



4th Annual Diamond Route Research Conference 29th & 30th October 2013

**Multipurpose Room, Cornerstone Building,
De Beers Corporate Headquarters, Johannesburg**

The objectives of this conference are to provide a platform for researchers to:

- Share the outcomes of the range of research projects that have taken place across the Diamond Route properties and other sites within the De Beers Group of Companies and E Oppenheimer & Son.
- Provide a networking opportunity for the site managers and researchers working across these sites.
- Guide future research and post-graduate opportunities across the properties.

Time	Tuesday 29 th October
08h30	REGISTRATION and TEA / COFFEE
09h00	Rob Smart, Chair of the Diamond Route Overview of the Diamond Route
09h20	<u>Graham Williamson</u> & Françoise Williamson Keynote Address: The Sperrgebiet – Nature’s Parched Masterpiece
	Mammal Ecology CHAIR: Dylan Smith, Site Representative, Tswalu Kalahari
09h50	<u>N. M. Weyer</u> ¹ , A. Fuller ¹ , R. S. Hetem ¹ & M. Picker ² How do seasonal fluctuations in prey availability affect the physiology of free-living aardvark (<i>Orycteropus afer</i>)?
10h10	<u>T. Ramathavha</u> ¹ , P. Ramathuba ¹ & R.M. Baxter ¹ Seasonal variation in the bat community in Venetia Limpopo Nature Reserve
10h30	H. Louw Comparative population dynamics of ungulates on a Bankenveld Game Reserve
10h50	TEA / COFFEE and Poster Session
	Archaeozoology, Archaeology and Heritage CHAIR: Dayne Knight, Site Representative, Rooipoort
11h20	D. Morris Kimberley's prehistoric landscapes in the history of archaeology in South Africa
11h40	P. Beaumont About the cupule sites on Tswalu Kalahari
12h00	<u>C. van der Merwe</u> & C.M. Rogerson Industrial Heritage Tourism in South Africa – the case of The ‘Big Hole’, Kimberley
12h20	B. Senut Macroselidea from the Sperrgebiet: Clues for understanding the history of Sengis
12h40	<u>M. Pickford</u> , B. Senut & H. Mocke Eocliff, Africa’s richest Eocene micromammal occurrence: implications for palaeoclimate
13h00	LUNCH and Poster Session and Conference Photograph

Time	Tuesday 29 th October (continued)
Conservation Ecology CHAIR: Warwick Davies-Mostert, Biodiversity Coordinator, De Beers Group	
14h00	<u>P. Nyoni</u> , C. R. Edwards, D. M. Parker & G. K. Purchase Leopard population density and community attitudes towards leopard in and around Debshan Ranch, Shangani, Zimbabwe
14h20	<u>M. Mberi</u> & C. Edwards Debshan Ranch and the holistic alternative – an overview
14h40	<u>L. Mudodzwa</u> , P. Ramathuba & R.M. Baxter The rupicolous small mammals at Venetia Limpopo Nature Reserve
15h00	<u>J. Artingstall</u> & N. Pillay The Goldilocks effect: picky southern African hedgehogs (<i>Atelerix frontalis</i>)
15h20	TEA / COFFEE
Invertebrate Conservation CHAIR: Duncan MacFadyen, EOS Research and Conservation	
15h50	M. D. Picker Termites as keystone species in Tswalu Kalahari
16h10	M. Allsopp Pollination crisis and bee alerts
16h30	C. Willis An introduction to the dragonflies and damselflies of Ezemvelo Nature Reserve
16h50	<u>R. Lyle</u> , A.S. Dippenaar-Schoeman, J. du Toit & P. Webb Increase in spider diversity of the Tswalu Kalahari Reserve, Northern Cape Province, and South Africa
17h10	R. F. Terblanche A preliminary outline of landscape ecology of South African butterflies with special reference to <i>Belenois aurota</i> , the brown-veined white, at Tswalu Kalahari
17h30	M. Stiller Leafhoppers of Ezemvelo, Rooipoort, Tswalu and Venetia Nature Reserves
17h50	Close of Day 1
18h00	COCKTAIL FUNCTION: GOLD REEF CITY THEME PARK HOTEL
	Photographic Slide Show & Launch of <i>Africa's Wild Gems</i> : Erwin & Nicoleen Niemand
	Presentation: Prof. Gus Mills "Kalahari to Kruger and back: reflections of a carnivore biologist"

Time	Wednesday 30 th October
08h00	TEA / COFFEE
Invertebrate Conservation (Continued) CHAIR: Elsabe Bosch, Site Representative, Telperion	
08h30	Clive Walker Keynote Address: Which Way the Rhino
09h00	D.H. Jacobs Biological and ecological notes on selected Heteroptera species of some of the Diamond Route properties
09h20	J. Leroy & A. Leroy Rain spiders mating on Brenthurst: close-up photography explains the mechanisms (Araneae: Sparassidae)
09h40	M. Venter, J. Williams, J. Steyl, S. van Niekerk, C. van Eeden, P.I. Stivaktas, L.E.O. Braack & R. Swanepoel Arboviruses as cause of neurological disease in humans, farm and wild animals
10h00	C. Scholtz & A. Davis Tswalu Kalahari Reserve: a desert refuge for a diverse community of dung beetles
10h20	M.W. Mansell The Tswalu lacewings: diversity through specialization
10h40	TEA / COFFEE and Poster Session
Species and Vegetation Studies CHAIR: Patti Wickens, Environmental Principal, De Beers Group	
11h10	D.J. Krynauw & D.G.C. du Plessis The dynamics and extent of vegetation change on Ezemvelo and Telperion: an analysis of selected case studies
11h30	M. Child & H. Davies-Mostert Using social network analysis to increase the efficiency of a National Red Listing project
11h50	W. Collinson & C. Patterson-Abrolat Mitigating the impacts of roads on wildlife: a pilot study in the Greater Mapungubwe Transfrontier Conservation Area
12h10	C. Sharp Preliminary results of a study to determine the biodiversity and survival strategy of ectomycorrhizal fungi in a miombo woodland on Debshan Ranch, Zimbabwe
12h30	LUNCH and Poster Session
Avian Conservation Malwande Dumeko, Site Representative, Brenthurst Garden	
13h30	S. J. Cunningham & R. O. Martin Hot temperatures, behavioural trade-offs and breeding success in shrikes
13h50	S. W. Evans, D. P. Cilliers, H. Coetzee & L. van Rensburg Development of a site selection process and tools to assist re-introduction efforts for the Southern Ground-Hornbill <i>Bucorvus leadbeateri</i>
14h10	R. Lerm The conservation value of the avifauna of the Kathu forest, Northern Cape
14h30	K. J. Senyatso Resource-rich pan habitats regulate seasonal movements and home range dynamics in female Kori Bustard <i>Ardeotis kori</i>
14h50	W.H. Oosthuizen & R.J.M. Crawford Mainland seabird colonies in South Africa – their growing importance and need of protection
15h10	D. du Plessis, C. Symes, H. Smit-Robinson & S. Hofmeyr Changes in the distribution range of White-bellied Korhaan in South Africa
15h30	Presentation of Awards - Mrs Strilli Oppenheimer
15h40	Closing - Phillip Barton (CEO, De Beers Consolidated Mines)
15h50	CONFERENCE CLOSURE

