6th Annual Diamond Route Research Conference
20th & 21st October 2015

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 20th October
08h30	REGISTRATION and TEA / COFFEE
09h00	Nicky Oppenheimer **Overview and Introduction to the Diamond Route**
09h20	Ara Monadjem **Keynote Address:** African small mammals: under-appreciated and under-studied
	Species and Population Management **CHAIR: Duncan MacFadyen**
09h50	Automated photogrammetry body mass estimation of large mammals Martin Postma and Nico de Bruyn
10h10	Stingless bees, a destructively exploited biodiversity resource in South Africa Connal Eardley
10h30	Biogeographic patterns of insect diversity across South Africa's Cape biomes Jonathan Colville
10h50	TEA / COFFEE
	Archaeology and Heritage **CHAIR: Corné Anderson**
11h20	Antiquity of the Cape Biome Martin Pickford
11h40	Spring in pedetids and the desertification of the Namib Brigitte Senut
12h00	The space of flow at Telperion Shelter, Mpumalanga: the rock art of a recycled, reused, and reimagined place Tim Forssman and Christian Louw
12h20	Leaving a mask: South African war-period (1899-1902) refuge graffiti at Telperion Shelter in western Mpumalanga, South Africa Tim Forssman and Christian Louw
12h40	Trade and exchange network systems in prehistoric time in southern Africa Kefilwe Rammutloa
13h00	LUNCH and Conference Photograph

Time	Tuesday 20th October (continued)
	Vegetation and Plant Studies **CHAIR: Warwick Mostert**
14h00	Population dynamics of the tall trees of the Greefswald Riparian Forest, Mapungubwe National Park Tony Swemmer and Jesse Nippert
14h20	A vegetation classification and description of Telperion, Mpumalanga Palisa Pepenene, Leslie Brown and Johann du Preez
14h40	Sendelingsdrif Restoration Ecology Programme Joyce Katjirua
15h00	Vegetation monitoring on Shangani Ranch, Zimbabwe Fay Robertson
15h20	TEA / COFFEE
	Species and Ecosystem Conservation **CHAIR: Elsabe Bosch**
15h50	Nematode fauna in the Telperion Nature Reserve Chantelle Jansen, Mariette Marais, Antoinette Swart and Hendrika Fourie
16h10	Wild herbivore use of abandoned short duration kraals in a southern African savanna on Debshan Ranch, Zimbabwe: Implications for holistic livestock management. Ranga Huruba, Colin Edwards, Peter Mundy, Sicelo Sebata and Netty Purchase
16h30	Soil Fusarium survey in the grassland biome of South Africa Adriaana Jacobs, Lydia Mojela, Ntsakelo Maluleke, Brett Summerell and Eduard Venter
16h50	BRAKE4WILDLIFE – making a difference on South African roads. Wendy Collinson, Shelley Lizzio and Harriet Davies-Mostert
17h10	Schroda Dam: Biological monitoring – The Pros and the Cons. Andrew Deacon and Pieter Kotze
17h30	Impaired state of the fishes of the lower Vaal River requires conservation action to curb species losses Gordon O'Brien and Francois Jacobs
17h50	Close of Day 1
18h00	FORMAL POSTER SESSION
18h30	COCKTAIL FUNCTION: **DE BEERS CORNERSTONE**
	Buskaid Performance

Time	Wednesday 21st October
08h00	TEA / COFFEE
08h30	John Ledger **Keynote Address:** Both Sides Now
	Invertebrate Conservation **CHAIR: Dylan Smith**
09h00	The antlions, owlflies and lacewings of Tswalu Kalahari Reserve – The next steps. Mervyn Mansell, Catherine Sole, Clarke Scholtz and Jonathan Ball
09h20	Dung beetle assemblages of rehabilitated coal mines of the Highveld, South Africa Alexandra Howard, Clarke Scholtz and Jackie Dabrowski
09h40	Sexual selection and habitat heterogeneity – complimentary drivers of diversification in the monkey beetles? Ariella Rink, Res Altwegg, Rauri Bowie and Jonathan Colville
10h00	Honey bee colony losses: 25th anniversary of the 'capensis' problem Robin Crewe, Hannelie Human and Christian Pirk
10h20	Butterflies and their sense of place at Tswalu Kalahari Reserve and Debshan: The hilltopping imperative Reinier Terblanche
10h40	Diamond Route reserves important for spider conservation in the Northern Cape Robin Lyle, Ansie Dippenaar-Schoeman and Peter Webb
11h00	TEA / COFFEE
	Avian Conservation **CHAIR: Colin Edwards**
11h30	Rapid land-use change in Debshan Ranch, Zimbabwe alters the functional diversity of the bird community Martin Dallimer, Ngoni Chiweshe, Stephen Pringle, Peter Steward, Jake Bicknell and Peter Mundy
11h50	Assessing nest site selectivity of the sympatric vultures in the Makgadikgadi Wetland System, Botswana Motshereganyi Virat Kootsositse, Kabelo Senyatso, Peter Hancock, Lucas Rutina and Richard Fynn
12h10	Fledgling Success of African White-backed Vultures on Dronfield Nature Reserve, Kimberley Angus Anthony and Mark Anderson
12h30	Wattled Cranes (*Bugeranus carunculatus*) what can we learn from captivity for future translocations Lara Jordan and Colleen Downs
12h50	LUNCH
	Mammal Ecology **CHAIR: Patti Wickens**
13h50	Importance of wetland, forest and patch richness for a population of servals in a fragmented landscape in South Africa Tharmalingam Ramesh, Riddhika Kalle and Colleen Downs
14h10	The Black-footed Cat (*Felis nigripes*): a review of the geographical distribution and conservation status Beryl Wilson, Alex Sliwa, Nellie de Crom, Brian Reilly and Lizanne Roxburgh
14h30	Phylogeography of the eastern rock elephant shrew, *Elephantulus myurus* Heather Webster, Heike Lutermann, Peter Teske and Bettine van Vuuren
14h50	The leopards of Debshan ranch, Shangani, Zimbabwe Phumuzile Nyoni, Colin Edwards, Dan Parker and Nettie Purchase
15h10	Searching for the origin of altruism - What can mole-rats teach us? Markus Zoettl and Kyle Finn
15h30	The distribution and urban occurrence of the elusive southern African hedgehog (*Atelerix frontalis*). Jessica Light and Neville Pillay
15h50	Ungulate antipredator behavioral patterns vary by predator hunting strategy Meredith Palmer and Craig Packer
16h10	Presentation of Awards – Phillip Barton
16h20	Closing - Phillip Barton (DBCM)
16h30	**CONFERENCE CLOSURE**

Posters	
Authors	**Titles**
Doug Makin, Simon Chamaillé-Jammes and Adrian Shrader	The impact of wild dog introduction on herbivore species' foraging behaviour and habitat use in Tswalu Kalahari Reserve?
Bruce Humphries, Tharmalingam Ramesh, Trevor Hill and Colleen Downs	Habitat use and home range of black-backed jackals (*Canis mesomelas*) on farmlands in the Midlands of KwaZulu-Natal, South Africa
Hannes Louw	Challenges preserving ungulate diversity in smaller conservation areas
Felicity Simelane, Themb'a Mahlaba and Ara Monadjem	Habitat associations of terrestrial small mammals at Wakefield
Phumlile Simelane, Themb'a Mahlaba and Ara Monadjem	Foraging ecology of Nguni cattle at Wakefield
Martin van Rooyen and Robert Millar	Effects of phytosteroid activities in natural grasses and in supplementary fodder on female southern white rhino (*Ceratotherium simum simium*) reproductive competence
Ross Pitman, Luke Hunter, Rob Slotow and Guy Balme	Establishing an adaptive management framework for leopard
Andrea Webster and Michael Somers	Comparison of mesocarnivore activity patterns in grassland and riparian vegetation types
Nora Weyer, Robyn Hetem, Mike Picker and Andrea Fuller	Physiological responses of free-living aardvark (*Orycteropus afer*) to seasonal fluctuations in a semi-desert environment
Ernest Seamark, Wanda Markotter and Teresa Kearney	Bats (Mammalia, Chiroptera) of Wakefield farm (KwaZulu Natal, South Africa)
Lesley Marisa, Peter Henzi. Leslie Brown and Alan Barrett	Effects of seasonality on the ranging behaviour of a wild Chacma baboon troop at Telperion Nature Reserve, Mpumalanga, South Africa
Heike Lutermann and Dina Fagir	This host is full - competition and facilitation between ectoparasites infesting rock sengis
Nico Avenant, Gus van Dyk and Duncan MacFadyen	Small mammal community composition, Tswalu Kalahari Reserve
Mark Turnbull, Bettine Jansen van Vuuren and Chris Chimimba	Comparing genetic patterns in native and introduced species
Hannah Thomas, Daniel Swanepoel and Nigel Bennett	Manipulating colony composition in free ranging Damaraland mole-rats: The effects of cross fostering
Wendy Panaino, Robyn Hetem, Francesca Parrini, Gus van Dyk, Dylan Smith, Mike Picker and Andrea Fuller	Body temperature and activity patterns of free-living ground pangolins (*Smutsia temminckii*) in Tswalu Kalahari Reserve
Phil Richardson, Stephanus Ferreira, Ziggy Rode, Lana Müller and Robyn Khoury	Virtual fencing as a new strategy for monitoring and managing baboons
Dawie de Swardt	African Rock Pipits *Anthus crenatus* in the Northern Cape: a study at two isolated populations in Tswalu Kalahari Reserve and in the Groblershoop area
Thomas Johnson and Campbell Murn	Investigating causes of nesting failure in White-backed Vultures in the greater Kimberley area, South Africa
René van Dijk, Rita Covas, Claire Doutrelant, Claire Spottiswoode and Ben Hatchwell	Dispersal, population genetic structure and sociality
Anthony Lowney and Robert Thomson	Weaver nests as a resource to the Kalahari animals: positive associations in the structure and function of a community in a stressful environment
Beryl Wilson, Melissa Groenewald and André Botha	Tracking Kimberley's Secretarybirds (*Sagittarius serpentarius*)
Andrew McKechnie, Matthew Noakes, Blair Wolf and Ben Smit	Flexibility in a changing world: intraspecific variation in the thermal physiology of white-browed sparrow-weavers
Motlhalefi Mogashoa, Stefan Kienzle, Alan Barrett and Leslie Brown	Hydrogeomorphic classification, biodiversity assessment and management recommendations for wetlands in Telperion Nature Reserve
Graeme Wilson	The Telperion UNISA Conservation Mentorship Project a growing success story
Mike Peel, Andrew Rossaaak and Mette Rossaak	An Independent Review of de Beers Reserve Management Plans: Venetia, Benfontein, Dronfield and Rooipoort
Erika Vercuiel, Lebo Sentle, Jabu Magagula and Jessica Light	Development of a rat dissection model utilizing computer tomography and additive manufacturing as an alternative to using animals

