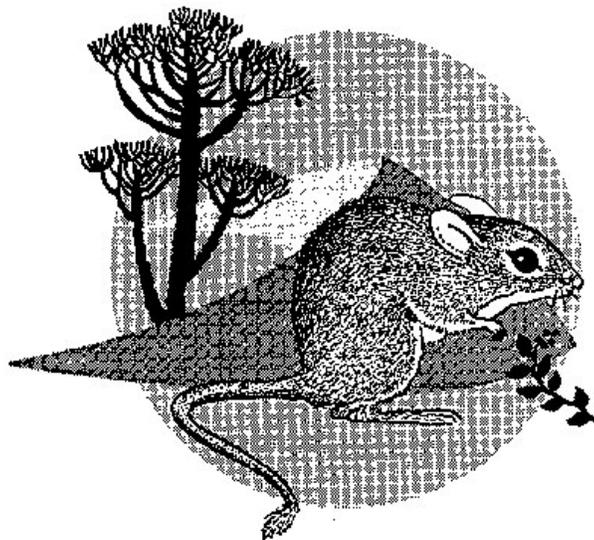


# TERRESTRIAL ECOLOGY RESEARCH UNIT

## ANNUAL REPORT

1995

Department of Zoology, University of Port Elizabeth



## **DIRECTOR'S REPORT**

The Terrestrial Ecology Research Unit has a significant milestone to celebrate, with the cumulative research funds raised in the last four years now exceeding R1.1 million. This does not include contributions in kind, which have exceeded R100 000 over this period. This substantial and sustained support by thirteen different funding agencies reflects very positively on the quality of research and student training that is being conducted by TERU. This recognition has become international, with Thokozane Simelane and Graham Kerley both being awarded Earthwatch Fellowships to participate in research in Kenya during 1995.

Productivity more than doubled during 1995, with TERU staff and students generating 7 scientific publications, 4 technical reports, 5 popular articles and 22 conference presentations. The increase in scientific publications is gratifying to note and is expected to continue, as 10 manuscripts are in press and a further 10 manuscripts have been submitted to scientific journals for review. A new aspect of TERU's output is the production of TERU reports. These are valuable tools to convey research findings to specific user agencies, and 4 reports have appeared.

The important aspect of student training was also successful: Justin Watson is to be congratulated on being awarded his MSc degree, and 3 Honours students successfully participated in TERU research for their student projects. Two MSc students joined TERU for their studies, both Bev Geach and Mervin Mason having obtained their earlier degrees from other universities before joining TERU. The postgraduate corps within TERU thus comprises 7 MSc and 1 PhD student, of which 4 MSc students are due to graduate in 1996.

1995 has also been a year of change for TERU, with the departure of Prof A. McLachlan from the Zoology Department. It was through Prof McLachlan's vision that TERU came into being, and he has been a pillar of support for TERU over the last four years. It is hoped that it will be possible to maintain his contacts with TERU in the future. Nigel Adams has also moved on, and we wish him all the best in his new career in KwaZulu/Natal.

Other changes are that, as of the end of 1995, I was appointed to a permanent academic post within the Zoology Department, and I would like to express my appreciation to the Department and University for this expression of support. The lack of permanence in the Director's post has always been a serious threat to the future of TERU, and this threat has now been removed. The implications are that I will have to shift my focus from research to teaching, but I am confident that this can be achieved while maintaining the high standards and productivity of TERU.

All of these achievements represent a team effort, ranging from the guidance provided by the Advisory Board and Prof J.F.K. Marais and Dr A.F. Boshoff to the financial support of the various funding agencies (see last page) and the Mazda Wildlife Fund. I would particularly like to thank Angela Gaylard for her hard work and support during 1995, as well as the TERU students for their active participation in all aspects of TERU's activities.

**DR G I H KERLEY**

**DIRECTOR: TERRESTRIAL ECOLOGY RESEARCH UNIT**

## **RESEARCH ACTIVITIES**

### **FOREST PROGRAMME**

This programme aims to provide information on factors which influence the diversity of Afromontane forest vertebrates, as well as an understanding of their ecology.

Guy Castley's continued monitoring of the effects of herbivores on forest habitat structure has confirmed that domestic herbivores reduce litter and plant cover in forests, severely impacting on the habitat of forest vertebrates. He has completed the data collection for his PhD and is analysing this vast data set to test his hypotheses of the effects of forest features on vertebrate diversity. He has had two manuscripts on this work accepted for publication. Guy was awarded the Lawrence Memorial Grant by the Zoological Society of Southern Africa for his work on forest litter fauna.