Posters

Authors	Titles
A. L. Warnock, B. Steinback, & B. Branfireun	Mercury in rivers and streams near the De Beers Victor Mine in the Hudson Bay Lowland, Canada
J. Leeming	Importance of Telperion for Scorpion Conservation
<u>G.A. Wilson</u> & T. Groenwaldt	A pilot nature conservation work-integrated learning (WIL) communications project, in partnership with E Oppenheimer & Son
C. Blaser	Is conservation sustainable in South Africa?
I. Engelbrecht	A survey of trapdoor and baboon spiders (Araneae: Mygalomorphae)
S. Edwards & K. A. Tolley	Is dietary niche breadth linked to morphology and performance in Sandveld lizards <i>Nucras</i> (Sauria: Lacertidae)?
<u>A. Coetzer</u> & P. Webb	Butterflies of Tswalu Kalahari Reserve
C. van der Sluis	Winter survival of common warhogs (<i>Phacochoerus africanus</i>) in a grassland ecosystem
S. Grönschloss	Trophic overlap between the Cape clawless otter (<i>Aonyx capensis</i>), spotted-necked otter (<i>Lutra maculicollis</i>) and water mongoose (<i>Atilax paludinosus</i>) on Ezemvelo Nature Reserve, Gauteng, South Africa
<u>D.F Makin</u> , S. Chamailé-Jammes & A.M. Shrader	How do predator reintroductions drive ungulate species' foraging behaviour and landscape use in Tswalu Kalahari Reserve?
<u>N.M.N. Ngoloyi</u> , J. Finch, & T. Hill	The use of palaeoecological evidence to reconstruct natural landscapes and historical climate-human-environment relationships in Mapungubwe National Park, Limpopo Basin
<u>A. E. McKechnie</u> , B. Smit, R. O. Martin, S. J. Cunningham & P. A. R. Hockey	Can behaviour provide the basis for rapid assessments of the relative vulnerabilities of desert birds to climate change?
H. A. Smit-Robinson	White-winged Flufftail <i>Sarothrura ayresi</i> : The rarest Bird of the Year
<u>E.F. Retief</u> and H.A. Smit-Robinson	Keeping track of Secretarybirds
T. Forssman	Mi casa es su casa: changing forager settlement patterns on the Greater Mapungubwe Landscape
<u>N. Chiweshe</u> , P. Mundy & M. Dallimer	The impact of rapid land redistribution on the bird communities of Debshan Ranch, Zimbabwe
<u>A.S. Dippenaar-Schoeman</u> & C.R. Haddad	New book on the spiders of the Grassland Biome
<u>G. T. Pahad</u> , B. J. van Vuuren & C. A. Matthee	Small Mammal Phylogeography in South Africa
<u>M. Turnbull</u> , B.J. van Vuuren, & C. Chimimba	Comparative (native vs. alien) phylogeographic patterns in small mammals: lessons to be learned?
<u>I. den Drijver</u> & B.J. van Vuuren	Phylogeographic patterns in the hairy-footed gerbil <i>Gerbillurus paeba</i> and the Cape short-tailed gerbil <i>Desmodillus auricularis</i>
C. E. Philips	Seasonal distribution patterns of three charismatic large mammal species at Tswalu as determined by game drive sighting data
<u>H. G. Thomas</u> , D. Swanepoel & N. C. Bennett	Colony composition in free ranging Damaraland mole-rats (<i>Fukomys damarensis</i>): the effects of cross-fostering individuals
<u>L.R. Brown</u> & Barrett, A.S.	Ecology and management of <i>Seriphium plumosum</i> at Telperion
G. O. U. Wogan, G. Voelker, & R.C.K. Bowie	Biome stability predicts the landscape genetics of a generalist bird species, the Cape Robin-Chat (<i>Cossypha caffra</i>) in the aridlands of southern Africa
Graciela Gil-Romera ¹ , Frank H. Neumann ² , Louis Scott ³ , Miguel Sevilla-Callejo ¹ & Yolanda Fernández-Jalvo ⁴	Pollen taphonomy from hyaena scats and coprolites: preservation and quantitative differences

E.F. Robertson	Holistic management: monitoring the change
<u>R.E. van Dijk</u> , J.C. Kaden, A. Argüelles-Ticó & B. Hatchwell	Kin-directed investment in public goods
N. Wright	Rehabilitated wildlife released on Diamond Route Reserves
<u>H. Lutermann</u> & D. M. Fagir	Host diversity and tick-small mammal networks
T. L. Rymer, R. L. Thomson & M. J. Whiting	At home with the birds: Kalahari tree skinks associate with sociable weaver nests despite African pygmy falcon presence
<u>P.R.K Richardson</u> , J. Wood, E. Jordan, N.S.D Shaw, C.J. de Jager & S.C. Rode	An integrated approach to Baboon Management on the Cape Peninsula
<u>A. Chamberlain</u> , E. Witkowski, M. Whitecross & S. Archibald	Frozen in time: Frequency of frost and rainfall events in relation to <i>Colophospermum mopane</i> growth in Limpopo province, South Africa

ORAL ABSTRACTS

The Sperrgebiet – Nature’s Parched Masterpiece

G. Williamson & F. Williamson

Our work in the Sperrgebiet began in 1978 with all plant collections sent to Bolus Herbarium, University of Cape Town and Compton Herbarium, Kirstenbosch, Rondebosch, Cape Town. Insects were originally identified by Dr. Mike Picker and reptiles by members of the South African Museum. All in all approximately 3000 plant collections were made from the arid areas of South Africa with 900 from the Sperrgebiet. Our work in the Sperrgebiet followed through from 1978 to 1997. The Sperrgebiet covers an area of about 2600 sq. km and is situated in the southwest corner of Namibia. It lies almost completely within the winter rainfall Succulent Karoo biome. The area to the east of the coastal mines comprises one of the most protected areas in the world. For over a century the forbidden desert land has yielded a spectacular quantity of high quality diamond gems. Apart from a treasure-trove of human artifacts from bygone eras a number of fossil sites have been uncovered during prospecting operations up river from Oranjemund. The Arrisdrif, Auchas and Rooilepel sites have yielded fossils unique to the subcontinent. Over the years we led various expeditions into the Sperrgebiet covering all the mountain massifs, the full length of the spectacular coastline and over the vast picturesque dune fields. On retiring from dentistry I was employed by the mine to monitor the Sperrgebiet and complete an EIA of the mining areas. A full account of the Sperrgebiet has been completed in a book, “The Sperrgebiet- Nature’s Parched Masterpiece” which awaits publication. The book comprises 1233 scanned images (slides, graphics and paintings,) 393 pages and 134,614 words.

How do seasonal fluctuations in prey availability affect the physiology of free-living aardvark (*Orycteropus afer*)?

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The survival of myrmecophageous mammals, such as aardvarks, is directly dependent on constant and reliable prey resources, namely ants and termites. Hotter and drier conditions are predicted for Tswalu under climatic change scenarios. These environmental changes might negatively impact populations of social insects, altering their abundance and distribution, and ultimately influencing the nutritional physiology of mammals which rely on them. We are assessing the effect of seasonal and climatic factors on aardvark prey species diversity and abundance. This will serve to relate prey availability fluctuations to changes in aardvark physical condition, body temperature rhythms, and activity patterns, and home range use of aardvark in a changing habitat.

Seasonal variation in the bat community in Venetia Limpopo Nature Reserve

T. Ramathavha, P. Ramathuba & R.M. Baxter

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The aim of this study was to investigate the effects of seasonal variation on the bat community in Venetia Limpopo Nature Reserve based on classifying bat calls recorded using an ANABAT detector. In May alone 500 calls were recorded overnight and 14 species were identified. The three most common species were *Neoromicia nana*, *Pipistrellus rusticus* and *Tadarida aegyptiaca* and they produced 57% of the calls. The most common species *Neoromicia nana* showed high activity in early evening followed by a decrease. The expected result is that species richness and activity will be greater in the warm season than the cold.

Comparative population dynamics of ungulates on a Bankenveld Game Reserve

H. Louw

Ezemvelo Game Reserve, situated to the extreme north of South Africa's grassland biome was variously classified as Bankenveld Grassland (Acocks, 1988), Rocky Highveld Grassland (Bredenkamp & Van Rooyen, 1998 and later as Rand Highveld Grassland (Mucina et al., 2005). With predominating acidic soils it is regarded as a nutrient poor area, with ungulates expected to experience nutritional shortages especially during the winter months. The allometric scaling of body size with metabolic requirements dictate that smaller species should experience more severe nutritional bottlenecks compared to larger species during the dry season. This is expected to be somewhat mediated by feeding type amongst the ungulate community with the crude distinction of short grass grazers and long grass grazers in mind. Rainfall and grazing interactively dictate grassland productivity and therefore to a large extent the performance of ungulate populations. Larger ungulate more tolerant of forage quality are instrumental in the establishment of grazing lawns. Population dynamics of short grass feeders relies on the extent of grazing lawns and are expected to be strongly tied to rainfall, in particular its temporal distribution. Climax grassland communities are a more stable food source, with food quality rather than quantity the limiting factor for species foraging selectively. Rainfall and grazing intensity are therefore expected to be less influential on the population dynamics of ungulates feeding primarily in climax communities. Regular burning is common practice on this Game Reserve with grassland communities therefore temporally transformed from climax to short grass communities. This should differentially favour the different members of the ungulate assemblage. This study aims to identify the main drivers dictating the population dynamics across a multi species assemblage.

