5th Annual Diamond Route Research Conference
21st & 22nd October 2014

Multipurpose Rooms, 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 21st October
08h30	REGISTRATION and TEA / COFFEE
09h00	Phillip Barton, De Beers Consolidated Mines CEO and Chair of the Diamond Route Trustees **Overview and Introduction to the Diamond Route**
09h20	John Hanks **Keynote Address:** The need to embrace 'ancillary considerations' in strategies to reduce elephant and rhino poaching
	Mammal Ecology **CHAIR: Jamie Zylstra, Site Representative, Venetia Limpopo Nature Reserve**
09h50	Darren Pietersen Molecular phylogeography of Temminck's Ground Pangolin populations in southern Africa
10h10	Doug Makin, S. Chamaillé-Jammes & Adrian Shrader The Ecology of Fear: How large predators impact herbivore' habitat use and foraging behaviour in Tswalu Kalahari Reserve
10h30	Ilana Bruton & Bettine van Vuuren Patterns and processes in the Bushveld gerbil *Gerbilliscus leucogaster* across the northern parts of South Africa
10h50	TEA / COFFEE
	Avian Conservation **Warwick Davies-Mostert, Biodiversity Manager, De Beers Group**
11h20	Ryan O'Connor, Andrew McKechnie & Mark Brigham Thermoregulation during summer in free-ranging Rufous-cheeked Nightjars
11h40	Zephné Bernitz, K. Stępniewski, J.K. Nowakowski, K. Stępniewska, H. Bernitz, J. Avni & M. Remisiewicz Evolution of Wing Morphology: inter- and intra-specific variation of wing shape and moult as an evolutionary adaptation to birds' lifestyle, migration behaviour and habitat
12h00	Dawie de Swardt Preliminary vocalization data on African Rock Pipit *Anthus crenatus* at Tswalu Kalahari Reserve
12h20	Emma Wood & Andrew Young Ageing in a cooperatively breeding bird: the white-browed sparrow weaver
12h40	Kabelo Senyatso Resource-rich pan habitats regulate seasonal movements and home range dynamics in female Kori Bustard *Ardeotis kori*
13h00	LUNCH and Conference Photograph

Time	Tuesday 21st October (continued)
	Conservation Ecology **CHAIR: Colin Edwards, General Manager, Debshan**
14h00	Sindiso Chamane, Kevin Kirkman, Craig Morris & Tim O'Connor Can forbs survive holistic grazing?
14h20	Emily Taylor The Endangered Wildlife Trust's Urban Conservation Project: Promoting sustainable coexistence of humans and wildlife in the urban matrix of Gauteng
14h40	Mupenyu Mberi & Colin Edwards Impacts of Holistic Management on Debshan Ranch
15h00	Ross Pitman, Luke Hunter, Rob Slotow & Guy Balme Limpopo Leopard Project – establishing a provincial framework to enable adaptive management of leopards in Limpopo, South Africa
15h20	TEA / COFFEE
	Species Conservation **CHAIR: Duncan MacFadyen, EOS Research and Conservation**
15h50	Helmut Müller, Dina Fagir & Heike Lutermann Body condition indices and their suitability to indicate stress in a wild mammal
16h10	Marietjie Oosthuizen Exploration and memory in wild and lab Damaraland mole-rats
16h30	Nico Avenant, Gus van Dyk & Duncan MacFadyen Small mammal sampling: a useful conservation tool?
16h50	Robert Thomson Breeding system and ecology of the African Pygmy Falcon
17h10	Peter Taylor & Rod Baxter Overview of bat diversity in northern Limpopo: is the Limpopo Valley depauperate relative to the Soutpansberg?
17h30	Sarah Edwards & Ingrid Wiesel Brown hyena Occupancy and Density Estimation on Tswalu Kalahari Reserve
17h50	Close of Day 1
18h00	FORMAL POSTER SESSION
18h30	COCKTAIL FUNCTION: **DE BEERS CORNERSTONE**
	Buskaid Performance

Time	Wednesday 22nd October
08h00	TEA / COFFEE
08h30	Craig Packer **Keynote Address:** Behaviour & Ecology of Serengeti Lions
	Invertebrate Conservation **CHAIR: Dylan Smith, Site Representative, Tswalu Kalahari Reserve**
09h00	Donovan de Swardt, C. Coetsee & Tim O'Connor Investigating the Effects of Mopane Worm Frass on Soil Nutrients in the Mopane Veld of Venetia Limpopo Reserve, South Africa
09h20	Nina Parry, M. Mansell & Chris Weldon Seasonal and Habitat Variation in Species Assemblages of Carrion-Feeding Diptera with Larval Key
09h40	Ivan Horak & Heloise Heyne Beauty and the Beast
10h00	Heike Lutermann & Dina Fagir Effects of small mammal community composition on tick burdens in Ezemvelo and Telperion Nature Reserve
10h20	Reinier Terblanche Butterflies of Tswalu Kalahari and their sense of place
10h40	Robin Crewe & Robin Moritz Honey bee colony densities and losses: pollinator availability in the future
11h00	TEA / COFFEE
	Archaeology and Heritage **CHAIR: Patti Wickens, Senior Environmental Manager, De Beers Group**
11h30	Tim Forssman, Bruce Page & Jeanette Selier How Important was the Presence of Elephants as a Determinant of the Zhizo Settlement of the Greater Mapungubwe Landscape?
11h50	Michelle Dye, Carl Grossmann & A. Forbes Comparison of time-of-flight and phase shift terrestrial laser scanning for the documentation of petroglyphs in Rooipoort Nature Reserve, South Africa
12h10	Kefilwe Rammutloa Regional trade, exchange and consumption on the Greater Mapungubwe Landscape: an archaeological investigation
12h30	Trent Seiler Bushman and farmer interactions in the Motloutse-Limpopo confluence area: a landscape approach
12h50	LUNCH
	Species and Population Studies **CHAIR: Elsabe Bosch, Site Representative, Telperion**
13h50	Gordon O'Brien, Francois Jacobs, Steven Evans & Nico Smit First observation of African tigerfish *Hydrocynus vittatus* predating on barn swallows *Hirundo rustica* in flight
14h10	Hanneline Smit-Robinson & Lance Robinson Seasonal species richness and habitat use of urban bird species at Brenthurst Garden
14h30	Bryan Maritz & Graham Alexander Hunters hunted: ecological and evolutionary implications of predation on snakes
14h50	Andrea Goldsworthy & Neville Pillay The good, the bad and the not so ugly
15h10	Matthew Child & Harriet Davies-Mostert Making the Red List work for both researchers and practitioners
15h30	Nina Steffani & Mark J Gibbons What can you find on the seabed off southern Namibia, and why?
15h50	Presentation of Awards – Nicky Oppenheimer
16h00	Closing - Nicky Oppenheimer (E Oppenheimer & Son)
16h20	**CONFERENCE CLOSURE**