Angela Gaylard has started to publish her findings on the ecology of the tree dassie, and has been reviewing ecological information on the giant golden mole, one of the least understood forest species. Indications are that the abundance of this species is depressed by cattle grazing in forests, supporting Guy Castley's findings on the effect of grazing on forest habitat structure.

Thokozane Simelane is in the final phase of his project, and has demonstrated that 171 species of mammals, 58 birds, 31 reptiles and two amphibian species are used in traditional healing, with 63 % of these mammals, 16 % of birds and 10 % of reptiles listed in the Red Data Books. Thokozane used the opportunity of his Earthwatch sponsored visit to Kakamega forest in Kenya to collect information on community based management structures, which should reduce the observed abuse of forest vertebrates for recreational and bushmeat hunting.

### **DUNE PROGRAMME**

The overall objective of this programme, run in close collaboration with the Botany and Geology Departments, is to provide fundamental scientific information on coastal dunes which is necessary for the formulation of a sound management plan and to advance basic knowledge of interactive dune processes.

The project on dune breeding birds and human impacts led to the awarding of Justin Watson's MSc and Justin has had two manuscripts accepted for publication. Justin's findings have been particularly useful in terms identifying problems and solutions for coastal management authorities. Monitoring of Damara tern and oystercatcher breeding activity at the Alexandria dunefield has shown significant shifts in the location of the Damara tern colony.

Olivia Brazzale has identified 46 species of nematodes in the meiofauna of the successional gradient at Mtunzini and shown that this community is dominated by predators. Samples from the Richards Bay Minerals mining site however lack some of these species, particularly some of the predatory species. She is continuing her analysis of the relationships between environmental features and the meiofaunal communities at these sites.

Angela Gaylard has been analysing the last couple of years' data on the fauna of the Mtunzini dunes, and another two field trips were conducted to the site in 1995. Clear communities of birds, ants and dungbeetles have been identified across the successional gradient, in contrast to the lack of such community responses by the

small mammals. The environmental correlates of the structure of these communities must still be determined.

Bridget Elliott has shown that hummock dunes formed by the plants *Arctotheca populifolia* and *Gazania rigens* differ considerably in their physical structure, reflecting the plant growth forms. A diverse invertebrate community developed on these hummocks and characteristic communities for each plant species could be identified. Bridget has submitted her MSc thesis on this work.

Bronwyn Egan has submitted her MSc thesis on her study of the ecology of earwigs in dunefields. She showed that earwigs reach peak abundance's in summer and that they exhibit clear habitat preferences for non-vegetated areas, with shelter in the form of stones or driftwood. These earwigs are important predators in the dunefields, preferring insect prey over crustaceans.

### **VALLEY BUSHVELD PROGRAMME**

This programme has been identified as a research priority for TERU and considerable effort has been directed at establishing this programme. These efforts are now bearing fruit, and it is anticipated that this programme will increase in significance in the future.

Bev Geach completed her synthesis of ecological and socioeconomic aspects of landuse in the Sundays River Valley, and submitted her report to National Parks Board. Bev is currently conducting questionnaire surveys of visitors in order to determine the value placed on visits to the Addo Elephant National Park. An exciting feature of Bev's MSc is that it represents a joint effort between the Department of Economics and Economic History (Dr S Hosking) and TERU.

Brian Colloty investigated seed dispersal by black rhino in Valley Bushveld, and showed that seeds of at least eight plant species were dispersed by rhino. He estimated that up to 2 million seeds could be dispersed by black rhino in the Addo Elephant National Park annually, indicating the importance of this process. It is hoped that this study can be expanded in the future.

Claire Vial from the University of Otago in New Zealand has joined TERU for the fieldwork phase of her degree. She is investigating the perceptions of visitors to Addo Elephant National Park, and has confirmed that the park is a premier elephant viewing location, with 97 % of visitors seeing elephants.

Graham Kerley collaborated with Dave Tongway and John Ludwig from CSIRO (Australia) in a project on animal/plant/soil interactions. A considerable amount of data and soil samples were collected to test the hypotheses that the irreversibility of vegetation degradation by goat browsing in Valley Bushveld can be ascribed to the loss of soil resources. In contrast, it was shown that browsing by elephants did not lead to a loss of soil resources. These data therefore provide a model to explain why it is the nature of the browsing rather than the amount of material that is consumed that is important. This is a refreshing approach to the problems of veld degradation, and also an example of the value of international collaboration.

Sharon Haschick prepared a report on current landuse for the eastern Swartkops River Valley, and identified suitable Valley Bushveld habitat for conservation in this area. This report has been submitted to WWF - SA.