Kimberley's prehistoric landscapes in the history of archaeology in South Africa

D. Morris

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On the Diamond Fields in the 1870s, Mary Elizabeth Barber was one of the earliest to remark on "stone implements [that] abound in the neighbourhood." Her brother, Col Bowker, was, she said, the first to recognise stone tools in the diggings at Pniel. In the 1870s, George Stow recorded rock engravings around Kimberley, A.A. Anderson having depicted them in landscape sketches perhaps even earlier than that. In the decades that followed, numbers of amateur prehistorians and some of the pioneers of archaeology in South Africa, such as A.J.H. Goodwin and C. van Riet Lowe, would collect artefacts and describe sites in the area. Eminent scientists from Europe including Miles Burkitt and the Abbé Breuil interacted with locals on koppies and river banks. At sites in the region some of the formative ideas in South African Stone Age typology were figured out. McGregor Museum director Maria Wilman made a distinctive contribution, particularly in the study of rock engravings. The presentation reviews this pageant to illustrate the place of Kimberley's prehistoric landscapes in the development of archaeology in this country. It considers prospects for the future on the eve of the establishment of a new university in the Diamond City, one of whose foci is to be a School of Heritage Studies.

About the cupule sites on Tswalu Kalahari

P. Beaumont

This report includes results from research project that commenced in the year 2000 at three cupule sites, namely Potholes Hoek and Klipbak 1&2, all situated on Tswalu, on the south-eastern margin of the Kalahari. Age estimates, based on palaeoclimatic constraints, contiguous artefacts, and microerosion analysis, were used, in the absence of stratified finds, to construct a conservative provisional temporal framework for them. In terms of this, the earliest Phase 1 petroglyphs, with cupules only, occur at Potholes Hoek and predate 270 000 years ago, whereas Phase 2 markings, comprising cupules and outline circles, relate to Middle Stone Age intervals at about 130 000 – 70 000 years BP.

Industrial Heritage Tourism in South Africa – the case of The ‘Big Hole’, Kimberley

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Industrial heritage is one element of the heritage tourism sector under-investigated in South Africa. Using a mixed methods approach this paper investigates the case of The ‘Big Hole’, Kimberley – a settlement rich in cultural and industrial heritage but currently a declining tourism centre. Despite optimism and major investment into heritage tourism at the local level, limitations in local tourism marketing, poor budgeting, lack of strategic direction and leadership for tourism development at the local government level, need to be addressed if heritage tourism in South Africa is to contribute successfully to local economic development

Macroscelidea from the Sperrgebiet: clues for understanding the history of Sengis

B. Senut

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Macroscelidea (Sengis or Elephant Shrews) is an order of mammals found exclusively in Africa, where it is today widespread. The first fossil Macroscelididae from Southern Africa were found in Namibia and published by Stromer in the 1920's. Stromer (1931) described an Upper Miocene-Early Pliocene species *Palaeothentoides africanus* on the basis of fragmentary mandibles discovered in a diamond mine at Klein Zee (South Africa) and in 1970; Hendeby reported an Upper Miocene-Lower Pliocene *Elephantulus* sp. at Langebaanweg. Subsequently rich collections were made in the Sperrgebiet by the Namibia Palaeontology Expedition. The fossiliferous deposits yielded an abundant sample of Macroscelidea in the Oranje river (Arrisdrift, Auchas), and in the Northern Sperrgebiet from the Lower Miocene valley infillings at Langental and Grillental and the flood plain deposits at Elisabethfeld. They are highly diverse with an extraordinary variety of dental specialisations ranging from bunodont to highly hyposodont animals. In 2013, newly identified Eocene limestone deposits (Eocliff) immediately west of the Klinghardt Mountains have yielded a diversity of macroscelideans which throws a great deal of light on the the early history of the order. Some of the specimens are morphologically close to the Lower Miocene species from the Northern Sperrgebiet, whereas others are more brachyodont and smaller. They also differ from the few species defined in Northern African. The Eocliff discovery provides crucial information concerning the origin and evolution of sengis during the Palaeogene. We may be dealing with a South African cradle for the order! In conclusion, knowledge of Southern African fossil Macroscelidea is crucial for understanding the evolution of the group.

Eocliff, Africa's richest Eocene micromammal occurrence: implications for palaeoclimate

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The Sperrgebiet National Park, Namibia, has long been known for the richness and diversity of its fossil record, which comprises both marine and continental biotas, ranging in age from Late Cretaceous to Recent. In 2013, the Eocliff site was discovered close to the western margin of the Klinghardt Volcanic Complex. The steep-sided knoll at Eocliff is a circular mass of freshwater limestone 150 metres in diameter and 15 metres thick (ca 600,000 tons) reposing on carbonate breccia (probably of volcanic origin) and well bedded Plaquette Limestone, unconformably lying on Proterozoic dolomite of the Gariiep Group. Immense concentrations of micromammal fossils occur in the Eocliff Limestone, probably representing regurgitation pellets of birds of prey that roosted in trees growing close to the hard-water spring responsible for forming the limestone deposit. The assemblage of fossils is dominated by rodents, macroscelidids and insectivores (potamogalids, chrysochlorids). The presence of several hypsodont rodent and macroscelidid lineages indicates that the surrounding region was probably semi-arid to arid at the time of deposition (ca 47 Ma) thereby yielding the earliest evidence of aridity reported for the African continent. The Namib did not become a desert until the end of the Early Miocene (ca 21 Ma), but the evidence from Eocliff indicates that the south-

western part of Africa has been arid for much longer than any other part of the continent. The precocious onset of aridity demonstrated at Eocliff means that plants and animals have been exposed to natural selection driven by unstable climatic and environmental conditions for much longer in this part of the continent than elsewhere, which explains why the south-western corner of Africa is endowed with such a vast variety of indigenous plants and animals tolerant to arid conditions. The Eocliff fauna will contribute much new information concerning the processes of evolution in the south-western corner of Africa.

Leopard population density and community attitudes towards leopard in and around Debshan Ranch, Shangani, Zimbabwe

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A study of leopard on Debshan, a mixed cattle and wildlife ranch in Zimbabwe, is ongoing. A spoor survey was conducted (326.7km were driven, penetration rate of 2.75) where 59 individual spoor were observed giving a spoor density of 18.1spoor/100km. Leopards were observed along the Shangani river and in the center, with little presence noted in the north and west of the ranch. This is as expected given known preferences of leopards for riverine habitat and the distribution of wildlife on the ranch obtained from annual aerial counts. The spoor density when compared with other areas in Africa was relatively high indicating a healthy population. Questionnaires are ongoing to determine use of and tolerance to leopards in the surrounding communal and commercial communities.

Debshan Ranch and the holistic alternative – an overview

M. Mberi & C. Edwards

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“The need for a new approach to the challenge of making a living without destroying our environment goes back to prehistoric times....” A Savory, J. Butterfield. 1999, Holistic management. Debshan ranch is in the process of adopting a whole ranch planning system with the aim to better manage their agricultural resources in order to reap sustainable environmental, economic and social benefits. Since introducing this concept for over a year, some ecological, economic, and social changes have been noted. These may affect the future of Debshan, Zimbabwe and Southern Africa over time. A brief overview of what has been observed since choosing the holistic alternative will be given.

The rupicolous small mammals at Venetia Limpopo Nature Reserve

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A study of the distribution and abundance of rupicolous (inhabiting rocks) small mammals was conducted at the reserve. Sampling using Sherman livetraps was performed at four sites in three seasons (summer, winter and autumn, 2013). Twenty traps baited with a mixture of oats, sunflower oil and peanuts, were placed at each site. Two species were captured, the Eastern rock elephant shrew (*Elephantulus myurus*) and the Namaqua Rock mouse (*Michaelomys namaquensis*). The latter was the most abundant species (contributing 90.9% of the specimens caught). The larger *E. myurus* was diurnal and *M. namaquensis* nocturnal.