Posters	
Authors	**Titles**
A. Jacobs[1], L. Mojela[1], N. Maluleke[1], P. Dikhoba[1] & E. Venter[2]	Soil *Fusarium* survey in the grassland biome of South Africa
A. Jacobs[1], N. Seema[1], M. Manganyi[1], M. Tladi[1], G. Kwinda[1] & E. Venter2	Soil *Fusarium* survey on the Telperion Nature Reserve
E.T. Ramathuba, C.T. Munyai & R.M. Baxter	Ant communities and their interaction with the surrounding environment in Venetia Limpopo Nature Reserve
C.I. Eardley[1] & W. Coetzer[2]	The importance of accurate biodiversity information: a pollination perspective
W. de Frey[1] & K. Drescher[2]	Mapping to advance nature tourism
R.E. van Dijk[1], R. Covas[2,3,4], C. Doutrelant[4,5], C. Spottiswoode[6] & B.J. Hatchwell[1]	Restricted, female-biased dispersal causes fine-scale genetic structure within a population of sociable weavers (*Philetairus socius*)
H.G. Thomas, D. Swanepoel & N.C. Bennett	Manipulating colony composition in free ranging Damaraland mole-rats: the effects of cross fostering
A.S Dippenaar-Schoeman[1], P. Webb[2] & R. Lyle[1]	Photo gallery of the spiders (Arachnida: Araneae) of Telperion Nature Reserve
R. Lyle[1], A.S. Dippenaar-Schoeman[1], P. Marais[1] & P. Webb[2]	Telperion an important link in the spider grassland survey
Astri Leroy & John Leroy	Brenthurst Spiders, an illustrated guide
R.F. Terblanche	Shepherd's Trees of the Kalahari, a key source for Brown-veined White butterfly migrations across the face of South Africa
E.F. Robertson	Monitoring the change to holistic management: a productive season
L. Marisa[1], P. Henzi[1,2], A. Barrett[1] & L. Brown[1]	Nutritional ecology, habitat utilisation and activity scheduling of free ranging chacma baboons (*Papio hamadryas ursinus*) in a highly seasonal habitat at Telperion, Mpumalanga, South Africa
A. van Wyk	Changes in vegetation recorded after fire on Telperion
N. Weyer[1], A. Fuller[1], R. Hetem[1] & M. Picker[2]	Heterothermy in aardvark - a physiological response to environmental stress
S. Edwards[1, 2*] & K.A. Tolley[1,2]	Is dietary niche breadth linked to morphology and performance in Sandveld lizards *Nucras* (Sauria: Lacertidae)?
K.C. Wickins, A.S. Barrett & L.R. Brown	The response of *Seriphium plumosum* to various control methods within Telperion Nature Reserve
G.A. Wilson	Taking stock of seven years of Conservation Skills Development and Training on Telperion
P. Nyoni[1], C.R. Edwards[2], D.M. Parker[1] & G.K. Purchase[2]	Leopard population density and community attitudes towards leopards in and around Debshan Ranch, Shangani, Zimbabwe
R. Huruba[1], C. R. Edwards[2], P. Mundy[1], A. Sebata[1] & G.K Purchase[2]	An investigation of the productivity of abandoned kraal sites and their usage by wildlife on Debshan Ranch, Zimbabwe: Implications for holistic livestock management
K. Mooketsa[1], K.J. Senyatso[1], M.V. Kootsositse[1] & K. Soupu[2]	Improving Biodiversity Management Through Bird Monitoring: The Benefits of Citizen Science Programmes in Parks
C.J. Louw[1] & J.P. Marshall[2]	Does competition and facilitation within ungulate communities affect species at the population level?
E.C.J. Seamark[1], L. Labuschagne[1], S.D. McCulloch[2], T.P. Scott[2] & T.C. Kearney[1,3,4]	Bats (Mammalia, Chiroptera) of Telperion Nature Reserve (Gauteng and Mpumalanga, South Africa)
G.T. Pahad[1] & B. van Vuuren[2]	Using Ecological Niche Modelling to examine genetic structure in the forest shrew *Myosorex varius*
M. Turnbull[1] & B. van Vuuren[2]	Comparing patterns in native and introduced species – lessons to be learned
W.M. Strauss[1], R.S. Hetem[1], D. Mitchell[1], S. Maloney[3], L. Meyer[2] & A. Fuller[1]	Physiological flexibility could buffer the effects of climate change
M. Dye[1] & C.Grossmann[2]	Terrestrial 3D laser scanning of the historic 'Shooting Box' building in Rooipoort Nature Reserve, South Africa
D J Krynauw	The late great pompom weed threat in South Africa
P.R.K Richardson[1], J. Wood[2], E. Jordan[2], N.S.D. Shaw[1], C.J. de Jager[1], S.C. Rode[1] & R.R. Khoury[1]	Lessons learn't from Baboon Management on the Cape Peninsula
K. Padayachee[1] & G. Malan[1]	Diet of the Magaliesberg Verreaux's eagles

The need to embrace 'ancillary considerations' in strategies to reduce elephant and rhino poaching

J. Hanks
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Too many of the simple, mono-focal solutions to stop elephant and rhino poaching disregard the complexity of the context in which wildlife and people try to co-exist in Africa. Most of these 'ancillary considerations' fall outside of the ambit of the professional conservationists, and are rarely addressed or even mentioned. They include: (i) having the courage to speak out on corruption and help to eliminate it; (ii) promoting a greater awareness of some of the realities of living and working in Africa; (iii) stopping the developed world dictating to African countries on how to manage its wildlife; (iv) regularly calling attention to the realities of the impacts of human population growth; (v) be aware of the role of international terrorism in the illegal rhino horn and ivory trade; (vi) focussing on the growing impact of China in Africa; and (vii) promoting conservation triage.

Molecular phylogeography of Temminck's Ground Pangolin populations in southern Africa

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Temminck's Ground Pangolin is a shy, secretive and solitary species occurring across southern and East Africa. We constructed a molecular phylogeny using three mitochondrial gene regions for 25 samples and found high levels of genetic variation within populations. Our results suggest that South African populations are most closely related to populations in Namibia, while Mozambique and Zimbabwe populations group together. This apparent split may be attributable to the Mega Kalahari Sand Sea creating a historic barrier between these populations, or a more recent barrier may be responsible. Alternatively, this apparent sub-structuring may be as a result of incomplete geographical sampling.

Impacts of large predators on ungulate species' foraging behaviour and habitat use in Tswalu Kalahari Reserve

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This project aims to determine how large predator combinations impact on herbivore species' space use and foraging behaviour. To achieve this artificial foraging station were used as means of quantifying perceived predation risk within different habitat types. From these stations 'Giving-up-Densities' (amount of food left once a forager has finished utilising a patch) were collected and compared. Sable as a focal species, spent significantly more time feeding (lower GUDs) from patches located in open areas (69.2 g) compared to patches near intermediate (84.7 g) and dense vegetation cover (85 g). In response to wild dog introduction, sable foraging effort decreased by 6.2%, reflecting higher GUDs. These results indicate that sable do not utilise the landscape uniformly, but forage in areas they perceive to be safer from predators. Sable responded to increased predation risk from wild dog by reducing the time spent foraging from patches and increasing time spent vigilant.

Patterns and processes in the Bushveld gerbil Gerbilliscus leucogaster across the northern parts of South Africa.

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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 different aspects of genetic variation in the Bushveld gerbil *Gerbilliscus leucogaster*. Revising the phylogeny of gerbil species across South Africa as well as modifying the area diversity curve to see if larger areas really do hold more genetic diversity. 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.

