progress

### MSc

1. DAVIS, S. The Effect of Ingestion by Thicket Seed Dispersers on the Viability and Germinability of Thicket Seed Species. MSc thesis, Nelson Mandela Metropolitan University

2. DE RIDDER, C. 2006. Spekboom seedling survival in Succulent Thicket. MSc thesis, Nelson Mandela Metropolitan University
3. GERBER, J. The impact of impala on Shamwari Thicket. MSc thesis, Nelson Mandela Metropolitan University.
4. GOUGH, K.F. Association patterns of elephants: do behavioural patterns reflect genetic relationships? MSc thesis, University Nelson Mandela Metropolitan University.
5. JACOBS, EP The impact of giraffe as an introduced herbivore in the Thicket Biome. MSc thesis, Nelson Mandela Metropolitan University.
6. KIETZMANN, M. Ecological correlates of nasal turbinate structure and function. MSc thesis, Nelson Mandela Metropolitan University.
7. LESSING, J. Feeding impacts of elephants in Subtropical Thicket. MSc thesis, Nelson Mandela Metropolitan University.
8. MAMFENGU, P.F. An Assessment of Game Farming as a Landuse Option in the Communal Villages of Ngqushwa (Formerly Peddie) District, Eastern Cape. MSc thesis, Nelson Mandela Metropolitan University.
9. MAYEKISO, M.H. 2006. Comparative feeding behaviour of domestic herbivores (sheep and goats). MSc thesis, Nelson Mandela Metropolitan University.
10. MILNE, T.A. Dietary response to habitat transformation by small ungulates. MSc thesis, Nelson Mandela Metropolitan University.
11. XANGA, W.W. The relationship between land use, sediment delivery and hillslope form in Ngqushwa (formerly Peddie) district, Eastern Cape. MSc thesis, Nelson Mandela Metropolitan University.

#### **PhD**

12. LANDMAN, M. Foraging behaviour of the black rhinoceros (*Diceros bicornis bicornis*) in the Thicket vegetation of the Eastern Cape. PhD. thesis, Nelson Mandela Metropolitan University.
13. ODINDI, J.O. Temporal and scale considerations in vegetation invasion: The case of *Pteronia incana* (Blue bush) in the Eastern Cape, South Africa, PhD thesis, Nelson Mandela Metropolitan University.

#### **Postgraduate degrees completed**

1. REID, C. 2005. Habitat suitability and behaviour of springbok (*Antidorcas marsupialis*) at Augrabies Falls National Park, South Africa. MSc thesis, Nelson Mandela Metropolitan University.
2. O'Brien, J.W. Vegetation classification, mapping and condition assessment of Shamwari Game Reserve, Eastern Cape. MSc thesis, Nelson Mandela Metropolitan University.
3. SIGWELA, A.M. 2005. Animal seed interactions in the Thicket Biome: consequences of faunal replacements and land use for seed dynamics. PhD thesis, Nelson Mandela Metropolitan University.
4. SIMELANE, T.S. 2005. The role of conservation areas in conserving traditionally used natural resources and biodiversity. PhD thesis, Nelson Mandela Metropolitan University.



## FINANCIAL SUPPORT 2005

Research Grants	Programme	Amount (R)
National Research Foundation		
G Kerley		175 000
V Kakembo		152 231
Zoological Society of San Diego	Black rhino	130 959
	conservation biology	
South African National Parks	Mammal habitats	213 529
NMMU	Research Committee	112 646
	grants to G Kerley	
	(research and travel)	
Wilderness Foundation	Travel grant to G	12 000
	Kerley	
International Student Conference on	Travel grant to K	2 500
Conservation Science	Gough	
Contracts		128 859
Bursaries*		
Nelson Mandela Metropolitan University		
M. Kietzmann	14 000	
S. Davis	14 000	
J. Lessing	14 000	
J Gerber	14 000	
P. Mamfengu	54 000	
M. Landman	7 000	
J. Odindi	7 000	
C. De Ridder	9 780	
W.W. Xanga	3 950	
National Research Foundation		
M. Hayward	60 000	
M. Landman	55 000	
	<b>Bursary subtotal</b>	252 730
	<b>TOTAL</b>	<b>1 180 454</b>

\* Note that National Research Foundation Grant-Holder Bursaries are included within the NRF Programme amounts listed above.

### **In Kind Contributions**

The loan and maintenance of the 4x4 pickup by the Mazda Wildlife Fund represents a saving of about R25 000 on transport expenses.

The loan of the 4x4 pickup by Budget Rent-a-Car for the Predator Re-introduction project represents a saving of about R25 000 on transport expenses.

Gentyre donated a set of Continental tyres for the vehicles, valued at R5 000. Everready donated batteries worth R5000.

South African National Parks provides access and accommodation for TERU research in the Addo Elephant National Park.

<b>ADVISORY BOARD, STAFF AND ASSOCIATED STUDENTS</b>
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**Advisory Board 2004**

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Dr. A. F. Boshoff	Mr C. Kelley
Dr. S. L. Wilson	Mr. A. Uithaler
Dr. J. Langholz (Fulbright Scholar)	

**Research Associate**

Dr A. M. Whitehouse

**Scientific Collaborator**

Dr C. J. Skead

**Postdoctoral Researchers**

Dr M. Hayward

Dr A. Shrader

**Visiting Scientists**

Prof. D. Mitchel, Wits

**Postgraduate students (and their academic departments)**

<b>MSc</b>		<b>PhD</b>	
Ms S. Davis	Zoology	Ms M. Landman	Zoology
Mr C. de Ridder	Botany	Mr J. Odindi	Geography
Mr J. Gerber	Botany		
Ms K. Gough	Zoology		
Mr E.P. Jacobs	Zoology & Botany		
Ms M. Kietzman	Zoology		
Ms J. Lessing	Zoology		
Ms P. Mamfengu	Geography		
Mr M. H. Mayekiso	Zoology		
Ms T. Milne	Zoology		
Mr W.W. Xanga	Geography		

**External Students (all PhD)**

Mr. D. Druce	University of Kwazulu Natal
Ms R. Hetem	University of Witwatersrand

**Volunteers**

Ms Gina Dawson	
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