The Goldilocks effect: picky southern African hedgehogs (*Atelerix frontalis*)

J. Artingstall & N. Pillay

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Wildlife inhabiting urban areas exploits a range of habitats confined to particular microhabitats. We assessed the distribution characteristics of the southern African hedgehog *Atelerix frontalis* in the subcontinent and urban areas of Gauteng. From published data, reported sightings and incidental data, hedgehogs mainly occur in the savanna biome, covering mid-ranges of rainfall, temperature and altitude. In Gauteng, hedgehogs occur in Egoli granite grassland

vegetation, favouring areas close to watercourses, rocks and dense vegetation. Despite a wide distribution in southern Africa, hedgehogs are confined to protected areas in Johannesburg and their prevalence here might depend on selective urban development.

Termites as keystone species in Tswalu Kalahari

M. D. Picker

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The role of termites in enriching soils and increasing productivity is most apparent in arid regions, especially where naturally nutrient-poor sandy soils lack the microbial component required for decomposition of dead plant matter and recycling of nutrients. The possession of nitrogen fixing symbiotic bacteria in termites results in considerable soil fertilization where they occur. The Kalahari region supports a rich termite fauna of approximately 14 genera. However, only a few of the species occur in sufficient abundances to drive tropic and edaphic processes. The role of the dominant termites at Tswalu (*Hodotermes mossambicus*, *Trinervitermes* spp. and *Psammotermes allocerus*) in arid foodwebs and landscape engineering is discussed.

Pollination Crisis and Bee Alerts

M. Allsopp

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There is global concern at the loss of pollinators, and its impact on biodiversity and food security. The reported collapse of honeybee populations, in particular, has attracted media and public attention, as honeybees are the pivotal pollinator of commercial crops and an indicator species for pollinators in general. The Diamond Route properties have previously been utilized in studies on honeybee pests and population biology, as well as in developing community beekeeping. These properties could fulfill a crucial role in addressing pollination concerns in South Africa by establishing a network of Bee Alerts, a monitoring programme of honeybee population health.

An introduction to the dragonflies and damselflies of Ezemvelo Nature Reserve

C. Willis

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Following photographic surveys conducted along the Wilge River in the Ezemvelo Nature Reserve, Gauteng, between 2011 and 2013, a total of 22 dragonflies and seven damselflies have so far been recorded in the reserve. This represents 18% of South Africa's total number of dragonfly species. The value of dragonflies in freshwater ecology and opportunities for further research and surveys of these charismatic insects to be conducted in this and other Diamond Route nature reserves are discussed.

Increase in spider diversity of the Tswalu Kalahari Reserve, Northern Cape Province, and South Africa

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As part of the South African National Survey of Arachnida (SANSA) a third sampling trip for spiders (Arachnida: Araneae) was undertaken at Tswalu Kalahari Reserve from 11 to 17 March 2013. The known spider diversity before the trip was 29 families, 56 genera and 68 species. Sampling was done according to the SANSA protocol, with seven different sampling methods used at four different sites. The additional sampling methods used resulted in the first recordings of 4 families, 31 genera and 51 species. This brings the total for Tswalu to 33 families and 119 species. This illustrated the importance to sample all the field layers. Some of the new records are discussed together with their behaviour and ecology.

A preliminary outline of landscape ecology of South African butterflies with special reference to *Belenois aurota*, the brown-veined white, at Tswalu Kalahari

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Despite the repeatedly stated and accepted key importance of conserving habitats of butterflies, the landscape ecology of the butterfly species in South Africa, from most widespread species to highly localised species, is poorly understood. An ideal scenario to study the landscape ecology of butterflies is present at Tswalu Kalahari. An introduction and preliminary results concerning the main subject of the research, *Belenois aurota* (the brown-veined white) are presented. *Belenois aurota* is a common butterfly species, well-known for en masse migrations across the face of southern Africa, but enigmatic in terms of biological traits, especially in the field.

Leafhoppers of Ezemvelo, Rooipoort Tswalu and Venetia reserves

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Leafhoppers are sap-sucking insects with strong jumping hind legs and often with well-developed wings. Past work concerned leafhoppers of the Fynbos biome, consisting of up to 90 endemic grass-feeding leafhopper species. Recent work involved the endemic leafhoppers of the grassland biome. Qualitative collection in Ezemvelo took place in 1991, 2005 and 2006, and at Tswalu and Rooipoort during March 2013 and Venetia in February 2010. Methods involved the sweep net, vacuum techniques and thermal fogging. Ezemvelo yielded 58 species of leafhoppers, consisting of 20 endemic grass biome leafhoppers and the others being wide-spread savanna biome fauna. Rooipoort yielded 29 leafhopper species collected from 11 plant species and habitats. Tswalu yielded 33 leafhopper species from 22 plant species and habitats. Venetia with 63 species mostly from trees and herbs and under-represented in graminoid associated leafhoppers. Fogging at Rooipoort was successful but could be done only once at Tswalu. Most species from Rooipoort, Tswalu and Venetia form part of the wide-spread savanna leafhopper fauna.

Which Way the Rhino?

C. Walker

From the fossil record to 21st Century extinction. We currently face a very dark period in the history of rhinoceros conservation in South Africa as daily horrific statistics reveal the ongoing slaughter. The last rhino war did not impact South Africa's rhino populations but did we learn any lessons. Did we win the battle but lose the war. What is certain is the demand for rhino horn has never gone away. The demand is still there but the dynamics have changed and so too has the face of South African conservation. Clive Walker presents an overview and some options which may also be found within the pages of the book he co-authored with his son Anton, RHINO KEEPERS.

Biological and ecological notes on selected Heteroptera species of some of the Diamond Route properties

D.H. Jacobs

The Heteroptera are one of the most diverse Orders of insects. They are involved in most ecological interactions because they occur in all types of habitats (aquatic, semi-aquatic, terrestrial, subterranean, etc.) and have a wide array of feeding strategies (predators, plant feeders, seed feeders, scavengers, parasites of birds and mammals, and various specialized feeding strategies). Of all the insect groups only the Coleoptera (beetles), the largest order of insects, can match them in their ecological diversity. Biological and ecological aspects of a variety of heteropteran species occurring on Diamond Route properties are elucidated and discussed.

Rain spiders mating: close-up photography explains the mechanisms. (Araneae: Sparassidae)

J. Leroy & A. Leroy

Rain spiders (*Palystes* spp) are found throughout South Africa. Their impressive size and habit of entering houses means they are frequently encountered by the public. A pair of rain spiders, *Palystes superciliosus*, from Brenthurst Gardens was photographed mating, highlighting how photography can explain the behaviour and morphology of invertebrates. Male spiders store sperm in their pedipalps which are used to transfer sperm to the genitalia of the female. A sequence of photographs shows the different parts, how they function, how they are used during mating and clearly shows the use of the embolus during sperm transfer.

Arboviruses as cause of neurological disease in humans, farm and wild animals

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Many cases of acute neurological disease remain undiagnosed worldwide. The emergence of West Nile virus as a cause of encephalitis of humans, farm and wild animals in Europe and North America prompted us to investigate whether local strains of the virus in southern Africa were less pathogenic or had been overlooked as a cause of disease. We found that West Nile and other arboviruses (viruses transmitted by blood-sucking arthropods such as mosquitoes, midges, sandflies and ticks), including Sindbis, Middelburg, Wesselsbron and Shuni viruses, accounted for a proportion of undiagnosed cases of fatal disease not only in farm animals such as horses and cattle, but also in wild animals such as rhinoceroses, buffaloes, warthogs, giraffes and crocodiles. Some of the viruses had previously only been found in mosquitoes. Preliminary evidence indicates that humans are also affected. Arboviruses are usually maintained in nature by circulating cryptically between the arthropod-vectors and vertebrates which do not develop overt disease as a result of long evolutionary association with the virus. Small vertebrates such as rodents and birds which occur in large numbers and breed rapidly to ensure a constant supply of non-immune individuals constitute ideal reservoir hosts for arboviruses. Population explosions of small vertebrates and vectors, as occurs with seasonal and longer term climatic events (warm weather, heavy rainfall), magnifies the amount of virus in circulation with increased spill-over of infection to susceptible species such as humans plus farm and wild animals, with resultant generation of epidemics. We have selected a number of field study sites to perform regular surveillance of vector activity and later also small vertebrate populations to monitor arbovirus activity for improved prediction of outbreaks and application of control methods.