Craig Packer	Biodiversity Monitoring by Camera-Traps: Snapshot Serengeti
Willem de Frey and Karsten Drescher	Telperion: Mapping going mobile
Emily Taylor, Ute Schwaibold; and Harriet Davies-Mostert	Promoting sustainable coexistence between humans and wildlife within the urban areas of Gauteng, South Africa.
Sellina Nkosi, Leslie Brown, and Alan Barrett	Preliminary results for the management of the aggressive encroacher plant *Seriphium plumosum* in Bankenveld Grassland
Priscilla Burgoyne	*Frithia humilis* revisited; new population-data for a red listed succulent from Gauteng and Mpumalanga
Tania Anderson & Timm Hoffman	Monitoring vegetation change in Tswalu Kalahari Reserve: Conservation through the lens
Phillip Rousseau, Robert Rousseau and Braam van Wyk	The status of the critically endangered species *Encephalartos middelburgensis* endemic to the Highveld region of South Africa
Gerhard Prinsloo	South African flora – opportunities for the horticultural industry
Cathy Sharp	Practical value of ectomycorrhizal fungi in miombo woodland, Zimbabwe.
Retha van der Walt	A Survey on the Macro-fungi and Lichen of the Limpopo Valley including Mapungubwe National Park.
Adriaana Jacobs, Nthathi Seema, Pertunia Selowa and Eduard Venter	Soil Hypocrealean survey in the Telperion Nature Reserve
Chris van Swaay, Eugenie Regan , Matthew Ling , Emilija Bozhinovska , Miguel Fernandez, Onildo João Marini Filho , Blanca Huertas , Phon Chooi Khim , Ádám Kőrösi ,Jan Meerman, Guy Pe'er, Marcio Uehara Prado5 , Szabolcs Sáfián, Legi Sam, John Shuey, Doug Taron, Reinier Terblanche and Les Underhill	Guidelines for standardised global butterfly monitoring
Reinier Terblanche	Two keystone plant species, *Boscia albitrunca* and *Senna italica*, pivots for the great butterfly migration *of Belenois aurota* (Brown-veined White) and *Catopsilia florella* (African Migrant) from the Kalahari
Nina Parry, Elsje Pieterse and Chris Weldon	Evaluation of the Potential of Three *Chrysomya* spp. and *Lucilia sericata* (Diptera: Calliphoridae) for the Bioconversion of Waste Products
Alison Bijl	The breeding system and demography of *Sesamothamnus lugardii*; a descriptive pilot study.
Jonathan Leeming	Diamond Route Scorpion Survey
Rudy Jocqué, Ansie Dippenaar-Schoeman and Robin Lyle	Spider collecting at Wakefield
Joyce Katjirua and Ursula Witbooi	How diamond mining led to the discovery, conservation and management of a 500 year old Shipwreck at Oranjemund, Namibia
Rainie Sharpe, Clayton James, Melanie Jaeger, Timothy Barrett, Dan Coulton, Hilary Machtans, Larry Hildebrand, Peter Chapman, Michelle Peters and Alexandra Hood	Adaptive Management in Canada's Northwest Territories: A Glimpse into the Snap Lake Diamond Mine's Fisheries Monitoring Program and Special Studies
Elize Fourie, Craig Symes and Dailos Hernández-Brito	The Rose-ringed Parakeet Project – South Africa
Ingrid Wiesel, Dylan Smith, Kelsey Green and Gus van Dyk	Baseline data to model brown hyena (*Hyaena brunnea*) density from the Tsau//Khaib National Park (Namibia) and Tswalu Kalahari Reserve in South Africa
Kevin Cockburn and Steve Woodhall	Threatened butterfly species of the KwaZulu-Natal Midlands
Niki McCann and David White	Moth diversity of Waltham Place, United Kingdom
Mupenyu Mberi	Developing a holistic grazing management process on Debshan Ranch
Linda Mbalane and Stefania Merlo	Investigating the landscape time recovery to the aftermath of a flood using remotely sensed data: the case study of the 2000 and 2013 floods in the Shashe Limpopo Confluence area of South Africa
Lokwalo Olaotse Thabeng, Stefania Merlo and Elhadi Adam	Remote Sensing Survey of Archaeological Sites in the Shashe-Limpopo Region
Elizabeth Arredondo, Kimberly Smith, Grant Beverley, and Laurence Kruger	Comparison of Survival Rates of African Wild Dogs in Two South African Protected Areas

African small mammals: under-appreciated and under-studied

Ara Monadjem

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Small mammals (bats, rodents and “insectivores”) make up well over two-thirds of all of Africa’s mammal diversity, yet research and conservation effort on this group far lags behind the more charismatic large mammals. New species continue to be discovered at a high rate, but many genera are in urgent need of taxonomic revision. Species richness is not uniformly distributed across the continent. Small mammals play diverse ecological roles and provide numerous ecosystem services. The conservation status of a significant proportion of small mammals is unknown, hampering the development of strategies and action plans for their continued existence.

Automated photogrammetry body mass estimation of large mammals

Martin Postma[1] and Nico de Bruyn[1]

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Sampling life history parameters such as body mass, of elusive mammals, without immobilisation has proven to be challenging. We use a volumetric photogrammetric mass estimation method combined with basic camera-trapping principles to build an automated photogrammetry camera-trap at Telperion game reserve to assess mass variation in large mammals over a temporal scale. Ten GoPro cameras attached to a semi-permanent arena around a well-used path, controlled by motion sensors, allows creation of 3-D models for mass estimation. Automated photogrammetry camera traps enable the remote monitoring of individual mass change over a theoretically unlimited time with minimal disturbance.

Stingless bees, a destructively exploited biodiversity resource in South Africa

Connal Eardley

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Stingless bees are indigenous South African pollinators and honey producers. They are well known in the areas where they occur, i.e., parts of Limpopo, Mpumalanga and Kwazulu Natal. This is because of their honey, but they are also pollinators. Unfortunately, stingless bee honey harvesting in South Africa is destructive, and their use in pollination management is non-existent. In other parts of the globe they are kept for their honey, primarily for traditional medicine, and crop pollination. If this practice was introduced in South Africa, stingless bees would become better protected and simultaneously contribute to the well-being of nature through the pollination of wild plants, which produce food for animals.

Biogeographic patterns of insect diversity across South Africa's Cape biomes

Jonathan Colville[1,2]

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Insect diversity within South Africa's two global biodiversity hotspots of the fynbos and succulent karoo are poorly-documented. However, these biomes are world centres of richness, endemism and adaptive radiation for several insect groups. For example, South Africa is the global centre of diversification for monkey beetles, with 98% of the >1200 South African species and 80% of their genera being local endemics, many of these found within Namaqualand. Using a recently collated insect dataset for different groups of beetles, bees, wasps, flies, butterflies, and grasshoppers, we dissect and map patterns of insect diversity to profile the insect richness of the Cape biomes.

Antiquity of the Cape Biome

Martin Pickford

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The Namibia Palaeontology Expedition, working in the Sperrgebiet, has found Eocene fossil mammals ranging in age from 45 to 38 million years. The most exciting aspect of the faunas is that they reveal that the Cape Biome was well established by this remote period, and that its origins could go back as far as 65 million years. The Cape Floral Zone is one of the six botanical realms of the world. It must have experienced a long period of independent evolution. Now we have fossil evidence that the heterotrophs dependent on the flora also had a long independent history.

Spring in pedetids and the desertification of the Namib

Brigitte Senut

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During the surveys of the Namibia Palaeontology Expedition in the Sperrgebiet in Namibia, postcranial bones of springhares have been collected from the Lower and Middle Miocene sites. Interestingly, it is possible to demonstrate variations in the springing adaptations through the Miocene in relation with the onset of desertification of the Namib and by comparisons with other areas in Africa The modifications seem to be correlated with changes in the environments which are supported by isotopic studies Ultimately, understanding springing adaptations in these mammals can help to reconstruct the past environments.