Thermoregulation during summer in free-ranging Rufous-cheeked Nightjars

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Caprimulgid birds provide a model for understanding avian thermoregulation in hot environments without diurnal water intake. During summer 2013/2014, we investigated thermoregulation in free-ranging Rufous-cheeked Nightjars (Caprimulgus rufigena) at Dronfield using both external temperature-sensitive transmitters (n=5) for skin temperature (Tskin) and internal temperature loggers (n=2) for core body temperature (Tb). Mean Tskin was 38.5 ± 2.4 °C, but on occasion dropped as low as 25.9 °C). Mean Tb was 39.8 ± 1.1 °C (range=34.4-43.6 °C). Unlike most birds, Rufous-cheeked Nightjars show a unimodal distribution of Tb with no indication of the circadian cycle typical of avian thermoregulation.

Evolution of Wing Morphology : inter- and intra-specific variation of wing shape and moult as an evolutionary adaptation to birds' lifestyle, migration behaviour and habitat

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Migration imposes demands on birds that shape morphology and life cycle. The database of Operation Baltic, Poland contains detailed measurements of > one million birds; limited equivalent data exist for southern Africa. Moult for all species is known incompletely. Telperion supports diverse populations of European migrants and their ecologically equivalent resident and intra-African migrant species during their non-breeding season, when they moult their plumage. Preliminary results of relationships between the migratoriness-sedentariness of birds, their wing shapes and moult patterns will be presented. The project will provide South African university students with opportunities for practical participation. Bird biodiversity will be monitored.

Preliminary vocalization data on African Rock Pipit *Anthus crenatus* at Tswalu Kalahari Reserve

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The African Rock Pipit *Anthus crenatus* (ARP) is endemic to South Africa and Lesotho associated with mountainous areas, karoo hills and escarpments with rocky hills preferring open areas with adequate grass cover. Two isolated populations occur in the Northern Cape. ARP song consists of a two-syllable "whee-preeeu" vocalization which is repeated during a song bout. Syllable 1 (S1) is a drawn-out whistle while syllable 2 (S2) is a more complex trill, which consists of up to 4 sub-types (S2a-d). Considerable individual and inter-population variation in ARP song has been recorded. ARP song was recorded at isolated hills at Doornberg, Gosberg and Witberg in Tswalu Kalahari Reserve

during October 2013. Statistics of song components (S2a-d) were compared with ARP song recordings from other localities. This study is currently ongoing and visits to Tswalu Kalahari Reserve, the Groblershoop, Graaff Reinett and other isolated localities are in preparation

Ageing in a cooperatively breeding bird: the white-browed sparrow weaver

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Senescence is now known to be pervasive in wild animal populations. However, the causes of variation in ageing rates and the molecular mechanisms that mediate senescence are not well understood. Our long-term field study of white-browed sparrow-weaver societies at Tswalu Kalahari Reserve has revealed marked impacts of cooperation and conflict on the lives of these social birds. My research will now use long-term field data and molecular techniques to investigate the effects of the social environment on ageing and whether these effects are mediated by telomere dynamics.

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

K.J. Senyatso

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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, HR size and site-fidelity**.**

Can forbs survive holistic grazing?

S. Chamane[1], K. Kirkman[1], C. Morris[2] & T. O'Connor[3]

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Historically, research in grassland management in South Africa focused on grass composition because it directly affects livestock production. Forb (non-grass herbaceous plants) composition was neglected. Forbs rather than grasses comprise most of the plant diversity in grasslands, with forb species outnumbering grass species by about 6:1. Plant diversity may not play an important role for grazing but it plays a crucial role in ecosystem functioning. Different grazing systems are expected to have different effects on plant diversity, and the effect of short duration, high density stocking on plant diversity might be quite extreme. We set up a high density grazing simulation system, with five 2500 m2 paddocks, in which 15 mature cows were placed periodically for 24 hours, at a stocking density of about 50 large stock units per ha. Equivalent ungrazed plots were located adjacent to the grazed plots. Paddocks were grazed twice during the 2013/2014 summer season, with long periods of absence between grazing (> 2 months). Species composition (grasses and forbs) was assessed before and after each stocking event to assess frequency and cover.

Promoting sustainable coexistence between humans and wildlife within the urban matrix of Gauteng.

E. Taylor & H. Davies-Mostert

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The Endangered Wildlife Trust's Urban Conservation Project, with support from EO & Son, is developing a collaborative platform to facilitate the public's enjoyment of the rich array of wildlife and ecosystems within Gauteng's urban areas. A key objective is to promote positive interactions between people and wildlife in our city, in an environmentally sustainable way. We are developing a suite of guidelines and toolkits to address issues at the human-wildlife interface in Gauteng; creating a broad network of individuals and organisations capable of effectively and

sustainably facilitating coexistence between humans and wildlife in urban Gauteng; encouraging and supporting citizen participation in urban conservation initiatives; and increasing awareness among urban citizens of the ecosystem services provided by wildlife and the necessity to preserve biodiversity in our cities. In this presentation we briefly present progress made in the first year, examine the obstacles that have presented themselves along the way, and discuss our future plans for this exciting initiative.

Defining and assessing ecological, social and economic changes and their interrelationship - Debshan Ranch and the holistic alternative

M. Mberi & C. Edwards

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As Debshan continues to holistically manage their cattle and wildlife operation, some changes have been observed. Monitoring and analysing landscape function processes over 12 months has shown improvements which positively affect diversity. The social impact is also surveyed. An attempt to compute the qualitative benefits and changes economically is done. This necessitates defining the aspects of the triple bottom line in order to clarify the effects resulting from applying holistic principles. The complexly simple interplay between the ecological, social and economic benefits is determined so as to be able to understand how the balance is gained and constantly adjusted.

Limpopo Leopard Project – establishing a provincial framework to enable adaptive management of leopards in Limpopo, South Africa

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Leopards (*Panthera pardus*) throughout Limpopo Province, South Africa, are heavily persecuted through legal and illegal practices. Even though a large proportion of Limpopo is considered suitable leopard habitat, there are uncertainties regarding leopard population viability, especially given that harvest practices are potentially unsustainable. Small-scale site-specific studies have the advantage of collecting high resolution, precise data, but often lack the ability to generate accurate large-scale inferences; in contrast, large-scale multi-site studies are capable of determining relative, coarse demographic trends but sometimes lack the fine-resolution data necessary for management. A marriage between these two approaches can provide a satisfying compromise. The Limpopo Leopard Project (LLP) aims to establish a reliable and easily repeatable method for monitoring leopards at the provincial scale in Limpopo to facilitate effective adaptive management. Such a method has applicability for leopard management elsewhere in South Africa, and more widely across the species' range. The LLP will use simulation & spatial modeling alongside well-established survey methods to collect, manipulate and analyse leopard population and ecological data.

Body condition indices and their suitability to indicate stress in a wild mammal

H. Müller, D.M. Fagir & H. Lutermann

Individual body condition is an indicator of the availability of resources (e.g. energy) for reproduction and survival. Traditionally these have been assessed by destructive sampling but methods that allow repeated sampling are preferable for monitoring animal health. We collected various morphometric and physiological condition measurements from Namaqua rock mice (*Micaelamys namaquensis*) over the period of one year and evaluated their correlation with natural stressors such as seasonal fluctuations in food availability, reproductive activity and parasite burden. These will be compared to measurements from captive individuals that are kept parasite-free under constant temperature and food availability.