Tswalu Kalahari Reserve: a desert refuge for a diverse community of dung beetles

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Tswalu Kalahari Reserve is strategically placed to protect portions of two regional ecotypes, the Eastern Kalahari plains and outliers of the southwest Kalahari dune field. The reserve also incorporates six main local ecotypes, which not only include dunes and plains but, also, mountain habitat on the northern Korannaberg. The 71 species of dung beetles known to occur in this heterogeneous reserve are organized into assemblages that differ between the plains and dunes of the northern and southern parts of the reserve. Even greater differences occur between these Kalahari assemblages and those of the mountains, which include elements characteristic of the Nama Karoo. The various beetle assemblages are supported by the dung of a diverse assemblage of indigenous African mammals that have been re-introduced into the reserve.

The Tswalu lacewings: diversity through specialization

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The order Neuroptera, collectively known as “lacewings” comprises 17 families worldwide. 13 families are known from South Africa. Six families are already known from Tswalu Kalahari Reserve and at least another 4 should be revealed by further surveys. All larvae are predators, with unique mouthparts in which the mandibles and maxillae fit together to form piercing and sucking tubes – they are only insects with these specialized features. Adults are predators or pollinators. The specialised larval adaptations have not restricted the lacewings to an evolutionary dead-end but have enabled them to develop many morphological forms with an array of life strategies that ensure the survival of these unique insects. Tswalu Kalahari Reserve provides ideal habitats for most of the lacewing families, especially the psammophiles and arboreal species, and ensures their protection and conservation within a unique ecosystem of Kalahari sand intersected by the Korannaberg hills. The main Tswalu species and their biology are highlighted.

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Vegetation change in wildlife areas is greatly influenced by key factors like rainfall, fire and herbivore impacts. The nature and extent of such changes in wildlife areas are rarely recorded and assessed. An understanding of the dynamics and extent of such changes is however of great importance for scientific wildlife management. For this reason a vegetation monitoring project was launched on Ezemvelo and Telperion in 2007 to obtain concrete data on vegetation change over time. Data was recorded over a seven year period at representative sites in the main plant communities of the area. This resulted in a large and valuable data bank on vegetation change and dynamics. One of the major management challenges in wildlife areas is understanding and managing the varied ways in which large herbivores utilize and impact the natural veld. Some of the plant communities of Ezemvelo and Telperion are heavily impacted by large herbivores, while others are largely avoided, which is a typical and a totally natural phenomenon in such wildlife areas. Such driver's impacts are mainly due to the inherent characteristics of different areas, as well as the occurrence of fire. In this presentation the dynamics and extent of various vegetation changes that were recorded are assessed and interpreted, referring to key drivers of such changes. This is done by focussing on selected case studies, which illustrates the typical and diverse extent of changes that are occurring in this specific wildlife area. Even though specific results are analysed and assessed, the findings are relevant and important for an extensive vegetation region of Southern Africa.

Using social network analysis to increase the efficiency of a National Red Listing project

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Red Listing relies on the recruitment of expert networks to pool information and apply the Red List criteria to each species. However, most Red Listing projects rely on top-down, pre-determined expert groups to drive the assessments. We used a chain-referral technique to recruit mammal researchers and produced a map of both expert skill set (assessor or reviewer) and dataset distribution for each mammal species. This approach has enhanced the participation, efficiency and transparency of the Red List process. We suggest that social network analysis should be applied to more conservation frameworks to enhance on-ground effectiveness of information flow.

Mitigating the impacts of roads on wildlife: a pilot study in the Greater Mapungubwe Transfrontier Conservation Area

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In 2010, we initiated a project that formed the basis for the future development of the first national multi-species monitoring protocol of roadkill in South Africa. Implemented over a 120-day period in the Greater Mapungubwe Transfrontier Conservation Area (GMTFCA) in the northern Limpopo Valley, we detected 1121 roadkill carcasses, identified from 166 different species. A 'hotpost' section of the transect was identified for most roadkill occurrences. Movement patterns of many wildlife species are often associated with drainage lines, and can be modified with mesh fencing to encourage small vertebrate species. A pilot study examining the uses of culverts and funnel fencing will be implemented in October of this year in the GMTFCA to determine if there is a reduction post-erection of funnel fencing. This is a sister project to the EWT/WTP's Western Leopard Toad Roadkill Mitigation Project in the Western Cape.

Preliminary results of a study to determine the biodiversity and survival strategy of ectomycorrhizal fungi in a miombo woodland on Debshan Ranch, Zimbabwe

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The main objective to determine biodiversity and seasonality of macrofungi was achieved by above-ground sampling of fruiting bodies in three plots over two seasons. To investigate how mycorrhizae survive the long, cool-dry season, data-loggers were installed in the upper layer of soil where there is most mycorrhizal activity. The loggers were set to

measure changes in soil-moisture which can then be correlated to seasonal changes in incident light, canopy-cover and organic matter. A survey to investigate the below-ground 'activity' of ectomycorrhizae will be implemented in the 2013-2014 rainy season and will hopefully show relationships with the other environmental factors.

Hot temperatures, behavioural trade-offs and breeding success in shrikes

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Desert regions globally are warming rapidly under climate change, with wide-ranging but poorly understood implications for desert species. We studied the effects of temperature on the behaviour and breeding success of desert-dwelling fiscal shrikes (*Lanius collaris*) on Tswalu. We found that high temperatures drive breeding shrikes to make a complex series of trade-offs which result in reduced provisioning of nestlings. Temperature also affects nestlings directly. Together, these processes slow down nestling growth rates. The outcome of this is that individuals experiencing hot weather while in the nest fledge smaller and later, with implications for their survival and future reproductive success.

Development of a site selection process and tools to assist re-introduction efforts for the Southern Ground-Hornbill
Bucorvus leadbeateri

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The Southern Ground-Hornbill (SGH; *Bucorvus leadbeateri*) is red-listed globally as Vulnerable and in South Africa as Endangered. The aim of this project is to develop a process for identifying and evaluating possible priority sites for re-introducing SGH. Phase 1 involved using innovative techniques (Maxent and Geographic Information System-layer analyses) to identify possible re-introduction sites in the Savanna's of northern South Africa. Phase 2 involved field surveys of the sites in order to select the most suitable areas. Phase 3 involves a final assessment of the suitability of the sites for re-introduction of SGH, identified in phase 2, by a panel of experts on the biological and ecological requirements of SGH. Completion of Phase 1 and 2 culminated in Venetia-Limpopo Nature Reserve being selected as one of two priority sites. The next step is for Venetia-Limpopo Nature Reserve to be evaluated by the panel of SGH experts.

The conservation value of the avifauna of the Kathu forest, Northern Cape.

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Camel Thorn trees are keystone structures for birds in the southern Kalahari. The Kathu forest is a unique forest ecosystem located in the Northern Cape. I reasoned, that land uses inside the Kathu forest host an abundant and diverse range of birds compared to areas outside this forest. Four land uses were selected, one which was located outside the forest. Birds and their abundances were recorded at each of the sample sites. The bird assemblages at suburbia were significantly different from the natural habitats. The suburbia and golf course delivered strong indicator species. The forest only, hosted more unique species than outside. Results suggest higher conservation value within the forest than outside.

Resource-rich pan habitats regulate seasonal movements and home range dynamics in female Kori Bustard *Ardeotis kori*

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Knowing what determines annual movement patterns, home range (HR) size and site-fidelity is fundamental to designing species conservation programmes. However, this information is unavailable for most species, particularly in dryland Africa. Using data from satellite transmitters on six female Kori Bustard *Ardeotis kori* in Botswana during 2008 – 2011, this study investigated effects of season on HR size and site-fidelity. Across all birds, seasonal HR size did not

differ between wet and dry seasons. Birds were sedentary and did not exhibit any migratory tendencies, and there was strong site-fidelity. Findings suggest food resource affects Kori movement patterns, home range size and site-fidelity.