## GENERAL PROGRAMME

Vincent Egan has completed his study on the feeding behaviour of snakes and submitted his MSc thesis. He used optimal foraging theory to develop models of optimal prey size in puffadders, and demonstrated significant ontogenetic shifts in the diets of house snakes and puffadders. The innate prey preferences of the snakes could be related to their diet and foraging strategies.

A project on sustainable quail utilization has shown that there is a conflict between hunting requirements (peak abundance) and the breeding season of the quail. Although some quail are present throughout the year, the only period when they are present in sufficient numbers is the breeding season. Hunting management options for other game bird species are being investigated in order to identify a suitable strategy for the sustainable utilization of this population. Alida Badenhorst analysed the diet of quail for her Honours project, and showed that insects dominate the diet, with females consuming more insects than males. Weed seeds make up the remainder of the diet.

David Roote investigated the potential for seed dispersal by raptors, using captive owls. He showed that owls can ingest and regurgitate seeds in the carcasses of their prey, and that successful germination of seeds occurs after ingestion by owls. This indicates that raptors may be significant secondary dispersers of seeds, particularly when the large foraging ranges of these species is considered.

## PUBLICATIONS 1995

### Scientific Publications

- KERLEY, GIH. 1995. The round-eared elephant shrew *Macroscelides proboscideus* as an omnivore. *Mammal Rev.* 25:37-42.
- WATSON, JJ & KERLEY, GIH. 1995. A survey of the dune-breeding birds in the Eastern Cape, South Africa. *Ostrich* 66:15-20.
- MILTON, SJ, DEAN, WRJ, MARINCOWITZ, CP & KERLEY, GIH. 1995. Effects of the 1990/91 drought on rangeland in the Steytlerville Karoo. *S. Afr. J. Sci.* 91:78-84.
- WHITFORD, WG, FORBES, G, & KERLEY, GIH. 1995. Diversity, spatial variability, and functional roles of invertebrates in desert grassland ecosystems. In *The Desert Grassland*, Eds, McCLARAN, M.P. & VAN DEVENDER, T.R. University of Arizona Press, Tucson,.
- GAYLARD, A, McLACHLAN, A & KERLEY, GIH. 1995. Faunal changes along a vegetation gradient in the Alexandria Coastal Dunefield, South Africa. *S. Afr. J. Zool.* 30:23-28.
- GAYLARD, A & KERLEY, GIH. 1995. The use of interactive identification keys in ecological studies. *S. Afr. J. Wildl. Res.* 25:35-40.
- DEAN, WRJ, HOFFMAN, MT, KERLEY, GIH & MILTON, SJ. 1995. Desertification in developed countries: in search of the silver bullet. *S. Afr. J. Sci.* 91:213-215.

### Reports

- GEACH, B. 1995. Socio-economic and environmental aspects of land-use in the Sundays River Valley: pastoralism vs conservation/ecotourism. *Terrestrial Ecology Research Unit Report* 1:1-57.
- HASCHICK, S.L. & KERLEY, G.I.H. 1995. Land-use options of Valley Bushveld to the north-east of the Swartkops River. *Terrestrial Ecology Research Unit Report* 2:1-18.
- KERLEY, G.I.H. 1995. The terrestrial vertebrate fauna of Rein's Nature Reserve: inventories and management recommendations. *Terrestrial Ecology Research Unit Report* 3:1-19.
- KERLEY, G.I.H. 1995. The mammals of van der Kemp's Kloof. *Terrestrial Ecology Research Unit Report* 4:1-6.

### Popular Articles

- WATSON, JJ. 1995. Kurrichane buttonquail in the Eastern Cape. *The Bee-Eater*. 46:16-17.
- WATSON, JJ. 1995. Damara terns brooding two eggs. *The Bee-Eater*. 46:18-19.
- KERLEY, GIH. 1995. Empowering people to manage their environment - environmental education and UPE. *Fokus* Sept.: 29 & 47.
- GEACH, B. 1995. The RDP and landuse - ecotourism, an environmentally friendly option. *Fokus* Sept.:33 & 41.
- WATSON, JJ. 1995. Birds as seed dispersers: seed dispersal by redwinged starlings. *The Bee-Eater*. 46:15 -19.