Exploration and memory in wild and lab Damaraland mole-rats

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Damaraland mole-rats are eusocial subterranean rodents that exhibit a caste system (queens, infrequent workers and frequent workers). Frequent workers performs the majority of the work in the colonies, hence I was interested in caste differences in exploratory behaviour and memory performance. I also compared wild and laboratory animals. No differences were found in exploratory behaviour, and wild animals more erratic behaviour in the memory test.

Performance in the memory test improved significantly after the 2nd day for all groups. Initial performance of wild animals is better than that of lab animals. Laboratory housing does not appear to affect the mole-rats adversely.

Small mammal sampling: a useful conservation tool?

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Small mammal community structure and the presence or absence of specific indicator species has been found to correlate with ecological value in southern Africa's Grassland Biome. Following a recent short term study at Tswalu Kalahari Reserve (trapping in 14 transects across 5 broad habitats; 6200 trap nights), this contribution explores the utility of small mammal survey for the assessment of ecosystem integrity in an Arid Savanna Biome. The high overall trap success, species richness and diversity scores in almost all transects allow for interesting interpretations relating to ecosystem health. Such data also provides information on a number of research topics relating to small mammal species richness, communities, predators and conservation management.

Breeding system and ecology of the African Pygmy Falcon

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[2]Department of Zoology and Entomology, University of Pretoria

African Pygmy Falcons breed in Sociable Weaver colonies in Southern Africa. I investigated the breeding system, dispersal strategies and demography of a population within Tswalu Kalahari. I followed 25 (2011), 28 (2012) and 33 (2013) falcon territories. 22% of territories contained groups: a breeding pair in addition to other adults, mainly multiple males. Individual data confirmed that previous offspring delayed dispersal and helped at their natal nests. This is the second case documented in raptors. Natal and breeding dispersal events were documented, with movement frequent between neighbouring territories. Some first year birds dispersed, established new territories and attempted breeding.

Overview of bat diversity in northern Limpopo: is the Limpopo Valley depauperate relative to the Soutpansberg?

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A recent publication identified a South African hotspot of bat diversity associated with the Soutpansberg Mountains of northern Limpopo. A recent workshop likewise identified the Soutpansberg Mts as a hotspot for biodiversity generally within the recently proclaimed Vhembe Biosphere Reserve. However, sampling has been generally restricted in the Limpopo Valley north of the Soutpansberg Mountains. We present data from recent surveys at several sites in the Limpopo Basin (including multiple samples from Venetia) which indicate that estimated local species richness may be as high as 14 - 18 species for several sites surveyed from the Limpopo Valley which rivals or exceeds equivalent values obtained from a recent survey of 29 sites in the Soutpansberg.

Brown hyena Occupancy and Density Estimation on Tswalu Kalahari Reserve

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The Brown Hyena Research Project and Tswalu Kalahari present a new collaborative project aimed at estimating occupancy and density of a closed population of brown hyenas on Tswalu Kalahari Reserve. Twenty-two camera traps were set-up across Tswalu. Data will be used to assess occupancy and to determine factors affecting occupancy and detection probability. Individual identification will be used on a capture-recapture framework to estimate density. Data

will also be used in conjunction with a modelling study based in the Sperrgebiet National Park, Namibia, to test models developed for estimating brown hyena density without the need for individual identification.

Behavior & Ecology of Serengeti Lions

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Lion research in the Serengeti has focused on three main topics over the past 36 years. Firstly, why do lions live in groups? Lions are far more cooperative when collectively defending pride territories than when hunting together or raising cubs. Large prides dominate smaller prides and maintain exclusive access to localized "hot spots" of food, water and shelter. Lions are the only social felid, and they are also unique among cat species in exploiting such hot spots. Second, why do male lions have manes? Rather than shielding the neck against wounding, the lion's mane is a "badge" that advertises the male's health and genetic quality. Black-maned males are superior competitors, live longer and raise more cubs than do blond-maned males. Females are more attracted to black-maned males, whereas black manes intimidate rival males. Third, how do other species cope with lions? Lions kill hyenas, leopards, cheetahs and wild dogs, yet most of these species co-exist with lions. Carnivore species that avoid lions over short distances and brief time scales can maintain constant population sizes even when lion numbers triple, but species that show large-scale avoidance may disappear from areas where lions are abundant. A similar approach is currently underway to measure the impacts of lions on the behavior and ecology of their primary prey species and, consequently, on vegetation structure in the hot spots of lion activity.

Investigating the Effects of Mopane Worm Frass on Soil Nutrients in the Mopane Veld of Venitia Limpopo Reserve, South Africa

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Mopane worms (*Imbrasia belina*) are a valuable food source to African communities, providing a high protein food to replenish food stores at the end of winter. While much research has been conducted on the MW as a food source not much research has answered questions about how they affect the landscapes in which they occur. In the USA similar Lepidoptera outbreaks have revealed an increase in soil nutrients. The aim of this project is to investigate how MW influence soil nutrients in the Mopani Veld of South Africa. Nutrient tests will be compared to determine if MW do indeed affect soil nutrients.

Seasonal and Habitat Variation in Species Assemblages of Carrion-Feeding Diptera with Larval Key

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Trapping of carrion-feeding Diptera was conducted in Dinokeng, Telperion, Rietvlei and Groenkloof in savannah, grassland and disturbed habitats during March and June to determine the differences in species assemblages. Mean species richness and mean abundance was found to be similar from the different habitats and localities, but was significantly lower in June. Species diversity was found to differ only between localities and not between seasons or habitats. Telperion had the lowest mean abundance across both seasons and low mean species diversity with fewer exotic or pest species present.

Beauty and the Beast

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In the light of all the negative publicity surrounding the plight of rhinoceroses we decided to create something lasting from the situation, namely a validated host-parasite list. Strange as it may seem these behemoths harbour an array of tick species more beautiful than those infesting any other animal and the objectives of the project were to collect and identify these ticks. Ticks were collected from rhinos in Kenya and Namibia, and from animals in the Eastern Cape, KwaZulu-Natal, Free State, Mpumalanga and Limpopo provinces, South Africa, and approximately 420 animals were examined. A total of 5 830 ticks belonging to 32 species were collected, and 16 of these 32 species are ornate. Three of these ornate species are host-specific to rhinos and of these Amblyomma personatum and Amblyomma rhinocerotis are possibly critically endangered, and Dermacentor rhinocerinus endangered. Rhinos are amongst the preferred hosts of 17 of the remaining 29 tick species, while the other 12 species can be regarded as 'stragglers'. None of the latter 29 species would appear to be in danger of extinction. Only four of the 83 Rhipicephalus species (brown ticks) of the world are ornate, and three of these were present on the rhinos. Incidentally, the only Rhipicephalus species with reasonably long mouthparts, R. longiceps, was also recovered from the rhinos. The disappearance of the two African rhino species will also result in the loss of three African tick species.

Effects of small mammal community composition on tick burdens in Ezemvelo and Telperion Nature Reserve

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Host species diversity may affect the prevalence and abundance of pathogen vectors such as ticks. We tested this hypothesis by sampling eleven small mammal species over the course of one year in Ezemvelo and Telperion Nature Reserve. These hosts carried 14 species of ticks totalling 23088 individuals. The seven most prevalent tick species connected between two and eleven host species suggesting a high potential for interspecific pathogen transmission. Habitat type affected host density and diversity but not tick burden. Our results suggest that greater host diversity in some habitats may reduce the absolute but not the relative vector abundance.