Mainland seabird colonies in South Africa – their growing importance and need of protection

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Of 15 species of seabird that breed in South Africa, nine are endemic to southern Africa and nine have a Red List status of Threatened or Near-threatened. Recent environmental change off South Africa brought about and massive decreases in some species and increased the importance of mainland breeding localities, e.g. the proportion of African Penguins *Spheniscus demersus* in the Western Cape that bred at mainland localities grew from < 5% in 2005 to 30% in 2012. Consequently it is necessary to limit seabird predation by indigenous carnivores at mainland localities. The paper will explore various options for such control.

Changes in the distribution range of White-bellied Korhaan in South Africa

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The White-bellied Korhaan is restricted the east-central parts of South Africa. This species is threatened by the loss, degradation and fragmentation of its Grassland habitat. Data on the distribution and abundance trends from the first and second Southern African Bird Atlas Projects (SABAP1 and SABAP2, respectively) were compared. 82% of its current distribution range is centred in KwaZulu-Natal and Mpumalanga. The most severe reductions in reporting rate were however recorded from these provinces, which can be attributed to commercial afforestation and mining activities. On the other hand, certain agricultural practices in other parts of the country may be responsible for creating favourable conditions for the birds in otherwise unsuitable habitat, leading to increased abundance in these areas.

POSTER ABSTRACTS

Mercury in rivers and streams near the De Beers Victor Mine in the Hudson Bay Lowland, Canada

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Mercury bioaccumulates efficiently in aquatic biota (benthic invertebrates and fish) and biomagnifies in food webs to exceptionally high concentrations in high northern latitudes, despite being far-removed from point sources of contamination. The objective of this research was to examine mercury dynamics and bioaccumulation in aquatic food webs in rivers and streams of the northern Hudson Bay Lowland, Canada where the De Beers Canada Victor Mine is located. The findings of this research show that mercury concentrations are highly variable in northern freshwater food webs, including forage fish and insects, and that methylmercury bioaccumulation in top predator fish is highly efficient in this sub-arctic, wetland-dominated ecosystem.

Importance of Telperion for Scorpion Conservation

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Scorpion Adventures CC, Jonathan@scorpions.co.za

During a survey of the scorpion fauna of Telperion, *Hadogenes longimanus* was found to exist in high abundance. Due to the limited distribution of this scorpion, *H. longimanus* is an important find and should be recognized as a flagship species within the reserve. In this poster, the results of the survey, the importance of *H. longimanus* within the reserve and threats to scorpion conservation are discussed.

A pilot nature conservation work-integrated Learning (WIL) communications project, in partnership with Ernest Oppenheimer & Son

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The outcomes of a pilot project indicate that academic WIL requirements can be achieved through simulation and direct observation. Ten Nature Conservation students spent seven days preparing and implementing the pilot project at Telperion. The students worked in pairs to design and present a series of tourism activities, which included game drives, walks, tours and sun-downer experiences. Their summative assessment involved a 'VIP' delegation comprising both international and UNISA academics. Through direct observation the communications module lecturer and WIL mentor assessed each student against a set of predetermined outcomes. All participating students in the pilot project logged 43% of their required communication modules notional hours

New book on the spiders of the Grassland Biome

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As part of the South African National Survey of Arachnida (SANSA), all available information on spider species distribution in the Grassland Biome was compiled. A total of 11 470 records from more than 900 point localities were sampled in the South African Grassland Biome, representing 58 families, 275 genera and 792 described species. The most species-rich families in the grassland are the Salticidae (112 spp.), followed by the Gnaphosidae (88 spp.), Thomisidae (72 spp.) and Araneidae (52 spp.). There are 58 species that are endemic to the grasslands. All this information will form part of a new book on the spiders of the Grassland Biome and will be released soon. The book is sponsored by E Oppenheimer and Son and included numerous species sampled in Diamond Route reserves.

Is conservation Sustainable in South Africa?

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For conservation to be sustainable in South Africa, it is clear that environmental and social justice concerns need to be integrated. A lack of social cohesion is emerging as one of the biggest threats to conservation. It is evident that the peripheral areas of conservation spaces remain extremely contested. This study is mapping the stakeholders and interests in a range of conservation areas, and exploring cases in which collaborative usage solutions have been found.

A survey of trapdoor and baboon spiders (Araneae: Mygalomorphae)

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A survey of trapdoor and baboon spiders (Araneae: Mygalomorphae) was conducted on Ezemvelo Game Reserve as part of a larger study on the systematics and conservation of these animals in Gauteng Province. Pitfall trapping was carried out for a full summer season, in three habitat areas in the reserve representing different substrate-vegetation classes. Nine species were collected in total, with two potentially new species discovered. The results show some degree of habitat specialisation, which is important for planning further surveys and understanding landscape scale community structure in these spiders.

Is dietary niche breadth linked to morphology and performance in Sandveld lizards *Nucras*
(Sauria: Lacertidae)?

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The functional characteristics of prey items (such as hardness and evasiveness) have been linked with cranial morphology and performance in vertebrates. In lizards particularly, species with more robust crania generally feed on harder prey items and possess a greater bite force, whereas those that prey on evasive prey typically have longer snouts. However, the link between dietary niche breadth, morphology, and performance has not been explicitly investigated in lizards. The southern African genus *Nucras* was used to investigate this link because the species exhibit differing niche breadth values and dietary compositions. A phylogeny for the genus was established using mitochondrial and nuclear markers, and morphological clusters were identified. Dietary data of five *Nucras* species, as reported previously, were used in correlation analyses between cranial shape (quantified using geometric morphometrics) and dietary niche breadth, and the proportion of hard prey taken and bite force capacity. Dietary niche breadth and the proportion of hard prey eaten were significantly related to cranial shape, although not once phylogeny was accounted for using a phylogenetic generalized least squares regression. We conclude that, in *Nucras*, dietary niche breadth co-evolves with cranial shape. However, although head width is correlated with the proportion of hard prey eaten, this appears to be the result of shared ancestry rather than adaptive evolution.

Butterflies of Tswalu Kalahari Reserve

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Over the last few years there have been several surveys in the Tswalu Kalahari Reserve with the objective of establishing accurate butterfly diversity for the area. This poster represents the data collected over 6 surveys, begging April 2002 to the most recent survey that was completed in March 2013.

Winter survival of common warthogs (*Phacochoerus africanus*) in a grassland ecosystem

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Warthog populations are able to increase and decrease rapidly but the details of how they decrease are not understood. I studied warthog mortality on Telperion Nature Reserve hypothesizing that piglets would have high winter mortality. During autumn (March) through to spring (October), survival data (presence absence of individuals over time) were collected from seven groups. It was however found that all monitored warthogs survived over the study period. This can be because of warmer winter temperatures this year. Further studies will be done until end of October for final results and the study will be repeated next year.

Trophic overlap between the Cape clawless otter (*Aonyx capensis*), spotted-necked otter (*Lutra maculicollis*) and water mongoose (*Atilax paludinosus*) on Ezemvelo Nature Reserve, Gauteng, South Africa

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Faeces of the cape clawless otter (*Aonyx capensis*), spotted-necked otter (*Lutra maculicollis*) and water mongoose (*Atilax paludinosus*) were collected and examined between March 2013 and June 2013 in order to study and compare the food habits of these semi-aquatic carnivores. The degree of trophic overlap will also be determined. Seasonal variations in the diets of both the otter species were observed. During summer, crabs were mostly taken, whereas the amount of fish increased in the diets during the winter months. These variations can be explained by the decrease in the efficiency of locomotion of fish, and the retreating of crabs into inaccessible places during winter. Although these three carnivore species occupy the same area, little inter-specific competition is expected as *Atilax* "utilizes a wider range of habitats than do otters", its diet shows the highest diversity, and, based on preliminary results, there is separation in the three carnivores' diets.

How do predator reintroductions drive ungulate species' foraging behaviour and landscape use in Tswalu Kalahari Reserve?