### Conference Presentations

- KERLEY, GIH, KNIGHT, MH & DE KOCK, M. Desertification of Valley Bushveld and some alternatives. Oral Presentation at the Sustainable Utilization of Valley Bushveld Symposium, Grahamstown, July.
- ADAMS, NJ & KERLEY, GIH. Domestic and indigenous herbivores: their water use efficiencies and rangeland impacts. A hypothesis to address Valley Bushveld degradation. Poster presentation at the Sustainable Utilization of Valley Bushveld Symposium, Grahamstown, July.
- GEACH, B, KERLEY, GIH & HOSKING, S. Proposal for a cost-benefit analysis of ecotourism vs pastoralism in Valley Bushveld. Poster presentation at the Sustainable Utilization of Valley Bushveld Symposium, Grahamstown, July.
- HASCHICK, SL. & KERLEY, GIH. Boergoats: a threat to indigenous herbivores and vegetation in Valley Bushveld areas. Poster presentation at the Sustainable Utilization of Valley Bushveld Symposium, Grahamstown, July.
- MASON, M, WEATHERBY, C. & KERLEY, GIH. Tortoises in a sustainable Valley Bushveld system. Poster presentation at the Sustainable Utilization of Valley Bushveld Symposium, Grahamstown, July.
- MASON, MC, WEATHERBY, CA, KERLEY, GIH & BRANCH, WR. Dietary selection by leopard tortoise (*Geochelone pardalis*) and implications for habitat utilization in Valley Bushveld. Oral presentation at the ZSSA & SASAQs Symposium, Grahamstown, July.
- EGAN, BA, KERLEY, GIH & MCLACHLAN, A. Adaptations of the earwig *Labidura riparia* for exploitation of the Alexandria Dunefield. Oral presentation at the ZSSA & SASAQs Symposium, Grahamstown, July.
- EGAN, VT & BRANCH, WR. Vomerolfactory prey preferences of some common southern African snakes. Oral presentation at the ZSSA & SASAQs Symposium, Grahamstown
- EGAN, VT & BRANCH, WR. Strike induced chemosensory searching and prey-trailing in the puff-adder. Oral presentation at the Herpetological Association of Africa Symposium, St Lucia, October.
- EGAN, VT & BRANCH, WR. Feeding behaviour in *Bitis arietans*: effects of prey size. Oral presentation at the Herpetological Association of Africa Symposium, St Lucia.
- EGAN, VT & BRANCH, WR. Feeding behaviour in the puff-adder *Bitis arietans*. Poster presentation at the Herpetological Association of Africa Symposium, St Lucia.
- EGAN, VT & BRANCH, WR. Chemical prey preferences of some common southern African snakes. Poster presentation at the Herpetological Association of Africa Symposium, St Lucia, October.
- EGAN, VT & BRANCH, WR. Caudal luring in the puff-adder *Bitis arietans*? Poster presentation at the Herpetological Association of Africa Symposium, St Lucia.
- ELLIOTT, BE, MCLACHLAN, A & KERLEY, GIH. Patterns of faunal succession in dune hummocks. Oral presentation at the ZSSA & SASAQs Symposium, Grahamstown.
- GAYLARD, A & KERLEY, GIH. Conserving the rare tree hyrax in the Eastern Cape. Oral presentation at the ZSSA & SASAQs Symposium, Grahamstown, July.
- WHITE, RM, BERNARD, RT & KERLEY, GIH. Patterns of reproduction of the hairy-footed gerbil (*Gerbillurus paeba*) in the Karoo. Oral presentation at the ZSSA & SASAQs Symposium, Grahamstown, July.
- KERLEY, GIH. Ecotourism as a sustainable landuse option in Valley Bushveld. Oral presentation at the Ecotourism Powwow, Mpekwani Sun, September.

- KERLEY, GIH. Desertification of subtropical thicket in the Eastern Cape: a research programme for sustainable landuse. Poster presentation at the National research and development workshop on the assessment and monitoring of desertification in South Africa, October.
- MASON, MC, WEATHERBY, CA & BRANCH, WR. 1995. Does dietary selection influence habitat selection in the leopard tortoise?, Oral presentation at the International Conference of Chelonian Conservation, Gonfaron, France, July.
- MASON, MC & WEATHERBY, CA. 1995. The leopard tortoise and the angulate tortoise: two sympatric species in the Eastern Cape. Oral presentation at Herpetological Association of Africa Symposium, St Lucia, October.
- MASON, MC, WEATHERBY, CA & BRANCH, WR. Home range of the common padloper (*Homopus areolatus*). Oral presentation at Herpetological Association of Africa Symposium, St Lucia, October.
- SIMELANE, TS & KERLEY, GIH. Traditional beliefs, recognition and use of reptiles by Xhosa and Zulu communities of Southern Africa. Oral presentation at the 4th Herpetological Association of Africa Symposium, St Lucia, October.