Butterflies of Tswalu Kalahari and their sense of place

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Butterfly species at Tswalu Kalahari Game Reserve in the arid savannah of South Africa show remarkable habitat preferences. Currently a total of 71 butterfly species has been recorded from Tswalu Kalahari, which is high for such an arid area. Butterfly species with Nama-Karoo biome affinities have been found at higher mountainous elevations. Possible Kalahari endemics have been identified, such as Aloeides simplex that favours dune areas and Anthene lindae (Vulnerable). Improved research of landscape ecology of butterflies is not only important to habitat management but also for enhancing a sense of place in a vast wilderness.

Honey bee colony densities and losses: pollinator availability in the future

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In view of the widespread perception that populations of honey bee colonies are in decline with a potentially significant impact on food security, we have been exploring colony densities at selected sites in South Africa and Europe in order to assess potential changes in population densities over time. Colony density is a function of the number of colonies in wild populations together with those colonies managed by beekeepers. Our results show that wild colonies are relatively rare in Europe and that the population is largely confined to managed colonies in apiaries. In southern Africa, the reverse is true with a large wild population that exhibits high population density and genetic diversity, and a relative small proportion in apiaries managed by beekeepers.

How Important was the Presence of Elephants as a Determinant of the Zhizo Settlement of the Greater Mapungubwe Landscape?

T. Forssman, B. Page & J. Selier

The initial farmer settlement of the Greater Mapungubwe Landscape around AD 900 is linked to the large elephant population that the region once supported for the purpose of obtaining ivory for trading with the Indian Ocean trade network. However, there has been no attempt to determine whether the local elephant population was large enough to support such trade endeavours. In this paper, we use an inter-disciplinary approach to establish a projection of the past elephant population and conclude that elephants occurred in large enough numbers to support trade, but that other factors also contributed to the local settlement by farmers.

Comparison of time-of-flight and phase shift terrestrial laser scanning for the documentation of petroglyphs in Rooipoort Nature Reserve, South Africa

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This research compares time-of-flight and phase shift principles of terrestrial laser scanning for the spatial documentation of a petroglyph site in the Rooipoort Nature Reserve, South Africa. The Rooipoort Nature Reserve contains approximately 4600 petroglyphs, a collection that is one of its kind in Southern Africa. The sites are deteriorating as a result of natural erosion and animal movements. Advancements in laser scanning technology are presenting new methods for the accurate digital documentation of petroglyph sites. Laser scanning creates a permanent digital record of the site for future generations, and provides highly accurate baseline data to monitor deterioration over time.

Regional trade, exchange and consumption on the Greater Mapungubwe Landscape: an archaeological investigation

K. Rammutloa

The cultural and socio-economic changes that occurred on the Greater Mapungubwe Landscape (GML) between AD 1000 and AD 1300 were influenced by participation in long-distance trade systems. These external trade networks cannot be separated from local exchange systems. Our understanding of how trade and exchange systems functioned and were structured on the GML to facilitate the acquisition and distribution of trade items, and the consumption of foreign items versus those locally produced is poorly achieved. This paper explores the lack of research addressing local trade patterns and its importance in the establishment of the Mapungubwe state.

Bushman and farmer interactions in the Motloutse-Limpopo confluence area: a landscape perspective

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It has been suggested but not conclusively shown that there are various Later Stone Age cultural zones on the Greater Mapungubwe Landscape. In this paper I explore this prospect by looking at the extended landscape in order to assess whether there is a cultural link between the proposed Botswana and South African zones. To do so, I will identify and study all forager and farmer sites in my research area and explore concepts of cultural patterning across the region and forager and farmer interactions.

First observation of African tigerfish Hydrocynus vittatus predating on barn swallows *Hirundo rustica* in flight

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A population of African tigerfish *Hydrocynus vittatus* from the Schroda Dam, actively prey on barn swallows Hirundo rustica in flight. This behaviour was discovered during a radio telemetry study and documented using a motion picture video camera. These results show that an avivorous diet is a part of the feeding biology of *H. vittatus*, and may occur in other populations.

Seasonal species richness and habitat use of urban bird species at Brenthurst Garden

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The diversity and abundance of bird species in the Brenthurst Gardens in Johannesburg were surveyed. Each survey lasted 2.5 hours and was repeated once per season to capture seasonael differences as well as the presence/absence of any long distance and altitudinal migrants. Behaviour and nesting activity were noted. The birds seen or heard during the survey were then compared with species recorded within the same grid cell (pentad) within the Southern African Bird Atlas Project 2 (SABAP2) http://sabap2.adu.org.za/. Species recorded in the garden with low reporting rates recorded in the pentad include Bronze Mannikin; Black-backed Puffback and Greater Double-collared Sunbird.

Hunters hunted: ecological and evolutionary implications of predation on snakes

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Snakes are renowned predators, and may play important roles in ecosystems as such. Additionally, most snake species are preyed upon by a wide variety of predators, and thus provide an important trophic link in many systems. We used mark-recapture techniques to estimate survival of Namaqua Dwarf Adders (*Bitis schneideri*), and infer that these snakes are under extreme predation pressure. Additionally, we model the reproductive frequency required to sustain a population of snakes under high levels of predation. We show that unlike most vipers, Namaqua Dwarf Adders breed annually, most likely because of year-round food availability and feeding.

The good, the bad and the not so ugly

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Human-wildlife conflicts in urban areas elevate some species to pest status. The rock hyrax *Procavia capensis* is a pest in many parts of its range. We studied the occurrence and public opinion of rock hyraxes throughout Greater Johannesburg, and conducted a detailed study of their behavioural responses of a population along an urban gradient. Rock hyraxes are associated with rocky outcrops and are pests in many parts. Rock hyraxes close to humans have altered activity patterns and habituated to people. Rock hyraxes form part of the biodiversity of rocky areas and they show an inherent ability to live in cities.

Making the Red List work for both researchers and practitioners

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National Red Lists are used extensively in legislation, management and research. However, it is difficult to extract the data and expertise needed to revise them. There was a significant increase in participation when assessments were drafted as scientific papers rather than templates, and postgraduate researchers were more likely to edit assessments. We recorded significantly different perspectives on threats and interventions between academic researchers and provincial conservation authorities. These results illustrate both the untapped resources of postgraduate researchers and the lack of translation of knowledge into practice. We propose establishing an online system where new knowledge can be efficiently integrated and experts are incentivised to contribute.

What can you find on the seabed off southern Namibia, and why?

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Almost nothing has been published on the benthic fauna off southern Namibia. Extrapolating from studies on communities of demersal (bottom-living) fish and intertidal organisms would suggest that diversity is likely to be low, and that communities would be dominated by few species Here we use more than 500 grab samples collected from license areas (De Beers Marine Namibia, NamDeb) off southern Namibia that have remained unaffected by mining and describe the communities present and explore the drivers of community structure. As expected, communities are dominated by polychaetes and micro-crustaceans, and sediment characteristics and depth appear to drive structure. Whilst diversity is indeed low, it is far lower than anticipated. The implications of these data are discussed.