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This study aims to determine how multiple predators' impact on ungulate species' behavioural responses which in turn affect foraging behaviour, habitat use and at a finer scale patch use. To achieve this, Giving-up-densities (GUDs) coupled with vigilance monitoring will be used to quantify perceived predation risk by ungulates within habitats. This will relay important information on how animals perceive their environment by determining an animal's foraging efficiency within different habitats, patches and across time. We propose to test species-specific foraging and prey demographic class' responses to different predator treatments by setting up grids of foraging stations across habitat types. The findings from this study will help elucidate potential trophic cascades driven by shifting temporal and spatial risks of predation.

The use of palaeoecological evidence to reconstruct natural landscapes and historical climate-human-environment relationships in Mapungubwe National Park, Limpopo Basin

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Palaeoenvironmental studies are an inimitable approach to understanding a broad spectrum of environmental trends and the phenomenon of climate change. A scarce number of fossil pollen records have been analysed in coalescence with different forms of historical evidence in South Africa, often forfeiting the valuable information derived from such studies. The Mapungubwe National Park has been classified as a UNESCO World Heritage Site rich in biodiversity, cultural and archaeological archives. This study will use multi-proxy data derived from natural archives to support archaeological evidence, allowing for assumptions regarding palaeoenvironmental trends and a reconstruction of past climate-human-environment relationships to be made.

Can behaviour provide the basis for rapid assessments of the relative vulnerabilities of desert birds to climate change?

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Avian behaviours related to heat dissipation (e.g., panting, wing-drooping) potentially provide the basis for rapid, low-cost assessments of vulnerability to hotter future climates. Over the last few years at Tswalu, we have compiled a large number of behavioural data during hot weather for 35 species. A phylogenetically-independent analysis revealed that both activity levels and body mass are significant predictors of heat dissipation behaviour. We are currently starting a project to explore the underlying physiological correlates of these behavioural differences, and link heat dissipation behaviours to vulnerability to heat stress and dehydration.

White-winged Flufftail *Sarothrura ayresi*: The rarest Bird of the Year

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The White-winged Flufftail is listed nationally as Critically Endangered, with the current population in South Africa estimated to be less than 50 individual birds. This poorly known species has a highly fragmented distribution and is threatened by continued habitat destruction. It is only currently known from a few high-altitude marshes in Ethiopia (near Addis Ababa) and almost 4000 km to the south, from ten high-altitude wetlands in eastern South Africa. Through the involvement of BirdLife South Africa, the Middelpunt Wetland Trust (a trust solely responsible for the conservation of White-winged Flufftail) and the Ethiopian Wildlife Natural History Society, measures are to be put in place to aid the

conservation of this enigmatic species. The research envisaged includes genetic and isotope studies from samples collected in Ethiopia in August 2013; surveys of suitable wetland habitat in South Africa and a proposed captive facility. The genetic and isotope research should confirm the genetic connectivity between the South African and Ethiopian birds.

Keeping track of Secretarybirds

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BirdLife South Africa initiated a research project to better understand the biology of Secretarybirds. The project aims are to determine:

- The foraging range of the Secretarybird;
- How different habitats influence foraging range; and
- Post-natal dispersal and survival.

Thus far, BirdLife South Africa has fitted tracking devices to three Secretarybirds chicks.

The talk will give an overview of project progress, including challenges experienced, tracking devices used, and successes achieved. Up-to-date data will be presented on the movement of the birds fitted with tracking devices. Although it is too early to make conclusive statements, some data indicate that the birds could possibly follow similar post-natal dispersal patterns. After fledging they remain at the nest site for a short period, foraging in the vicinity of the nest, where-after they then leave their natal site and disperse over long distances.

Mi casa es su casa: changing forager settlement patterns on the Greater Mapungubwe Landscape

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The Greater Mapungubwe Landscape, which includes the De Beers Venetia Limpopo Nature Reserve, has one of the most unique archaeological records in southern Africa. Here, between AD 900 and 1300, developments in the agriculturalist economy led to the establishment of the Mapungubwe kingdom and state. During this time, foragers were present on the landscape and interacted with agriculturalists, and by the time the Mapungubwe capital was abandoned, their foraging material record disappears. Recent research in the area has revealed one potential explanation as to why this happened.

The impact of rapid land redistribution on the bird communities of Debshan Ranch, Zimbabwe

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Land redistribution has had a profound impact on agricultural land-use across Zimbabwe. However there is little information on how this process may have altered bird communities. Taking Debshan Ranch, central Zimbabwe, as a case study, we compared avian species richness, density and community composition between sites that are now owned by resettled farmers and sites that retain their original management as a game/cattle ranch. Species richness and density were higher on resettled sites, and community composition was similar. However, there was a lack of raptors and game birds on resettled sites, suggesting that a more subtle shift in the avian community has occurred.

New book on the spiders of the Grassland Biome

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As part of the South African National Survey of Arachnida (SANSA), all available information on spider species distribution in the Grassland Biome was compiled. A total of 11 470 records from more than 900 point localities were

sampled in the South African Grassland Biome, representing 58 families, 275 genera and 792 described species. The most species-rich families in the grassland are the Salticidae (112 spp.), followed by the Gnaphosidae (88 spp.), Thomisidae (72 spp.) and Araneidae (52 spp.). There are 58 species that are endemic to the grasslands. All this information will form part of a new book on the spiders of the Grassland Biome and will be released soon. The book is sponsored by E. Oppenheimer and Son and included numerous species sampled in Diamond Route reserves.

Small Mammal Phylogeography in South Africa

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South Africa has a rich biodiversity including two of the world's biodiversity hotspots. Despite this, relatively little is known about the genetic diversity that underlies this biodiversity, and most of the research that has been done focusses on the southern part of the country. In our projects we will examine the phylogeography of several small mammal taxa across the north of South Africa. To contextualise this work, I will review the information currently available for South Africa on the genetic structure of small mammals and other taxa with similarly low vagilities.

Comparative (native vs. alien) phylogeographic patterns in small mammals: lessons to be learned?

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The spatial distribution of genetic variation in species is shaped by several factors including the landscape. To this end, the majority of species examined to date show structured genetic patterns. To add to a growing body of literature on small mammals, we investigate the phylogeographic structure in the eastern rock elephant-shrew. In addition, invasive species has a detrimental effect on native biodiversity and may even cause local extinctions. We include the house mouse in our study to understand aspects of its biology.

Phylogeographic patterns in the hairy-footed gerbil *Gerbillurus paeba* and the Cape short-tailed gerbil *Desmodillus auricularis*

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Understanding the spatial distribution of genetic variation in species provides information for their management and conservation. In this study, we investigate genetic variation at two spatial scales in the hairy-footed gerbil *Gerbillurus paeba*. By adopting a landscape genetics approach, we wish to understand local movements of animals and connectivity amongst populations. At a larger spatial scale, we document the phylogeographic patterns and correlate these to possible landscape variables. The information from this study can be extrapolated to other species with similar biologies and life histories and provide an understanding of the processes that shape genetic diversity across the landscape.

Seasonal distribution patterns of three charismatic large mammal species at Tswalu as determined by game drive sighting data

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The relationship between habitat usage, proximity to water and seasonal changes in giraffe, white and black rhino was studied by method of game drive sightings in Tswalu between April 2012 and September 2012. Giraffe indicated a tendency to utilise *Acacia* dominated plant communities. Black rhino indicated predominant usage of plant communities dominated by *Acacia* spp. and indicated that their choice in habitat was dependent on permanent water-holes. White rhino showed predominant usage in the late wet season of plant communities with a high density of woody plants and available graze while in the late dry season their choice of habitat was dependent on permanent water-holes.

Colony composition in free ranging Damaraland mole-rats (*Fukomys damarensis*): the effects of cross-fostering individuals

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The Damaraland mole-rat is eusocial and occurs in medium-sized colonies of around 12 animals (range 2-41) (Bennett & Jarvis, 1988; Jarvis & Bennett, 1993). The colony consists of a founding reproductive pair and their progeny from several litters; these younger individuals do not breed while in the natal colony. The reproductive pair comprises the most dominant individuals. The non-reproductive members of the colony can be placed into work-related groups based on body mass: there is a tendency for smaller animals to perform more burrow maintenance than larger animals. One of the major potential factors driving cooperative breeding in African mole-rats is environmental constraints on dispersal and independent reproduction. The main objective of the project so far has been to mark a population of Damaraland mole-rats and determine the reproductive individuals within the colonies.