The space of flow at Telperion Shelter, Mpumalanga: the rock art of a recycled, reused, and reimagined place

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Manuel Castells (2000) discusses “space, time, and their dynamic interaction with society” in a digital age where these concepts are no longer necessarily dependent on proximity. A redressing of this concept in an archaeological framework allows for Castells’s “space of flow” to be considered in a time where landscape and space was the foundation for networks of communication, social confluence, and time. The aim of this paper is to present the multiple layers of Bushman, Khoekhoen, Sotho-Tswana, and Boer War-period rock art as well as assess how it helps us understand the temporality, flow, recycling and cultural convergence of space.

Leaving a mask: South African war-period (1899-1902) refuge graffiti at Telperion Shelter in western Mpumalanga, South Africa

Tim Forssman[1] and Christian Louw[2]

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Telperion Shelter in western Mpumalanga affords us an archaeological insight into a South African War refuge camp. The site was occupied by both black and white women and children, some of who inscribed the shelter’s wall, writing their names and producing depictions of life as a refugee. Through these records it was possible to consider the antagonistic, defiant, and rebellious nature of Telperion's ‘graffiti’. These testimonies are unlike those written in diary entries and provide us with an unusual narrative into the difficulties faced by women and children who took to the veld to avoid capture by the British and to assist Boer commandos.

Trade and exchange network systems in prehistoric time in southern Africa

Kefilwe Rammutloa

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The emergence of complex societies in the prehistory of southern Africa has been attributed to the accumulation of cattle (Beech 1980), climate change (Pikirayi 2001) and the effects of external interactions with other region (Huffman 1972). According to Kohl (1973: 43) such external exchange of material culture within and between states has been a major catalyst in socio-political, cultural and economic transformation globally (see also Posnansky 1973: 149). The Shashe Limpopo Confluence Area (SLCA) and its inhabitants were also subject to such transformations. According to Manyanga (2006:138), towards the end of the first millennium AD the SLCA experienced major technological and socio-political transformation (also see Pwiti 2005). The aim of this paper is to present preliminary result on the trade and exchange networks in GML looking at the distribution and consumption of material culture that is considered *elite.* In Addition to give a synthesis on how trade networks were manipulated or evolved over a period of time.

Population dynamics of the tall trees of the Greefswald Riparian Forest, Mapungubwe National Park

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Riparian ecosystems are highly productive and rich in biodiversity relative to their size. They are also amongst the most threatened ecosystems in South Africa. The Limpopo River once supported huge swaths of riparian forests which have been lost to agriculture. Greefswald riparian forest, located within the Mapungubwe National Park, is one of the last remaining examples of these ecosystems, and is included on the National List of Threatened Ecosystems (SANBI, 2011). This forest has been in decline since the 1990's, with initial mortality resulting from droughts, floods and possibly water abstraction by the De Beers Venetia mine. Recent research indicates high rates of mortality are continuing for certain species, with the growing population of elephants the primary cause. Studies on the sensitivity to elephant damage, water stress and floods, for the five dominant tree species, indicate that this ecosystem will continue to transition from forest to open woodland, unless major management interventions are implemented.

A vegetation classification and description of Telperion, Mpumalanga

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Because ecosystems react differently to different management practices, it is important that a description and classification of the vegetation of an area be undertaken. As part of a larger vegetation survey programme the vegetation of Telperion was investigated. From a modified TWINSPAN classification, refined by Braun-Blanquet procedures, 22 plant communities, which can be grouped into five major groups, were identified. A classification and description of the major communities is presented. Descriptions of the plant communities include diagnostic species as well as prominent and less conspicuous species of the tree, shrub, herb and grass strata. This study proves that Telperion provides a high number of different habitats to different plant and animal species.

Sendelingsdrif Restoration Ecology Programme

Joyce Katjirua

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Sendelingsdrif approved EMPR, makes provision for restoration ecology as part of the rehabilitation and closure plan for the Sendelingsdrif mine. The restoration ecology plan, titled: Sendelingsdrif Mine Restoration Plan- Adaptive Management System Framework was developed. This plan identified the key ecological drivers, defined a number of potential natural tools to recover the ecological character of the mined areas, and defined a framework for implementation. The aim of the presentation is to give an overview of the first Restoration Ecology Programme for Namdeb, how it's being implemented to date and the learnings from the programme.

Vegetation monitoring on Shangani Ranch, Zimbabwe

Fay Robertson

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Vegetation monitoring sites established on Shangani Ranch during 2013 were reassessed annually. Rainfall during 2014/2015 was 466 mm, well below the long-term mean. Changes in grass species composition during 2015 were more noticeable than during 2014, with ecological condition and weighted grazing values improving on some sites but deteriorating on others. Herbaceous cover had declined since 2014. In all vegetation types, the longest grass was shorter than it had been since monitoring began. The proportion of moribund grass and litter cover had increased at most sites. Photopanoramas showed that shrubs had increased in size at several sites and that many branches and the occasional dead tree had fallen since 2013.

Nematode fauna in the Telperion Nature Reserve

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The Nematology Unit of the ARC-PPR Biosystematics Division founded the South African Plant-Parasitic Nematode Survey (SAPPNS) in 1987. The aim is to make a comprehensive assessment of the nematode biodiversity resources of South Africa. A systematic nematode survey, over four consecutive seasons, of the Telperion Nature Reserve form part of the SAPPNS. Several samples were collected in June 2015, from various localities within the reserve and included soil, root and water substrate samples. Nematodes will be identified to compile a biodiversity checklist of the area. The samples collected in June 2015, showed very high diversity among the nematode fauna.

Wild herbivore use of abandoned short duration kraals in a southern African savanna on Debshan Ranch, Zimbabwe: Implications for holistic livestock management

Ranga Huruba[1], Colin Edwards[2], Peter Mundy[1], Allan Sebata[1] and Netty Purchase[2]

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The use of short duration cattle kraaling to improve range productivity is increasingly becoming popular. Once abandoned the kraals develop into ecological hotspots that attract diverse wildlife species. The aggregation of wild ungulates in the abandoned kraals has been attributed to improved forage quality and the newly created open spaces. We monitored wildlife use of kraals 2, 4, 12 and 24 weeks post abandonment and compared these to the surrounding landscape. The dung density was regressed against foliar nitrogen, phosphorus, potassium and condensed tannins concentration. Further the relationship between soil and foliar N, P and K was determined. Five wild herbivore species *viz.* impala, duiker, kudu, zebra and elephants utilised the abandoned kraals.

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

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Species in the genus *Fusarium* are characterized by significant variation in morphological characters. These characters were employed extensively for species identification. However, for some species identification based on morphological characteristics alone is extremely difficult. Therefore, extensive phylogenetic protocols were developed to aid in species identifications and descriptions. During the current soil *Fusarium* 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. 1200 isolates have been obtained from seven nature reserves, including Telperion, and DNA barcode sequence data are being generated for the majority of the isolates. The isolates for which DNA barcodes have been generated represent new geographical distributions, 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 from the grassland biome of South Africa.

BRAKE4WILDLIFE – making a difference on South African roads

Wendy Collinson[1], Shelley Lizzio[1] and Harriet Davies-Mostert[1]

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Roadkill data collected by the Endangered Wildlife Trust since 2009 highlighted the existence of a major roadkill hotspot in the Greater Mapungubwe Transfrontier Conservation Area. To reduce the rate of roadkill in this area we installed low-level fencing by the roadside to direct wildlife towards existing culverts beneath the road. Our results showed a significant decrease in the rate of roadkill where the barriers were installed, with the roadkill rate decreasing from 0.23 roadkill/day/km to 0.04 roadkill/day/km.

Schroda Dam: Biological monitoring – The Pros and the Cons.

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The Schroda Dam in the Mapungubwe National Park is an artificial impoundment created with the primary aim of water storage at the De Beers Venetia Mine. The dammed system creates an additional ecosystem, which may be beneficial to the biodiversity of the area. It is also important to manage this artificial ecosystem in such a way that it does not impact negatively on the surrounding ecosystems. The current study therefore aims to determine the applicability of bio-monitoring protocols to this system and to design a reliable long-term monitoring approach to assist in the environmental management of the dam. The design of the biological monitoring programme will initially focus on both the aquatic and terrestrial aspects associated with the dam.

Impaired state of the fishes of the lower Vaal River requires conservation action to curb species losses

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Wellbeing assessments of fish communities in the lower Vaal River, close to Rooipoort Nature Reserve, has identified significant effects of water resource use to the wellbeing of the system. Findings included the largely modified state of the fish community, loss of ecologically important populations and a reduction in fish for subsistence fisheries. Threats include altered water quality, quantity and habitat states and disturbance impacts associated with local mining activities and alien and extra-limital fishes. To achieve conservation goals, local stakeholders must establish and implement protection measures to balance the use and protection of water resource use in the region.

Both Sides Now

John Ledger

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Climate alarmism' has dominated the global scientific, political, social and economic discourse ever since the IPCC (Intergovernmental Panel on Climate Change) was created in 1988 by the United Nations to support the UNFCC (UN Framework Convention on Climate Change). Billions of dollars have been poured into research into 'climate change', and far-reaching policies have been implemented, or are on the table for implementation, to 'combat' climate change. The planet, however, is impervious to these human constructs, and global surface temperatures appear to have not increased for 18 years, despite Carbon Dioxide levels in the atmosphere steadily increasing as fossil fuels have increasingly been used by developing countries to generate electricity for economic development and social upliftment of their citizens. The dire global heating projections of climate alarmists, based entirely on computer models, are increasingly diverging from observed global temperatures. The many unintended consequences of climate alarmism are starkly demonstrated by the dire situation facing one of our primate relatives. The Orang-utans of Malaysia and Indonesia are facing extinction because their forest habitat is being set alight to clear land to grow oil palms to provide biofuel for EU countries to reduce their 'carbon footprints. Surely this is not part of 'combatting climate change?