## **POST-GRADUATE TRAINING**

### **Honours Projects**

- ROOTE, D. 1995. Secondary dispersal of seeds by raptors.
- BADENHORST, A. 1995. Diet of the common quail *Corturnix corturnix* in the Eastern Cape.
- COLLOTY, B. 1995. Seed dispersal by black rhinoceros *Diceros bicornis* in Valley Bushveld.

### **Postgraduate students in training**

- BRAZZALE, OV. Successional patterns across coastal dune chrono-sequences and rehabilitation implications. MSc (1993-)
- CASTLEY, JG. Vertebrate diversity in Afromontane forests. PhD (1992 -).
- ELLIOTT, B. Dune hummocks in the Alexandria dunefield: patterns of development and succession. M.Sc (1994 -).
- EGAN, V. Foraging behaviour in snakes, with special reference to the puffadder *Bitis arietans*. M.Sc. thesis (1994 -).
- SIMELANE, TS. The traditional use of indigenous vertebrates. M.Sc. (1994 -).
- EGAN, B. Ecology of *Labidura riparia* (Pallas) (Dermaptera: Labiduridae) in the Alexandria Coastal Dunefield. (1994 -).
- MASON, M. Ecology of sympatric tortoises in Valley Bushveld. M.Sc. (1995 -).
- GEACH, B. Ecological and economic implications of land use in Valley Bushveld. M.Sc. (1995 -).

### **Postgraduate degrees completed**

- WATSON, JJ. 1995. Dune breeding birds and human use of the Alexandria Coastal Reserve: interactions and management implications. MSc thesis, University of Port Elizabeth.

**FINANCIAL SUPPORT 1995**

<b>Funding agency</b>	<b>Programme</b>	<b>Amount</b>
Foundation for Research Development & Department of Environment Affairs Joint Venture Special Programme	Forest vertebrates	R80 000
World Wide Fund For Nature - South Africa	Forest herbivory	R 2 500
Foundation for Research Development Special Programme	Dunes	R37 000
Department of Environment Affairs (via Institute for Coastal Research)	Dunes	R40 000
National Parks Board	Valley Bushveld	R25 000
Foundation for Research Development (Resource Economics)	Valley Bushveld	R15 000
Pretoria Software Solutions	Valley Bushveld	R 1 500
Foundation for Research Development (Science Liaison)	Valley Bushveld	R 5 530
Foundation for Research Development Grant to A. McLachlan	Core Travel, salaries running	R20 000
Foundation for Research Development Grant to W. Branch	Core Reptiles	R 1 500
Earthwatch Europe	Travel	R10 000
<b>Bursaries</b>		
Foundation for Research Development		
Adams, N.J.		R10 000
Egan, B.		R 8 000
Egan, V.E.		R 8 000
Elliott, B.L.		R10 000
Geach, B.		R10 000
Mason, M.C.		R10 000
Simelane, T.S.		R10 000
University of Port Elizabeth		
Castley, J.G.		R 2 150
Egan, B.		R 1 800
Egan, V.E.		R 1 850
Elliott, B.L.		R 1 850
Mason, M.C.		R 2 300
Simelane, T.S.		R 1 800
<b>Total</b>		<b>R 77 750</b> <b>R315 780</b>

Additional support in the form of the loan of a 4x4 bakkie by Mazda Wildlife Fund represents a saving of about R12 000 on transport expenses, and Gentyre donated a set of tyres.

## OFFICE BEARERS AND STAFF 1995

### **Advisory Board 1994**

Dr R Ellis, Agricultural Research Council (Chairman)  
Dr E E Campbell, Botany Department, University of Port Elizabeth  
Mr P W Coetzee, Algoa Regional Services Council  
Mr P Niven, Amanzi Estates  
Dr P M Norton, Eastern Cape Nature Conservation  
Dr B Ras, Department of Agriculture  
Dr P Novellie, National Parks Board  
Dr D Walmsley, Foundation for Research Development

and all members of the Executive

### **Executive**

Dr G I H Kerley, Director  
Dr A F Boshoff, Eastern Cape Nature Conservation  
Prof A McLachlan  
Prof J F K Marais

### **Staff**

Dr N J Adams (Post-doctoral Fellow until April)  
Ms A Gaylard  
Ms B Geach (until March)  
Ms S Haschick (part-time)

### **Postgraduate students**

Miss O V Brazzale  
Mr J G Castley  
Mrs B Egan  
Mr V E Egan  
Miss B Elliott  
Ms B Geach  
Mr M Mason  
Mr T S Simelane  
Mr J J Watson

### **Function of the Advisory Committee**

The function of this committee is to review and advise on the activities of the Terrestrial Ecology Research Unit, and to report back to the Council of the University of Port Elizabeth via the Zoology Department.