Ecology and management of *Seriphium plumosum* at Telperion Nature Reserve

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Seriphium plumosum encroachment is a problem in South African grasslands where the shrub converts extensive areas of grassland into less productive shrubland. The broad ecology and factors affecting the growth of *Seriphium plumosum* are not fully understood. Proposed research will investigate the effects of different selective clearing options on grass recovery and growth. The impact of various management strategies on *Seriphium plumosum* growth and natural veld species composition will also be investigated. Comparisons of veld condition in encroached and non-encroached areas will be done to determine the ecological and economic impact of *Seriphium plumosum* encroachment at Telperion.

Biome stability predicts the landscape genetics of a generalist bird species, the Cape Robin-Chat (*Cossypha caffra*) in the aridlands of southern Africa

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Historical factors such as changes in climate or landscape have likely had large impact on species distributions in the past, and in turn these range changes may have left an indelible signature on the demographic history of populations. Habitats and the species within them often share close associations. As habitats contract, expand, and shift through time, it is expected that habitat specialist species will track those changes leaving genetic signatures that reflect demographic fluctuations. While this framework has been widely applied to forest systems, it has been less investigated in non-forest systems or with generalist species. In this study we focus on the Cape Robin-Chat (*Cossypha caffra*), a widespread habitat generalist species found across the many aridland biomes in southern Africa. We utilize predictive models to delineate species refugia (e.g. areas where the environment is predicted to have remained suitable for a focal taxon over time), and habitat persistence/habitat refugia (e.g. areas where the environment is predicted to have remained stable for a biome over time) throughout the Holocene and recent Pleistocene. We use these spatially explicit hypotheses to then test the interplay among landscape and climate variables in structuring genetic diversity. Spatially explicit population analyses reveal that among localities there are relatively high F_{st} values. Both DFA and spatial PCA support the existence of two primary genetic clusters. The clusters are tightly associated with aridland biome stability, and better explain the genetic data than patterns of isolation by environment or isolation by geographic distance. This demonstrates that historical habitat stability is an important predictor of contemporary genetic patterns even for generalist species in non-forest habitats, and suggests that the habitat refugia paradigm is more broadly applicable than presently recognized.

Pollen taphonomy from hyaena scats and coprolites: preservation and quantitative differences

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Coprolites are often used in African and European archaeological sites as archives for different environmental proxies like pollen. However, few studies on pollen taphonomy have been done to recognize the pollen sources from coprolites for the reconstructing of past environments. We compare pollen contents in scats from the known environment using fresh hyaena scats from the Tswalu Kalahari Reserve (South Africa) with modern soil and the pollen contents in coprolites from Equus Cave (Southern Kalahari, South Africa). The results indicate that for reconstructing the regional settings, scats preserve and contain higher amounts of pollen than soil and that the coprolite core is richer than the external parts, reflecting local environmental conditions more effectively.

Holistic management: monitoring the change

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The management of cattle on Shangani Ranch has changed to follow holistic principles. In order to record any significant changes that might follow, I collected baseline data for a long-term monitoring project. Twenty-seven permanently marked transects were laid out across the ranch. Within quadrats placed along each transect, I recorded the frequency and dry weight rank of grass species, assessed the condition of the herbaceous layer by ranking five variables using Walker's 7-point scale, and recorded an index of grass basal area. Fixed-point photopanoramas record the abundance of trees and shrubs.

Kin-directed investment in public goods

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Animal societies have evolved in many taxa, demonstrating that a 'tragedy of the commons' leading to social collapse is not inevitable in nature. Social interactions, especially among kin, can have profound implications for individual fitness influencing the extent to which individuals should cooperate. Using social network analysis combined with analysis of fine-scale population genetic structure we show that kin are spatially clustered and form cohesive social units within the massive communal nests of sociable weavers, *Philetairus socius*. Additionally, we found that individuals build the nest above their own and their relatives' chambers. These results show how kin-directed cooperation may act to maintain animal-built physical structures.

Rehabilitated wildlife released on Diamond Route Reserves

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The ultimate object of rehabilitating wildlife is to successfully release them into suitable habitats. In the case of hand-reared species it is vitally important to follow a slow release process which gradually allows the animal's instinctual behaviour to be stimulated. Close monitoring, either through telemetry or observation, and support feeding is an integral component of the successful release of rehabilitated or hand-reared wildlife. Records and observations of the behaviour and movement of each release are kept. Insights gained will add to and improve future releases and this provides fascinating data on learned and inherited behaviours. A successful release, following a well-planned guideline, is measured by the animal recognising its natural food items, becoming independent of humans and/or breeding with wild members of its species.

Host diversity and tick-small mammal networks

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High host species diversity may have the potential to reduce the pathogen prevalence of vectors such as ticks. Over the course of one year a total of eleven small mammal species was collected during from sixteen study plots. These carried a total of 23088 ticks from 14 species. The most prevalent tick species connected all hosts in an interaction network and although host abundance differed between grassland and rocky outcrops tick burden did not. These results indicate that host encounter reduction mechanisms may act in habitats with higher host diversity reducing not the relative but the absolute vector abundance.

At home with the birds: Kalahari tree skinks associate with sociable weaver nests despite African pygmy falcon presence

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Sociable weaver *Philetairus socius* nests are a conspicuous feature of the Kalahari. We examined if Kalahari tree skinks *Trachylepis spilogaster* associated with weaver nests and examined if the presence of pygmy falcon *Polihierax semitorquatus*, an obligate user of nests and a skink predator, impacted skink abundance. We found a significant association between the skink abundance and weaver nest presence in trees. Skinks were also more likely to sit on nests if present. Surprisingly, falcon presence did not influence skink abundance. Kalahari tree skinks clearly use the nests and appear to benefit through lowered predation risk, thermal refuge and prey availability.

An integrated approach to Baboon Management on the Cape Peninsula

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Human-wildlife conflict is a challenging aspect for most wildlife management and is common across Africa. In the Cape Peninsula, South Africa, the rapidly increasing human population and urban development puts growing pressure on the chacma baboon (*Papio ursinus*) population. Interaction between humans and baboons has led to habituation of most troops and, in some cases, baboons living inside the urban area. Ultimately this leads to a high level of conflict which needs to be mitigated. Currently baboon management focusses on a holistic approach using a variety of methods to limit conflict and decrease contact between humans and baboons. Preliminary data is presented on the use of paintball markers, bear bangers and selective euthanasia of raiding animals, to manage troops.

Frozen in time: Frequency of frost and rainfall events in relation to *Colophospermum mopane* growth in Limpopo province, South Africa

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Few studies have been conducted exploring the effect of minimum temperatures on savannah trees in Southern Africa. This study aimed to explore the long term effects of frost/freeze and rainfall events on the survival of *Colophospermum mopane* (Mopane). This was done by exploring the long term temperature patterns within and outside the range of C.

mopane within South Africa. Along with the long term investigation, a localized case study was explored in the Venetia-Limpopo Nature Reserve (Venetia). Temperatures in and out of the canopy, along a slope and at different heights were explored. Re-growth was also measured after the 2010 freeze event, from the years 2010-2013. It was shown that frost (-2°C) frequency in the range (Musina) is approximately every 9 years and outside (Polokwane) at about every 12 years. Re-growth mostly takes about 3 years in the case of *C. mopane* following a freeze event. Temperatures measured inside of the canopies were 0.56°C warmer than outside of the canopy. Slope and height differences in temperatures confirmed that the coldest temperatures were found at the bottom of the slope, whilst 1.5m-2m experienced the coldest temperatures above the ground level at all slope positions. When analyzing long term weather trends, it is important to understand the limitations of weather station data. Slope position, height and canopy position all have an effect on temperatures experienced by the tree. It is therefore important to note these microclimates when doing these types of studies. Lastly, under climate change, if frost were to become more frequent in the area, *C. mopane* may be under threat. Under current conditions though, *C. mopane* should thrive and may be even spread southwards.