POSTER ABSTRACTS

Soil *Fusarium* survey in the grassland biome of South Africa

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Species in the genus *Fusarium* are characterised by significant variation in morphological characters, enabling the use of these characters for species identification. However, some species proved very difficult to identify based on morphology alone and, therefore, extensive phylogenetic protocols were developed to aid in species identifications and descriptions. During the current *Fusarium* soil survey, an integrated approach is used to demarcate species obtained from undisturbed soils and dominant grass species in the grassland biome of South Africa. To date ca. 800 isolates have been obtained, and sequence data has been generated for 20% of the isolates. These isolates represent new host reports for known species, new species, and new haplotypes in some known species complexes. This survey serves as a crucial baseline study on the species richness of the fusaria in the grassland biome of South Africa.

Soil *Fusarium* survey on the Telperion Nature Reserve

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The genus *Fusarium* was established to accommodate phialidic fungi with fusiform macroconidia borne on poly- or monophialides in the Hypocreales. During the current soil survey in the Telperion Nature Reserve, an integrated approach of morphological characters and phylogenetic relationships are used to demarcate species. A large number of isolates have been obtained from soil, and grass samples and translation elongation factor 1α sequence have been generated for these isolates. These isolates represent new host reports for known species and new haplotypes in some known species complexes. This survey contributes to our knowledge regarding this economically important genus in natural ecosystems in South Africa.

Ant communities and their interaction with the surrounding environment in Venetia Limpopo Nature Reserve

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Ants are social insects living in colonies more than 12,500 described species. Ants' distribution and abundance around their habitats were assessed during four seasons at Venetia Limpopo Nature Reserve, Limpopo Province. Ants were sampled using pitfall traps. The results showed high distribution and abundance during spring season. A total of 17 ant species representing 9 genera in 3 subfamilies were collected. The high diversity of ants in the subfamilies Myrmicinae

and Formicinae is common in other South African ant studies. Ant's diversity and distribution decreased from autumn to winter while it was highest during spring.

The importance of accurate biodiversity information: a pollination perspective

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Biological, locality and taxonomic information are all important kinds of biodiversity information needed to understand ecological processes. Pollination, excluding wind and water pollination, requires symbiotic interactions between two free-living groups of organisms; namely plants and animals. Pollinators are attracted to flowers for different resources, the most common being pollen and nectar, but plant oils are also important. These contribute to a complex web in which some pollinators visit flowers of one or a few plant species and others are generalized and visit a wide variety of flowers. Similarly plants may also be specialized or generalized. Thus pollinator / plant interactions often form dynamic webs. To understand pollen webs, data on the pollinator behaviour on flowers, geographic locality and the species are important. A new project at Tswalu will begin collecting data on bees and their host plants in order to map pollination webs.

Mapping to advance nature tourism

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The main objective of the mapping to advance nature tourism research project was to provide the various tourists who enjoy the private and governmental nature reserves in South Africa, access to electronic maps that can be used on the electronic devices currently available. Nature tourists enjoy the opportunities available within the various private and governmental nature reserves in South Africa, in various ways such as driving with vehicles, mountain biking and hiking. However often when they visit the less travelled or well-known nature reserves they are presented with a black and white A4 paper map, which is often difficult to understand or navigate. The project explored various techniques to capture and document the landscape associated with nature reserves as well as the infrastructure that tourist will be utilizing and then presenting it on media easily accessible to the public such as Global Position Receivers, Tablets and Smartphones. Depending on the media/ technology utilized by the tourists, they would be able either to navigate the infrastructure of the relevant reserve or track their movement along the infrastructure. Ezemvelo Nature Reserve which forms part of the Diamond Route was used as a test site.

Restricted, female-biased dispersal causes fine-scale genetic structure within a population of sociable weavers (*Philetairus socius*)

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Dispersal is critical driver of gene flow with important consequences for population genetic structure influencing social dynamics and other biological processes. In particular, availability of kin within social groups or territories predicts the extent to which kin selection may operate and socialites evolve. Emergence of kin clusters, however, also promotes kin competition and a risk of inbreeding. Here, we use a combination of field data and molecular genetics to examine the factors driving dispersal and its consequences in a highly social bird, the sociable weaver, *Philetairus socius*. Sociable weavers exhibit cooperation at various levels of sociality, including cooperative breeding within family groups and cooperative investment in the massive communal nests that they occupy throughout the year. We found that both sexes are philopatric until 2-3 years of age, and thereafter there is limited, female-biased dispersal. We then show that this pattern of dispersal is reflected by fine-scale population genetic structure for both sexes, with isolation by distance in terms of genetic relatedness, and significant genetic variance among colonies, both relationships being stronger among males than females. Crucially, significant relatedness extended beyond the level of colony, but largely within

the range of female dispersal. These results indicate not only that such fine-scale population genetic structure has likely played an important role in the evolution of sociality in this species, but also that a significant inbreeding risk exists in a population of sociable weavers, against which female-biased dispersal alone is unlikely to be an efficient strategy.

Manipulating colony composition in free ranging Damaraland mole-rats: the effects of cross fostering

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In total 251 animals from 37 colonies of Damaraland mole-rat (*Fukomys damaranesis*) have been permanently identified using a mini (8mm) Micro-ID chip. 241 mole-rats were categorized as being adult (weighing above 50g). All the animals have been sexed, weighed and have had a tissue sample taken for future genetic analysis. Ten juveniles (weighing less than 50g) were caught from 7 different colonies over a period of 6 months. The juveniles have been cross-fostered into alternative colonies and the same sex breeder has been removed from that colony. Over the next year the colonies will be recaptured and the composition of the colony will be monitored to observe for reproductive status and dispersal of the cross fostered individuals.

Photo gallery of the spiders (Arachnida: Araneae) of Telperion Nature Reserve

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As part of the South African National Survey of Arachnida (SANSA), a virtual museum is available online containing images of spiders photographed by people throughout the country. SANSA has several photographic survey projects underway, one of which is imaging the spider fauna of the Telperion Nature Reserve (TNR). At a bioblitz undertaken at the reserve in April 2014, >400 images of spiders were taken and made available on the SANSA Virtual Museum. Most spiders sampled from the TNR are typical grassland species as illustrated by the 20 species depicted on this poster.

Telperion an important link in the spider grassland survey

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The South African National Survey of Arachnida (SANSA), which is a national atlas project, is presently underway. Grassland Biome is one of the biomes that are currently being surveyed, with eight survey areas identified, of which Telperion Nature Reserve is one. It is characterised by rich biodiversity and, so far, a total of 454 spider species represented by 46 families have been recorded here. The Telperion Nature Reserve, a Diamond Route Reserve near Bronkhorstspruit, is situated on the Bankenveld, which is a transition ecotone between the Grassland Biome and the Savanna Biome. Several surveys have been undertaken at the reserve and, thanks to the last bio blitz in April 2014, the number of known spider species have increased to more than 200. The diversity of the reserve is discussed, and compared with other Mpumalanga sites.

Brenthurst Spiders, an illustrated guide

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A small illustrated book on the spiders of Brenthurst Gardens is in the final stages of production. The title is still to be finalised but might be “Spiders of the Brenthurst Garden” or “Strilli’s Spiders”. The text scientifically correct but set out in layman's terms. Because the spider fauna is representative of that found in suburban gardens throughout

Johannesburg, this small book should be a useful guide for suburbanites throughout the city and beyond. It is hoped that it can be used by the garden guides to point out to guest and identify most spiders that they see.