The Antlions, Owlflies and Lacewings of Tswalu Kalahari Reserve – The next steps.

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Tswalu Kalahari Reserve harbours a rich diversity of lacewings, insects that belong to the Order Neuroptera. Surveys to date have revealed over 50 species comprising seven families that have been recorded from Tswalu, including five previously unknown taxa. But the collecting surveys are only the first, but essential and ongoing step, upon which all subsequent activities are based. The first of these activities is the preparation, identification and databasing of all material, and its

subsequent housing and curation in the South African National Collection of Insects, Pretoria. The second is molecular analysis of specimens obtained during the surveys. The databasing component is then developed into a number of products such as taxonomic inventories and specimen records that have been provided to the South African National Biodiversity Institute (SANBI) and the Animal Demography Unit, University of Cape Town (ADU), where distribution maps are generated, which identify areas of high endemicity, species richness and gaps in surveys. Analysis of Tswalu specimens, within a larger treatise on the arrow- and spoon-winged lacewings (family Nemopteridae) has revealed a remarkable Kalahari endemic, *Derhynchia vansoni*, an extremely ancient phylogenetic lineage, which is protected within the Tswalu Kalahari Reserve, with its great variety of habitats. These aspects, especially the evolutionary significance of *D. vansoni* will be highlighted in the presentation.

Dung beetle assemblages of rehabilitated coal mines of the Highveld, South Africa

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To determine whether natural populations of dung beetles can aid the mine rehabilitation process, this field study aims to evaluate the extent to which mining has impacted natural populations. In addition, to identify specialist species which may thrive in this environment, and could be bred for the purpose? Dung beetle diversity and abundance was compared between five rehabilitated coal mines and three reference sites on the Highveld. Over 20 000 specimens have been identified after sampling trips in February, March and April, with the Telperion Nature Reserve continuously being the most diverse and abundant in dung beetles.

Sexual selection and habitat heterogeneity – complimentary drivers of diversification in the monkey beetles?

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Monkey beetles' global centre of endemism and diversity lie within Namaqualand and the fynbos. They display strong sexual dimorphism with regards to hind-leg size and body colour. Sexual dimorphism is commonly ascribed to the presence of sexual selection, thought to be a strong driver of diversification in insects. Levels of sexual dimorphism in monkey beetles differ across feeding guild and habitats (being most common in Namaqualand), suggesting that it may be mediated by fine-scale plant habitat heterogeneity. This study aims to test these drivers of diversification. I will discuss this background and present preliminary results.

Honey bee colony losses: 25th anniversary of the 'capensis' problem

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The honey bees have become a component of agricultural production on which human populations depend for their food security. The pollination service provided by the bees is a significant industry, on which our wellbeing depends. Since 2009 questionnaires regarding colony losses have been circulated to South African beekeepers, both hobbyists and commercial. The results of the survey indicate that average colony losses steadily increased from 2009 (48%) 55% for the 2014/2015 period. The losses are attributed to the 'capensis' problem (71%) while other causes include fire (8%), insecticides (6%), hive pests (5%) and absconding only 2%. The 'capensis' problem has persisted for 25 years. The spread of this social parasite can be controlled by beekeepers but other control measures will be considered.

Butterflies and their sense of place at Tswalu Kalahari Reserve and Debshan: The hilltopping imperative

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Habitat specificity of butterfly species at the Tswalu Kalahari Reserve and Debshan has been confirmed by exploration of habitats and quantitative butterfly surveys. An outstanding feature of butterfly assemblages at the landscape level was the temporal and spatial stratification of hilltopping butterflies. Conservation of hilltops as territorial beacons should be highlighted in any relevant ecological management plan. Importance of large conservation areas that contain hilltops in the habitat matrix are emphasized by these results. In addition these results are most encouraging for the use of hilltopping butterfly counts as a feasible supplementary protocol in a Standardized Global Monitoring Index.

Diamond Route reserves important for spider conservation in the Northern Cape

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As part of the South African National Survey of Arachnida (SANSA), spiders were sampled from three Diamond Route reserves in the Northern Cape Province: Benfontein, Rooipoort Nature Reserve and Tswalu Kalahari Reserve. Different collecting methods were used, namely sweep nets, beating trays, litter sieves and pittraps to sample the different habitats. Two hundred species from 40 families are presently protected in these reserves. This represents 40 % of the known Northern Cape spider species, and 9 % of all South African spiders. This is important information for the red listing of spiders that is presently underway.

Rapid land-use change in Debshan Ranch, Zimbabwe alters the functional diversity of the bird community

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Rapid land redistribution has had a profound impact on agricultural practices across Zimbabwe. We know little about how this has altered bird communities. Taking Debshan Ranch as a case study, we compared avian communities 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. However, when disaggregated by season, habitat and feeding guild, a more subtle shift in the avian community becomes apparent. Resettled farms have fewer large-bodied species, game birds and nectivores, while the abundance of wide-ranging granivores has increased.

Assessing nest site selection of sympatric vultures in the Makgadikgadi Wetland System, Botswana

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Although African birds in general have been declining, over the period 1988 to 2012, where 25 species of birds were upgraded to a higher IUCN Red Data list categories while only seven species were down listed the most affected are vultures (BirdLife International, 2013) indicating a population decline for most species including vultures. The vulture decline has mainly been attributed to human activities, notably poisoning and illegal trade (Ogada et al. 2015), and in some disturbance to nesting areas and habitat destruction (Floris et al, 2008, Phipps 2013, Baral and Gautam, 2007). It is therefore critical to understand habitat and land use types that affect nest site selection, if conservation efforts of these vultures are to be successful. This paper highlights preferred nesting land use types in the Makgadikgadi Wetlands System using data from stratified sampling from aerial surveys undertaken in 2006 and 2008 by a low flying gyrocopter to locate either active or non-active nests. The expansion of the Orapa Game Park from 10,840ha to 48,964ha presents a positive influence not only for conservation efforts, but also a safe haven for White backed and the Lappet faced vulture.

Fledgling Success of African White-backed Vultures on Dronfield Nature Reserve, Kimberley

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African White-backed Vultures have been known to breed on Dronfield Nature Reserve, Kimberley, South Africa, for the last 50 years. From 1993 the breeding success of these vultures has been monitored annually. Each year the status of the active nests are recorded as: a) fledgling raised. b) Failed as a nestling. c) Failed as an egg. d) Nest occupied no breeding. The fledgling success has averaged 59.2% over the 22 years with a high of 79.5% in 1993 and a low of 33.3% in 2012. The reasons for the variation is not known, but could be attributed to local poisoning events of parent vultures and/or increased depredation of nestlings during some years. The average fledgling success is higher, but not too dissimilar, to the 49% recorded in Zimbabwe and 55% from a combination of six areas in Southern Africa. The Dronfield breeding population has increased from an average of 50 active pairs in the first five years of the study (1993 to 1997) to an average of 86 active pairs during the last five years (2010 to 2014). This is in contrast to other populations in Southern Africa which appear to be declining.

Wattled Cranes (*Bugeranus carunculatus*) what can we learn from captivity for future translocations

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The Critically Endangered Wattled Cranes have been handreared in captivity in South Africa since 2006 as part of the conservation breeding program. The current captive flock now stands at 49 individual birds. These birds serve as a safety net for the wild population in South Africa as the population is currently 311 individuals in the wild (2014). The data collated whilst rearing 24 of these birds has now being anlaysed to determine what can be learned from the captive rearing processes of Wattled Cranes as a benefit for future translocation projects.

Importance of wetland, forest and patch richness for a population of servals in a fragmented landscape in South Africa

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The conversion of wetlands for farming, residential development and commercial purposes has led to many small disconnected patches of indigenous vegetation surrounded by human altered land uses that are often inhospitable. Such human interventions pose a serious threat to the survival of wetland dependent species such as the serval (*Leptailurus serval*) in the Drakensberg Midlands of KwaZulu-Natal, South Africa. To address the effects of habitat fragmentation on serval movement we used global positioning system fixes of collared individuals for 100 days during May 2013 to January 2014. We tracked 15 servals (5 females, 10 males) with GPS-UHF collars. Twenty one compositional fragmentation metrics at the class level (wetland, forest with bushland, grassland and cropland) were calculated within collared serval's MCP home range. The response of serval to fragmentation metrics was analyzed using generalized linear models with negative binomial family at three levels; male, female and the overall population. We found that wetland core area positively explained landscape use by servals. Effects of forest core area, forest proximity and patch richness were important for landscape use by male servals. Serval use declined with increasing forest shape complexity for males, wetland clumpiness for females and overall, and cropland split index for the overall serval population. Our results show that effective conservation of serval populations demands sufficient viable indigenous habitat, particularly wetlands in fragmented landscapes of southern Africa.