Shepherd's Trees of the Kalahari, a key source for Brown-veined White butterfly migrations across the face of South Africa

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Clouds of white butterflies grace the face of southern Africa during favourable times in summer. Most of the butterflies taking part in these migrations are Brown-veined White butterflies, *Belenois aurota* of which the ecology and behaviour are studied at Tswalu Kalahari. It emerged that migrating populations of Brown-veined White butterflies across many parts of South Africa owe their strength to one host plant species, the Shepherd's Tree, *Boscia albitrunca* (Capparaceae; Caper family). Currently resource partitioning and habitat specificity among eight butterfly species that all use *Boscia albitrunca* as a host plant for their caterpillars at Tswalu Kalahari, are investigated.

Monitoring the change to holistic management: a productive season

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All twenty-seven of the monitoring sites established on Shangani Ranch during 2013 were reassessed during 2014. Bush and grass were so dense that the marker stakes were hard to see, but a metal detector uncovered them all. Rainfall exceeded 800 mm during 2013/14, well above the long-term mean of 606 mm. Neither frost nor fire affected the monitoring sites. While grass species composition had not changed significantly, on most sites there was a greater cover of grass and of forbs and litter, and the grass was also taller than it had been during 2013. Photopanoramas showed little change in the woody vegetation, except for a large *Julbernardia* tree that had been felled by elephant at one site.

Nutritional ecology, habitat utilisation and activity scheduling of free ranging chacma baboons (*Papio hamadryas ursinus*) in a highly seasonal habitat at Telperion, Mpumalanga, South Africa

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Chacma baboons are prominent members of most Southern African habitats. They are intelligent and adaptable dietary generalists living in almost all local ecosystems. This study is being undertaken to gain knowledge on their behavior, and the various factors affecting their populations. Nutritional dynamics across the troop's home range, habitat use, food patch availability and utilisation, resource selection, and how they traverse their home range will be investigated. Tree phenology will be examined to determine seasonal resource availability. Temperature loggers will be used to generate a thermo map for movement pattern analysis. How climatic variables and food availability act as ecological stressors will be assessed using faecal samples that will be collected and analysed for glucocorticoid metabolites. Foraging strategies, activity patterns, social behaviour and home range use will be assessed by following and observing the troop at 15-minute intervals for at least four days a month.

Vegetation changes induced by fire on Ezemvelo and Telperion – case studies from an ongoing vegetation monitoring project

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Ezemvelo and Telperion, a unique wildlife area, which is managed with conservation objectives, has no specific burning programme. However, natural and accidental fires do occur from time to time. These fires usually occur during the dry season. As the area lies in the Bankenveld, a veld type where fire is known to be an important ecological driver, knowledge on the specific effects of fire incidences is considered to be of great importance to wildlife managers. A

vegetation monitoring programme was initiated on Ezemvelo and Telperion in 2007 by D. Krynauw and D. du Plessis, which also records many of the effects of fires in the area. This monitoring programme has been running for 8 years. Data recorded as part of this monitoring project was used for this project and presentation. Data obtained before fire events, were compared with data recorded after fire events occurred. Comparisons related to herbaceous layer data, but woody plant data comparisons were also made at sites with definite woody components. The effect of fire incidences on the invasive problem plant *Seripium plumosum* (bankrupt bush / bankrotbossie) is of special interest. The various plant communities of this reserve differ significantly in their nature and dynamics, and thus the effects of fire in the various differing plant communities were also of great interest. These recorded case studies are sure to contribute to our understanding of, and insight into, Bankenveld fire-dynamics.

Heterothermy in aardvark - a physiological response to environmental stress

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Aardvark are widely distributed throughout sub-Saharan Africa, only limited by arid deserts. Much of the aardvark's range, particularly the Kalahari, will become hotter and drier with global climate change. In this environment, aardvark are already challenged, and may need to further adjust their physiology, behaviour, and diet to withstand future changes. We are recording activity, body, and muscle temperature of aardvark, observing their activity patterns, and assessing diet and prey insect availability at Tswalu over two years, to predict aardvark survival capacity in a changing habitat. We will present preliminary results on the effects of daily and seasonal variations in climate on aardvark thermoregulation and behaviour.

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.

The response of *Seriphium plumosum* to various control methods within Telperion Nature Reserve

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The encroachment and densification of *Seriphium plumosum* within South African grasslands is currently considered an eminent ecological issue. If not properly managed, this species has the ability to alter large areas of grassland into less productive shrubland. It is vital to gain knowledge on the ecology and growth conditions of *S. plumosum.* A number of control methods for *S. plumosum* are being investigated to determine the most effective management strategy for this woody shrub. Control methods include selective clearing, response to herbicides, and the influence of fire. Here we provide details on our progress for this project.

Taking stock of seven years of Conservation Skills Development and Training on Telperion

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In 2007 the scope for education support on Telperion was increased to include undergraduate nature conservation diploma students from UNISA. The main aim of this expansion was to increase the usage and access to Telperion for deserving youth. The objectives were to make use of three allocated buildings to provide focused and specialised skills development and training to aspiring future conservation officials. A formalised mentorship programme was developed that saw work-integrated learning (WIL) students spend a week per month on Telperion gaining valuable work-placed based experience under the guidance of a dedicated mentor. Students are required to provide evidence of their competency in veld and game management issues through maintaining a logbook, completing five formal reports, developing a Portfolio of Evidence and to attend a summative interview assessment of their skills and experience.Telperion has served as a host and partial sponsor to these UNISA undergraduate students for the past seven years. The Telperion UNISA partnership has strengthen through communication and collaboration with the end result showing that all parties associated with this partnership have positively gained and stand to gain more in the future. This poster will present a break-down of the student numbers, accumulated WIL experience, projects undertaken and the number of students who have graduated with the help of Telperion over the last seven years.

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

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Debshan Ranch is a mixed cattle-wildlife ranch in the central region of Zimbabwe. Leopards have been hunted as trophies in the area for over twenty years, raising concern over the viability of the population, especially since the human population around the ranch has increased recently likely increasing conflict. To understand the leopard population dynamics; spoor and camera trap surveys were carried out. The spoor survey showed a high concentration of leopards in the centre of the ranch and to the east along the Shangani River (18.1spoor/100km). The camera trapping, covering an area of 240km2, yielded a total of 11 individual leopards. Questionnaire interviews with respondents surrounding the ranch showed varying attitudes among the different administrative provinces. Matebeleland North respondents were the most positive towards leopards, presumably because they receive benefits through trophy hunting, By contrast, Matebeleland South respondents tended to be more negative towards leopards as they did not receive any benefits from leopards being present in the region. My results show that while the current leopard population at Debshan is relatively healthy, conflict with land-owners adjacent to the ranch is a serious potential threat to their persistence. Future research should ideally, therefore, focus on mitigation of this conflict.

An investigation of the productivity of abandoned kraal sites and their usage by wildlife on Debshan Ranch, Zimbabwe: Implications for holistic livestock management

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In holistic grazing, cattle spatially redistribute nutrients obtained from other parts of the rangeland by defecating and excreting these nutrients in kraals. However, it remains uncertain how savanna vegetation and subsequently wild animals may respond to these changes in nutrient availability. This study seeks to assess and evaluate the effects of kraaling on soil nutrient concentrations, forage quantity and quality, and wildlife usage of the abandoned kraal sites in a semi-arid savanna. Specifically, the study tests, whether kraaling influences soil nutrient concentrations, if forage quality and quantity differ between abandoned kraals and non-kraal sites, and if wildlife use differs between abandoned kraals and non-kraal sites.