The Black-footed Cat (*Felis nigripes*): a review of the geographical distribution and conservation status

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The black-footed cat is one of the rarest cat species in Africa and is restricted to the southern African sub-region. A review of historical and current geographical distribution ranges was made from 2006 to 2014 as one of the investigations by the Black-footed Cat Working Group. The current GIS mapping suggests a wider but more fragmented geographical range than previously assumed. A replicable mapping method was developed to estimate population sizes in South Africa and regionally to allow for more informed decision-making in future conservation assessments. The findings support the change in national conservation status from Least Concern to Vulnerable, as well as the continued IUCN global listing of Vulnerable.

Phylogeography of the eastern rock elephant shrew, *Elephantulus myurus*

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Phylogeography is a study field that relates species' phylogenies to their geography. Phylogeographic structure is shaped by various factors including landscape, species biology, and life histories. We investigate the genetic structure in *Elephantulus myurus,* a rocky outcrop specialist. Using two mitochondrial genes, we report significant structure across the range. With a few exceptions, each locality had its own unique mitochondrial haplotype; shared haplotypes may reflect ancestral diversity. Within localities, diversity was also somewhat structured between different rocky outcrops. This would support that habitat and the biology of the species plays a major role in structuring genetic diversity.

The leopards of Debshan Ranch, Shangani, Zimbabwe

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A two-year study of leopards (*Panthera pardus*) on Debshan ranch (450 km^2) yielded the following results: spoor survey estimated between 5.62 and 13.57 leopards/100km^2, the camera trapping survey identified 10 individual leopards at a density of between 2.0 and 6.9 leopards/100km2. However, questionnaire interviews with 140 respondents surrounding Debshan revealed that they

generally held negative attitudes towards leopards. Although high densities are probable as leopards are apex predators and adequately protected, potential edge effects are not yet fully understood. No single predictor variable adequately explained the communities' negative views, however, livestock losses were repeatedly listed by respondents as being one of the main reasons for their lack of tolerance towards predators. Future work will aim to improve the attitudes of the surrounding communities to secure broader landscapes for leopard conservation while also reconciling density estimates to fully understand the leopard population of the region.

Searching for the origin of altruism - What can mole-rats teach us?

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Altruism in animal groups is an evolutionary puzzle because it is difficult to explain why helping others should evolve by natural selection. A simple ecologically based hypothesis to explain it suggests that by helping others to reproduce the group increases in size which provides benefits to all group members. Our research tests whether this can explain cooperation in highly social mole-rats. The results of our study will be highly relevant to understand the ecological factors generating selection for group living and sociality and will allow us to gain insight in the ecological origin of animal society.

The distribution and urban occurrence of the elusive southern African hedgehog (*Atelerix frontalis*).

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Southern African hedgehogs (*Atelerix frontalis*) are a rarely seen and poorly studied species. Currently, little is known about the species' climatic and resource requirements, which hinders conservation efforts. We studied the fundamental niche and urban occurrence of hedgehogs, and their ability to cope with climate and anthropogenic induced changes. We show that the species has specific climatic and habitat tolerances, which match their physiological and behavioural adaptations, which might impact its future distribution. Hedgehogs display behavioural plasticity in urban Greater Johannesburg. The survival of hedgehogs seems precarious given predicted climate change but urban environments may act as refugia in future.

Adaptive Ungulate Antipredator Behavioural Patterns

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Ungulates perform a variety of defensive behaviours when threatened by predators, yet no-one has surveyed responses to different predators with similar hunting strategies nor related behavioural patterns to morphological and ecological variables. I examined antipredator behaviours of five ungulates (impala, kudu, springbok, wildebeest, zebra) towards four predators of two hunting

modes (active: hyena, wild dog; sit-and-pursue: lion, cheetah). Behavioural differences within prey species arise based on group composition, while between-species responses are similar for animals of comparable body size. Wildebeest, zebra, and kudu alter the intensity of response by hunting type, whereas impala and springbok display different categories of behaviours.

POSTER ABSTRACTS

The impact of wild dog introduction on herbivore species' foraging behaviour and habitat use in Tswalu Kalahari Reserve?

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To establish the impact that wild dog release has had on the herbivore community within Tswalu, giving up densities (GUDs) were collected as a means of quantifying a prey species' perceived predation risk. This was achieved through measuring an animal's quitting harvest rate from artificial patches deployed across different habitat types. Kudu and sable responded to wild dog release by shifting their foraging behaviour and habitat use. Kudu and sable foraging effort at patches declined by 23 and 36% respectively over six months, additionally, both kudu and sable utilized more open habitats showing an increased avoidance of denser habitat types. Interestingly warthog foraging effort increased by 30% following wild dog introduction with warthog showing a clear preference for patches located in open habitats. These responses demonstrate differences in perceived predation risk by the herbivore species.

Habitat use and home range of black-backed jackals (*Canis mesomelas*) on farmlands in the Midlands of KwaZulu-Natal, South Africa

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Black-backed jackals (*Canis mesomelas*) are an abundant mesopredator in agricultural areas across South Africa. Knowledge of spatial movements provides important ecological information on the species and reasons why they adapt and survive in agricultural lands. From 2013 to 2014, we monitored five jackals in KwaZulu-Natal to determine home range and habitat use on farmlands. 95% kernel density home range sizes showed relatively large home ranges for both adult males and juveniles. There was marked seasonal variation in movement. One adult male dispersed 150 km over two seasons (winter and spring) and thereafter settled into a home range which it sustained. Variable habitat used and large home ranges in this study confirmed the species' ability to adapt to agricultural areas in order to survive. Information on the spatial movement of black-backed jackals as a carnivore species in this study provided important information on the species' persistence and success in agricultural areas.

Challenges preserving ungulate diversity in smaller conservation areas

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In smaller game reserves involving large scale species reintroductions ungulate assemblages are largely the product of anthropogenic decisions. In open systems, contrastingly, natural forces are shaping the structure of communities. During large scale game reintroductions following establishment of Nature Reserves little attention is given to these forces shaping spatial distributions of species. Within the context of landscapes roamed by large predators this has special relevance as demonstrated by precipitous declines of some species following reintroductions of large predators. Prey species display a variety of mechanisms to avoid predation. Avoidance of areas populated by favored prey species is one such mechanism. This mechanism is believed to be compromised under conditions of either high large predator densities or unnatural prey species assemblages. Overall prey abundance would have a bearing on availability of predator refuges and thus susceptibility to predation of these two species. Data suggest that eland and hartebeest are increasingly predated upon at high overall prey density. In small nature reserves devoid of large predators, data suggest that smaller carnivores such as black backed jackal might also impact on disproportionately on species that hide their young. Findings suggest differential spatial needs among ungulate species in order to maintain viable populations.

Habitat associations of terrestrial small mammals at Wakefield

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Small mammals were captured in six habitats at Wakefield. A total of 11 rodents and 3 shrew species were caught. Indigenous forest had the highest diversity of 7 species. In contrast, rocky outcrops and alien forest had the lowest diversity. Small mammal diversity showed a positive correlation with the vegetation cover. *Mastomys natalensis* and *Mus minutoides* were present in all habitats except rocky outcrops. *Mystromys albacaudatus* was restricted to rocky outcrops while *Grammomys dolichurus* and *Graphiurus murinus* were restricted to the natural forest. Fire severely impacted small mammal communities in grasslands, resulting in burnt areas becoming dominated by a single species, *Dendromus melanotis*.

Foraging ecology of Nguni cattle at Wakefield

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Nguni are an indigenous breed of cattle known for their high resistance and adaptability. This study investigated the foraging ecology of Nguni at a holistically management farm, Wakefield. Nguni fed on 11 species of grass with *Themeda triandra* most favored and *Aristida junciformis* least favored. Nguni fed at a rate of 35 bites/min. Focal sampling showed that Nguni spent most time feeding (62%), with less time spent resting or sleeping. Males fed for longer than females. The study proposes to continue by comparing foraging ecology and parasite loads of Nguni with an exotic breed.

Effects of phytosteroid activities in natural grasses and in supplementary fodder on female southern white rhino (*Ceratotherium simum simium*) reproductive competence.

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First generation captive female southern white rhinoceros (*Ceratotherium simum simum*) have a compromised reproductive competence, in contrast to the founding population that breed relatively well in captivity. This study aims to determine whether this phenomenon affects animals in semi-captive conditions as well. With preliminary results showing that there are high levels of phytoestrogens in pellets and lucerne fodder used in semi-captive feeding regimes which may be the cause of an older age of first reproduction found in individuals born into semi-captive conditions. Rhinoceros taken from the wild do not appear to have any reduction in their reproductive ability.

Establishing an adaptive management framework for leopard

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The Limpopo Leopard Project is a Panthera initiative set up in 2013 to advise provincial and national government on the status of key leopard populations. Here we present the results of two years of intensive monitoring, using camera-traps, from Venetia-Limpopo Nature Reserve that forms part of the wider provincial monitoring program. We then discuss management implications, further conservation objectives, and how these results feed into the provincial and national adaptive management framework set out to improve the sustainability of leopard harvest and persistence of the species.

Comparison of mesocarnivore activity patterns in grassland and riparian vegetation types

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Mesocarnivores contribute to the regulation of invertebrate and small mammal communities in terrestrial ecosystems. Differences related to spatial and temporal use of grassland and riparian landscapes by mesocarnivores at multi-species and community level have not previously been compared. Camera trapping was used to identify differences in species composition and utilization of these two vegetation types in Telperion Nature Reserve. Results suggest that species composition differs slightly between vegetation types and highlights that definite variations in peak activity periods occur in the same species depending on the type of vegetation being utilized.