Improving Biodiversity Management through Bird Monitoring: The Benefits of Citizen Science Programmes in Parks

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There is growing recognition that the decline in the state of nature has consequences for people and economies, especially through the loss of natural resources and ecological services. In response, leaders have pledged a reduction of the rate of biodiversity loss at global, regional and national-levels; but indicators are needed to measure progress towards achieving this. This paper describes the establishment and ongoing development of Bird Population Monitoring (BPM) in Botswana since 2009, which scheme was recently introduced in and around Debswana's Orapa Game Park. We present initial successes, challenges, lessons learnt, as well as population trends for some species.

Does competition and facilitation within ungulate communities affect species at the population level?

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Competition and facilitation among species rich ungulate assemblages are notoriously difficult to demonstrate. Habitat modification by key stone species such as zebra (*Equus quagga*) promotes favourable conditions for short grass with a cascading effect on the ungulate assemblage. Here we obtained annual census data from Telperion Nature Reserve but subdivided into two sub -populations by the Wilge River transecting the reserve. Contrasting dynamics for the two populations of hartebeest suggest that landscape heterogeneity and veld condition is perhaps more influential than the direct effects of population densities of species on one another. Landscape heterogeneity due to past agricultural practices and habitat modification by herbivores perhaps dilute the importance species interactions at shorter spatial scales.

Bats (Mammalia, Chiroptera) of Telperion Nature Reserve (Gauteng and Mpumalanga, South Africa)

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A survey of bats in Telperion Nature Reserve, which is south-east of Bronkhorstspruit, in an ecotone between the Savanna and Grassland biomes was undertaken in February 2014. A netting capture effort of 904 nm^2hrs resulted in twenty-two individuals of three species, from a single family, being caught, with a capture rate of 2.34%. Harp traps and active roost searching revealed an additional three species from two additional families. The following six species were recorded: Geoffroys Horseshoe Bat (*Rhinolophus clivosus*), Mauritian Tomb Bat (*Taphozous mauritianus*), Temminck's Hairy Bat (*Myotis tricolor*), Yellow House Bat (*Scotophilus dinganii*), Cape Serotine (*Neoromicia capensis*), and the Aloe Serotine (*Neoromicia zuluensis*). The record of *N. zuluensis* fills in a gap in the previously mapped distribution.

Using Ecological Niche Modelling to examine genetic structure in the forest shrew *Myosorex varius*

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Phylogenetic studies reveal genetic structure across the range of a species. A genetic break could be the result of adaptation to different environments or it could be the result of some physical barrier to gene flow causing genetic drift. The cause of genetic structure therefore often remains a matter of speculation. Niche modelling provides a second line of evidence, as the ranges of groups limited by environmental factors should form distinct ecological niches. I will model the ecological niches of clades within the shrew *Myosorex varius* to test the prediction that these clades are adapting to different environmental niches.

Comparing patterns in native and introduced species – lessons to be learned

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Genetic variation within a species provides researchers with an insight to the species' behaviour and history. In addition to this, the information can be extrapolated onto another species with a similar life history and biology. It is relatively common for genetic variation to create structure within a species' geographical range, this is mainly due to adaptation to the local habitats or the physical inability to move into an area (e.g. distance or physical barrier). Previous studies on small mammals have highlighted these factors and their effect on genetic structure, how these factors influence invasive species will be further investigated.

Physiological flexibility could buffer the effects of climate change

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Selective brain cooling is present in species with a carotid rete, such as artiodactyl mammals, where it attenuates the drive for evaporative heat loss, thereby conserving body water. To determine if selective brain cooling differs between free-living artiodactyls with varying water dependencies, we used implantable temperature tags to measure brain and carotid arterial blood temperatures at 5-min intervals in gemsbok (water independent), red hartebeest (intermediate water dependency) and blue wildebeest (water dependent). Using generalised linear mixed-effect models we investigated the effects of a number of variables, including species, on the attributes of selective brain cooling. We found greater variability in selective brain cooling attributes within species than between species.

Terrestrial 3D laser scanning of the historic 'Shooting Box' building in Rooipoort Nature Reserve, South Africa

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Originally a hunting lodge, the historic 'Shooting Box' building was constructed by Cecil John Rhodes in 1899 from a kit that was shipped from England and transported to the farm by ox wagon. The unique cultural heritage site was documented using cutting edge terrestrial 3D laser scanning technology. The scanner captures millions of points to create a precise and metrically accurate digital model of the building. The digital dataset can assist in the management of the national monument, and be used to create interpretation tools to encourage tourism.

The late great pompom weed threat in South Africa

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The Pompom weed (*Campuloclinium macrocephalum*) is considered to be one of the worst invasive alien plants in South Africa today. Large parts of South Africa's natural vegetation have already been invaded, with the worst invasions occurring in the Gauteng Province. Pompom weed poses a very serious threat to South Africa's biodiversity, and can destroy the production potential of natural veld. This poster will portray some of the adaptations of the plant, which makes it such a successful invader. It will also illustrate the invasive potential of the Pompom weed. One of the main ways of combatting this weed is to keep non invaded areas clean. It is crucial that everybody in South Africa be able to identify the plant, so that each person can contribute to its control, by keeping clean areas clean. The main identification characteristics of the plant will be illustrated.

Lessons learn't from Baboon Management on the Cape Peninsula

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Eleven baboon troops have been managed on the Cape Peninsula for the past two years. These troops have been kept out of urban areas for 98.5% of the time, by using aversive conditioning (paintball markers and bearbangers) and selective euthanasia. This has significantly reduced human-induced baboon deaths and other aspects of human baboon conflict. Baboons are highly social and intelligent animals and react to management in a variety of ways depending on social status, parental status, troop structure, individual character traits, physical disabilities, seasonal availability of food, and neighbouring troops. Here we discuss some lessons learn't whilst managing these troops.

Diet of the Magaliesberg Verreaux's eagles

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Apex predators are sensitive to changes in the abundance and availability of preferred prey species and are some of the first species to be negatively affected by expanding urban sprawl. The Magaliesberg has been subjected to extensive urban expansion for many years. Our study examines the diet of the Magaliesberg Verreaux's eagles *Aquila verreauxii* as a possible reason for their perceived decline in numbers over the past 30 years. Camera traps placed at active nests and prey remains collected bellow nests provided information on prey selection of studied Verreaux's eagle pairs. The diet of the Magaliesberg Verreaux's eagles consisted of 176 individual prey items from 6 known prey species. Domestic goat (1%), greater cane rat *Thryonomys swinderianus* (3%), Jameson's red rock rabbit *Pronolagus randensis* (3%), unknown mammal (4%), unknown prey (6%), helmeted guineafowl *Numida meleagris* (14%), scrub hare *Lepus saxatilis* (15%), unknown bird (18%), rock hyrax *Procavia capensis* (36%). Rock hyrax represented the most common prey species in urban and natural diets. However, urban Verreaux's eagle diets exhibited greater diversity than more natural pairs. This suggests the ability of Verreaux's eagles to adapt to the reduction of preferred prey by utilizing potential prey species associated with human habitation.