Physiological responses of free-living aardvark (*Orycteropus afer*) to seasonal fluctuations in a semi-desert environment

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The myrmecophageous aardvark has a wide distribution throughout sub-Saharan Africa, only limited by deserts. The semi-desert environment of the Kalahari is on the edge of the aardvark's distribution range and, with conditions predicted to become hotter and drier with climate change, aardvarks may need to adjust their behaviour and physiology to survive these imminent changes. Over the past two years we have quantified the direct effects of high environmental temperatures and aridity on aardvarks' physical condition, activity patterns, body and muscle temperature. We have also assessed seasonal changes in diet of aardvark and the relative abundance of ants and termites at Tswalu.

Bats (Mammalia, Chiroptera) of Wakefield farm (KwaZulu Natal, South Africa)

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A survey of bats was undertaken in April 2015, on the Wakefield farm, in the midlands of KwaZulu Natal. The area is characterized by Grassland with patches of Mist Belt Forest. A netting capture effort of 1157 nm2hrs resulted in fourteen individuals of three species, from two families (Molossidae and Vespertilionidae), being caught, with a capture rate of 1.21%. Harp traps and active roost searching revealed an additional two species from one additional family (Rhinolophidae). The following five species were recorded: Geoffroys Horseshoe Bat (*Rhinolophus clivosus*), Swinny's Horseshoe Bat (*Rhinolophus swinnyi*); Egyptian Free-tailed Bat (*Tadarida aegyptiaca*); Botswanae Long-eared Bat (*Laephotis botswanae*); and Cape Serotine (*Neoromicia capensis*). The record of *L. botswanae* is the second recorded locality in KwaZulu Natal for this species.

Effects of seasonality on the ranging behaviour of a wild Chacma baboon troop at Telperion Nature Reserve, Mpumalanga, South Africa

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Season influences food availability in Southern Africa. At Telperion the dry season exposes baboons to food and thermal stress resulting in innovative ecological decisions to locate resources. Fire further impacts on resource availability and an accidental fire in May 2015 destroyed three quarters of the study troops home range. In this study we assess how seasonality and consequently food availability influences baboon ranging behaviour. Our preliminary results suggest that the troop utilized the same core areas across seasons. Daily distances travelled were high in both seasons signifying limited food resources during the study period.

This host is full - competition and facilitation between ectoparasites infesting rock sengis

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In nature more than one parasite usually invades a host and such co-infecting parasites are likely to interact with each other. Such relationships might be mutually beneficial or detrimental for one parasite. In the current study of the ectoparasite community of wild eastern rock sengis (*Elephantulus myurus*) we experimentally reduced tick and flea infestations and monitored ectoparasite burdens over the course of three years. We found facilitating interactions between tick species. In contrast, relationships between ticks, mites and lice appeared to be antagonistic. Our manipulation resulted in long-term shifts in the ectoparasite community composition with implications for parasite management strategies.

Small mammal community composition, Tswalu Kalahari Reserve

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Studying small mammal community structure is a useful management tool for indicating ecosystem health. Trapping on 14 transects in 9 different areas (≈ 5 broad habitats; total effort 6200 trap nights) at Tswalu Kalahari Reserve aimed to set a baseline and reference for future research and management purposes. Trap success was relatively high throughout (= 11.7 ± 12.7%), and the species evenness (Evar) per area ranged between 0 and 0.98 (0.49 ± 0.31). Following the high species richness (= 4.4 ± 2.7) and diversity (mean Shannon H = 0.92 ± 0.47) scores, and the presence of specialist species and low contributions of generalist species, we conclude that the ecological integrity was high in almost all the habitats sampled.

Comparing genetic patterns in native and introduced species

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More often than not animals will have genetic structure across their native geographical range. This structuring over geographical features is known as phylogeography. Phylogeography occurs due to

barriers within the habitat (e.g. physical barriers or local adaptation to a habitat) restricting gene flow between certain populations. But do these barriers affect similar species that have been introduced into the region? The two aims of the project was to identify type of structure within small mammals species that may occur due to different habitat requirement and then to identify if any of these factors would influence the genetic structure within an invasive species.

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

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This study aimed to investigate preferential outbreeding as a means of incest avoidance in Damaraland mole-rats (*Fukomys damarensis*) through colony manipulation and cross fostering. In total, 54 colonies of Damaraland mole-rats were identified and monitored over a two year period observing for plasticity and recruitment in both breeding and non-breeding individuals of both sexes at pre and post dispersal events. Twenty juveniles have been cross fostered into new colonies. Our results show a sex ratio that is female biased and colonies produce on average 2 pups per litter. Three juveniles dispersed up to 6.4km from their foster colonies.

Body temperature and activity patterns of free-living ground pangolins (*Smutsia temminckii*) in Tswalu Kalahari Reserve

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The ground pangolin (*Smutsia temminckii*) is an elusive, primarily nocturnal mammal that occurs in areas of southern and eastern Africa, many of which are predicted to become hotter and drier with climate change. Little is known about how pangolins, which have an unusually low metabolic rate and poor insulation associated with their scale-covering, respond to changes in climatic variables. Use of burrow microhabitats may allow pangolins to protect themselves from temperature extremes. However, hotter and drier environments also may have indirect effects on pangolins, particularly by altering the availability of ants and termites on which they feed. In this study we will investigate body temperature, and activity patterns of free-living ground pangolins in relation to climatic conditions and prey activity over a one-year period in the Tswalu Kalahari Reserve. We will implant miniature data loggers to record body temperature and attach tags to record activity, GPS and external temperature of six pangolins, and assess prey species activity and pangolin scat content. Knowledge of the physiology and behaviour of free-living pangolins is crucial if we wish to manage this species appropriately.

Virtual fencing as a new strategy for monitoring and managing baboons

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Current baboon management practices in Cape Town are very labour intensive. Virtual fencing has been identified as a cheaper means of deterring baboons from entering urban / farming areas, particularly in remote terrain which is difficult to access. Human Wildlife Solutions has designed a remotely operated system whereby bangs and animal calls can be produced at will, or automatically in response to a collared baboon's proximity. These sounds create a landscape of fear which baboons are reluctant to cross. If a problem baboon is collared, this system can also be used as an early warning system to alert restaurants of his approach.

African Rock Pipits *Anthus crenatus* in the Northern Cape: a study at two isolated populations in Tswalu Kalahari Reserve and in the Groblershoop area

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The African Rock Pipit *Anthus crenatus* (ARP) is endemic to South Africa and Lesotho with at least five isolated populations in the Northern Cape. This species are associated with mountainous areas, karoo hills and escarpments with rocky hills preferring open areas with adequate grass cover. ARP's were studied during October 2013 and December 2014 at Tswalu Kalahari reserve and in the Groblershoop area in February 2015. Songs of individual pipit males were recorded at isolated hills at six different localities at Tswalu and at four localities in the Groblershoop area. Statistics of song components (S2a-d) recorded at Tswalu and Groblershoop were compared. An ARP male was also captured and ringed at Tswalu and blood samples were taken for comparative DNA studies between the other populations of this species.

Investigating causes of nesting failure in White-backed Vultures in the greater Kimberley area, South Africa

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Breeding success of White-backed Vultures at Dronfield Nature Reserve and Mokala National Park has fluctuated annually, with little indication of the causes. Using a combination of dummy eggs and cameras on active nests, we investigated causes of nesting failure and relevant nest predators. Pied Crows were a key nest predator and accounted for most dummy egg predations (60%, n= 27), followed by unidentified large raptors (26.7%, n =12) and Vervet Monkeys (2.2%, n =1). Of 10 nests with camera traps, four failed before the hatching stage. Pied Crows predated two of these nests.

Dispersal, population genetic structure and sociality

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Dispersal is a critical driver of gene flow, with important consequences for population genetic structure and social interactions. Here, we use a combination of 20 years of data from >6500 birds and molecular genetics and show that both sexes of the sociable weaver (*Philetairus socius*) are philopatric. Dispersal is female-biased, which is reflected by fine-scale population genetic structure, including significant relatedness extending beyond the level of the colony for both sexes. This may have driven the evolution of cooperation in this species, but may also result in a significant inbreeding risk, against which female-biased dispersal alone appears insufficiently effective.

Weaver nests as a resource to the Kalahari animals: positive associations in the structure and function of a community in a stressful environment

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Sociable Weaver (Philetairus socius) nests are a prominent feature of the Kalahari. These large nests are home to hundreds of weaver individuals, but also host a wide range of other species from several different taxa. The aim of my proposed project is to understand the diversity of animals associated with these nests, and to investigate their importance as a resource to the Kalahari animal community as environmental stress increases. In addition, I will investigate the interactions between associate species that might facilitate coexistence at weaver nests. Understanding these interactions will provide a baseline for future co-evolutionary research in this system.

Tracking Kimberley's Secretarybirds (*Sagittarius serpentarius*)

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Endemic to Africa, the Secretarybird is Globally Vulnerable and facing a high risk of extinction in the wild. The Northern Cape has been indicated as one of the major areas in which their numbers have declined dramatically. Three pre-fledging chicks from different localities (Alexandersfontein, Dronfield and Rooifontein) were monitored near Kimberley during the 2014-2015 breeding season using camera traps and remote-triggered photography revealing interesting dietary and behavioural activities. As part of a national project to fit young birds with tracking devices, two chicks (Dronfield and Rooifontein) were fitted with GSM tracking devices in January 2015 and post-fledging activity recorded for varying time periods.

Flexibility in a changing world: intraspecific variation in the thermal physiology of white-browed sparrow-weavers

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Our work on the thermal physiology of white-browed sparrow-weavers, which began at Tswalu and has subsequently expanded to include other populations, reveals that there is considerable physiological variation within this species. Key findings include: 1) a difference in daytime body temperature of 1.3 °C between sparrow-weavers at Tswalu and a hotter, more arid site 100 km to the west, 2) a corresponding difference in the temperature dependence of heat dissipation behaviours such as panting, and 3) significant summer increases in heat tolerance and evaporative cooling capacity in a Kalahari population, but not in two populations at cooler, more mesic sites.

Hydrogeomorphic classification, biodiversity assessment and management recommendations for wetlands in Telperion Nature Reserve

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Wetlands are important water resources. They are complex ecosystems housing an array of biological species and providing essential ecological functionality. This study assesses lateral variations of water at wetland sites within Telperion, comparing adjacent vegetation species richness with terrestrial environments, and establishing catchment scale variables that influence local hydrology. We used GIS terrain analysis tools to identify wetland sites. Telperion wetlands will be categorised under several classification schemes based on geomorphology and hydrology. An understanding of these dynamics are invaluable for managing the reserve as they identify sites that are hydrologically sensitive, require prioritization and conservation. Here we present preliminary hydo-period findings.

The Telperion UNISA Conservation Mentorship Project a growing success story

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In 2007, the financial support provided by Ernest Oppenheimer and Son (EOS) for formal education activities on Telperion was re-directed towards supporting undergraduate nature conservation diploma students from UNISA. The intention of this chance in focus was, to increase the usage of and access to Telperion for tertiary education and research activities. This change of focus laid to path for the formation of the Telperion UNISA Conservation Mentoring Project in 2012. Three facilities were made available to UNISA's Department of Environmental Sciences so that it may provide work-integrated learning (WIL) opportunities to students who were not successful in finding suitable WIL placement. The project aims to plan and host ten week-long visits to Telperion

each year. 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. The partnership between Telperion and UNISA is in its eighth year and has significantly contributed to the development of successful UNISA undergraduate students

An Independent Review of De Beers Reserve Management Plans: Venetia, Benfontein, Dronfield and Rooipoort

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De Beers Group Services (DBGS) and De Beers Consolidated Mines (DBCM) have rigorous environmental and biodiversity policies and standards. Within this framework, company game and conservation areas are managed within a formal overarching management plan. In addition to annual internal reviews, the conservation management plan and associated practices is reviewed externally every 3 years. This first external review aims to provide constructive comment and assurance on the objectives, procedures, practice and monitoring of the DBCM properties concerned. We reviewed the highly commendable and comprehensive management plan, as it relates to: DBCM Ecology Division objectives, requirements and regional context; alignment with management practices seen or recorded; specified processes or actions; legal compliance; and current status of the land. Comment, discussion and recommendations around the above issues are presented.

Development of a rat dissection model utilizing computer tomography and additive manufacturing as an alternative to using animals

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Rats are commonly dissected to teach basic anatomy at primary and secondary school level as well as University level. This necessitates a large number of animals, in particular rats, to be euthanased each year. This practice is considered unnecessary by the National Council of SPCA's and an alternative teaching aid needed to be found. A Computer Tomography (CT) scan of a rat was used to design and later print 3 dimensionally, a teaching aid that includes major anatomical landmarks. This model is available to schools and Universities to replace or partially replace the use of rats for teaching and educational purposes.

Biodiversity Monitoring by Camera-Traps: Snapshot Serengeti

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Large-scale camera trap surveys can provide unique opportunities for wildlife monitoring, scientific research and public outreach. The world's largest and longest continuous camera-trap survey, Snapshot Serengeti, covers a 1,100-km^2 area in the center of Serengeti National Park. Over 200 camera traps have operated continuously from June 2010, collecting 5.5 million images of 48 different species ranging in size from mongooses to elephants. Nearly 30,000 volunteers from around the world have viewed the images as part of a citizen-science project, www.SnapshotSerengeti.org, and classified the species and count the number of individuals in each photo. A simple algorithm aggregated each individual classification into a final "consensus" dataset with 98% accuracy. Population estimates from the camera-trap data largely reflected known herbivore and lion abundances, accurately captured the nature of the Serengeti migration, and matched the general distribution of giraffe. Camera traps therefore provide a less expensive, more sustainable, and higher resolution technique than many other approaches, such as aerial surveys or spoor counts, although complex analytical approaches are necessary for generating robust density measurements of shade-seeking species such as lions. Nevertheless even a simple comparison of raw capture rates can provide valuable information about population changes through time.

Telperion: Mapping going mobile

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The roads and main infrastructure of Telperion were captured in May 2015, processed and made available as maps running on several mobile platforms such as smartphones, tablets and GPS units. The poster shows the different available output formats that can be used by visitors as well as staff members. Furthermore some additional information that can be extracted is shown. Examples of these are vegetation mapping and driving condition assessment.
The generated maps are made available online but can also be distributed as high quality printed paper maps.

Promoting sustainable coexistence between humans and wildlife within the urban areas of Gauteng, South Africa

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This project combines aspects of the social and biological sciences to develop a holistic picture of human-wildlife interactions in urban areas and devise measures to improve these interactions and encourage a more environmentally conscious urban citizenry in Gauteng. One aspect of the project is a Masters study at the University of the Witwatersrand, examining public attitudes towards, and knowledge of, urban wildlife. This assessment investigates the rich variety of deep-seated cultural superstitions in Gauteng, to ascertain what effects these beliefs have on peoples' behaviour

towards urban wildlife. On a more practical level, the project aims to provide a support platform to facilitate the public's enjoyment of the rich array of wildlife and ecosystems within Gauteng's urban areas, in an environmentally sustainable way. This is done through public awareness raising and education activities and the production of knowledge products such as environmental management toolkits and guidelines. In this presentation we briefly present preliminary findings of our research, explain how these findings relate to human-wildlife interactions in urban environments, and provide an update of our plans to facilitate effective wildlife conservation in Gauteng.

Preliminary results for the management of the aggressive encroacher plant *Seriphium plumosum* in Bankenveld Grassland

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Seriphium plumosum is an aggressive encroacher dwarf-shrub threatening grasslands in most of the provinces of South Africa. It is an indigenous pioneer plant that invades natural veld and cultivated areas. In this study we investigated the morphology of *S. plumosum* and looked at different ways of controlling it at Telperion Nature Reserve, Mpumalanga, South Africa. Plants were classified into three height classes <0.5 m, 0.5–3 m, and >3 m. Above and below ground morphology and biomass was investigated to determine the relationship between height and biomass. Treatment options investigated for controlling *S. plumosum* include chemical control and proportional removal. The financial implications of various control measures were calculated per hectare. Our preliminary results indicate that an integrated approach should be adopted for controlling the plant. A combination of herbicide application and 100% removal proved most effective. Findings from this study provide valuable information for the management of *S. plumosum*.

Frithia humilis revisited; new population-data for a red listed succulent from Gauteng and Mpumalanga

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The status of both species of *Frithia* was assessed and all populations were visited and population counts were done. *Frithia humilis* occurs only on very special geological strata and is still only conserved within a small area of Ezemvelo Private Nature Resreve, Gauteng. Now fifteen years on, the populations of *Frithia humilis* have been recounted after threats not previously recognized in the initial study were encountered. This has improved upon the older data and has also brought to light that this taxon is more vulnerable to climate change than was previously suspected. Methods used and results found will be discussed.

Monitoring vegetation change in Tswalu Kalahari Reserve: Conservation through the lens

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A monitoring programme is being set up to determine benchmark conditions and rates of change in the various land forms in Tswalu. Management decisions are best made if they are informed by reliable monitoring data which document the extent, nature and rate of environmental change over time. There is a concern that climate change will have a significant impact on biological diversity and ecosystem function. An understanding of current rainfall–vegetation-herbivory dynamics will enable more effective planning for future changes in climate. Repeat photography will be used as the monitoring tool as it is an effective and robust method of monitoring vegetation change.

The status of the critically endangered species *Encephalartos middelburgensis* endemic to the Highveld region of South Africa

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Encephalartos middelburgensis is a Critically Endangered species of cycad endemic to the Highveld region of South Africa. It is protected in the Telperion where the westernmost metapopulations of this species is found. Natural regeneration however no longer occurs as population sizes have dwindled to almost no existent and individuals are located too far apart with no pollinators found to date. Here a running project is presented on the neighbouring Rhenosterpoort Nature Reserve which recently has included Mpumalanga Park. This artificial propagation project is including in the newly published biodiversity plans from the Department of Environmental affairs on 31 endangered cycads. The project aims to expand to include more reserve (especially Telperion) to include the entire *E. middelburgensis* taxon.

South African flora – opportunities for the horticultural industry

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South Africa hosts a variety of around 30 000 flowering plant species, accounting for almost 10% of the world's higher plant species. Many plants are well documented in the use of furniture, utensils, food, shelter and medicine, but very few for the horticultural industry. The study was conducted on Telperion to assess the horticultural potential with a strong focus on aspects such as the indigenous knowledge to realise the importance and uniqueness of the South African flora. More indigenous species needs to be continuously developed for the commercial market, but do not receive the necessary attention it deserves.

Practical value of ectomycorrhizal fungi in miombo woodland, Zimbabwe

Cathy Sharp

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The recent upsurge in the small-scale tobacco industry has decimated prime miombo woodland in Zimbabwe and there is an urgent need to address this situation. A preliminary list of ectomycorrhizal fungi was compiled after monthly collections over four wet seasons in three randomly selected plots. Correlations between presence of host trees and their fungi were investigated. Fungi that showed particular preferences for either Brachystegia spiciformis or Julbernardia globiflora have the potential for use in re-establishing miombo woodland. A pilot study of indigenous wood-lots using inoculated tree-seedlings has been initiated on Debshan Ranch in Zimbabwe.

A Survey on the Macro-fungi and Lichen of the Limpopo Valley including Mapungubwe National Park

Retha van der Walt

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The survey consists of the physical collection and preparation of fully annotated herbarium specimens in diverse micro-habitats within the study area. Detailed photographs of all species highlighting distinguishing characteristics, spore prints and microscopic spore images have been prepared. The survey will aid the establishment of a database regarding the biodiversity of this lesser-known kingdom in the Limpopo Valley normally not associated with fungal growth due to its harsh, dry climate and sporadic rainfall. The ultimate aim of the project is the publication of a well-illustrated field guide to simplify identification and create an awareness and better understanding of these groups so easily overlooked.

Soil *Hypocrealean* survey in the Telperion Nature Reserve

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The Hypocreales are an order of fungi within the class Sordariomycetes that consists of seven families, 237 genera, and 2647 species. They are recognised by their brightly coloured, perithecial ascomata, or spore-producing structures. These are often yellow, orange or red. This group of fungi accommodates a number of economically important fungi, including biocontrol agents, plant pathogens and entomopathogenic species. 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. Growth studies were conducted and sequence data for the *translation elongation factor 1α* gene were generated for these isolates. The obtained isolates represent new host reports from soil, geographical distributions for known species, and new haplotypes in some known species complexes. This survey contributes to our knowledge regarding this economically important order of fungi in natural ecosystems in South Africa.

Guidelines for standardised global butterfly monitoring

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Guidelines to support the development of butterfly monitoring at local, national, regional, and global levels are compiled at present. These guidelines describe a standard set of field protocols that can measure butterfly population change over specific spatial and temporal scales and that can be applied in any part of the world. The two recommended field protocols are transect counts and fruit baiting. Additional supplementary protocols are described for specific situations. The target audience of these guidelines is anybody who wants to organise butterfly monitoring in any part of the world (either undertaken by professionals or citizen scientists). It explains how to set up butterfly monitoring that can provide consistent and comparable results between sites and between years, consistent with international standards.

Two keystone plant species, *Boscia albitrunca* and *Senna italica*, pivots for the great butterfly migration of *Belenois aurota* (Brown-veined White) and *Catopsilia florella* (African Migrant) from the Kalahari

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Two butterfly species *Belenois aurota* (Brown-veined White) and *Catopsilia florella* (African Migrant) are most visible in the annual migrations of butterflies of southern Africa. *Boscia albitrunca* (Shepherd's Tree) is key host plant species of caterpillars of *Belenois aurota* from the southern Kalahari. During further research at Tswalu Kalahari Reserve it was found that another identified keystone plant species *Senna italica* is likely to be the main host plant that sustains large numbers of *Catopsilia florella*. Tswalu Kalahari Reserve is a conspicuous source of both of the above indigenous keystone plant species and therefore contributes substantially to the great annual butterfly migration of southern Africa.

Evaluation of the Potential of Three *Chrysomya* spp. and *Lucilia sericata* (Diptera: Calliphoridae) for the Bioconversion of Waste Products

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Bioconversion is a nutrient cycling process that can reduce agricultural, industrial and household waste products and produce useful materials such as protein that can be fed to livestock or lipids that can be converted into biodiesel. This study is assessing the suitability of mass-rearing of four species of carrion flies and to determine larval mortality and conversion efficiency on three types of waste for each species. The four species are *Chrysomya megacephala*, *C. cholorpyga*, *C. putoria* and *Lucilia sericata* (Calliphoridae), collected initially from Telperion. The waste products are food wastage, abattoir waste, and swine manure. Results will be discussed.

The breeding system and demography of *Sesamothamnus lugardii*; a descriptive pilot study

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Sesamothamnus lugardii (a rare succulent shrub) occurs in small populations in Mapungubwe National Park (MNP) and has a potentially vulnerable demography: there are few seedlings, and shrubs are slow to reach reproductive maturity (at heights of two meters and diameters of about 50 cm). They are heavily impacted by meso- and large herbivores, and although an assessment in 2008 found the shrubs to be resilient (by being long-lived and resprouting vigorously), the ever-increasing numbers of large herbivores in MNP may soon reach a critical threshold beyond which the shrubs lose their resilience, putting them at risk of local extirpation. The limited recruitment observed could be the result of a bottleneck in the breeding system: the population experiences intense florivory, and as natural reproductive success in the population is extremely low, it could also be pollinator limited. The exclusive pollinators of *S. lugardii* were found to be *Agrius convolvuli* moths, and as *S. lugardii* flowers are self-incompatible, they depend entirely on *A. convolvuli* for reproduction.

Diamond Route Scorpion Survey

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The Diamond Route properties encompass a wide variety of habitats, providing a refuge for a high diversity of fauna and flora. This network of conservation areas provides not only a refuge for specific species, but for entire groups. Surveys of scorpion fauna at 3 of properties have been completed, and the results are shaping our understanding of the importance of these properties for the conservation of these animals throughout southern Africa. In this poster, the outcomes of 3 Diamond Route property scorpion surveys will be presented with emphasis on collective results and diversity.

Spider collecting at Wakefield

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As part of the South African National Survey of Arachnida (SANSA), spiders were sampled from Wakefield in the Midlands of KwaZulu-Natal during January 2015. A sweep net, beating tray, litter sieve, and pittraps were used to sample the different habitats. Several members of the class Arachnida were sampled, including a scorpion, several species of harvestmen and pseudoscorpions. The spiders were the most abundant and diverse order, and 25 families represented by 56 species have been sampled.

How diamond mining led to the discovery, conservation and management of a 500 year old Shipwreck at Oranjemund, Namibia

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On the 6th May 2015 Namdeb was honored with the African World Heritage Fund Award for the company's commitment, and exemplary contribution to the conservation and management of the Oranjemund Shipwreck. This presentation will give an account of Namdeb's involvement in this whole process from the discovery to the handover of the artifacts to the Namibian government. The presentation also aims to highlight the support rendered by the company to conduct research related to the offerings of this 500 year old shipwreck.

Adaptive Management in Canada's Northwest Territories: A Glimpse into the Snap Lake Diamond Mine's Fisheries Monitoring Program and Special Studies

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Aquatic environmental studies often use biological endpoints to monitor for changes in ecosystem health. Fish studies are particularly useful for providing a robust indicator of changes that may be occurring in a system, such as nutrient enrichment (e.g., changes to fish size at age) or alterations in water chemistry (e.g., changes in fish tissue metal concentrations). Differentiating natural variability in fisheries data from changes that are due to anthropogenic influences is critical to the successful implementation of adaptive management to protect environmental integrity, and the results of the Snap Lake Diamond Mine fisheries studies will be discussed in this context.

The Rose-ringed Parakeet Project – South Africa

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Invasive species are cited as a major threat to indigenous biodiversity. Numerous exotic avian species are recorded in South Africa although only a small proportion has become invasive. The Rose-ringed Parakeet (*Psittacula krameri)* is a recent “invasion”, and there is concern, like in other parts of the world, it may have negative effects on local diversity. It currently occurs in isolated populations across the country, with strongholds in Gauteng and Durban, where its distribution is strongly associated with human-modified environments. This ongoing project investigates its distribution, ecology, and behaviour and the associated effects on native species and the environment.

Baseline data to model brown hyena (*Hyaena brunnea*) density from the Tsau//Khaib National Park (Namibia) and Tswalu Kalahari Reserve in South Africa

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The most recent brown hyena IUCN red data book assessment highlighted once more the paucity of data regarding their density across their entire range. Verification of existing data and filling of gaps may be possible by making use of the extensive network of camera trap owners across southern Africa, so that density could be modeled from photographic rate. At present GPS telemetry, camera trap and genetic data for two adjoining clans are available at our Namibian study site to test existing models, look at modifications or develop a new model. First available data from both sites are presented here.

Threatened butterfly species of the KwaZulu-Natal Midlands

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The 'Midlands' of KwaZulu-Natal have for many years been known anecdotally to be the habitat of several rare butterfly species. This poster defines the Midlands in terms of altitude (maximum and minimum boundary contours) and river valleys (Umzimkulu and Tugela and their upper tributaries, the Pholela and Bushmans rivers respectively). These criteria were mapped using Arcview 9 shapefiles. Using LepiMAP geodata, six butterfly species categorised as threatened under the IUCN Red Data criteria, whose known area of occurrence is at least 85% contained in the area defined as 'Midlands', are identified. The butterflies are shown with notes on their known habitat requirements. The butterflies' known localities are mapped with vegetation types and altitudes shown. Maps are also given showing how land transformation and IUCN threatened habitat status interact with these species' georeferenced localities. The area of the Midlands that has been identified for 'fracking' is intersected with the butterflies' distribution map. The farm 'Wakefield' is also mapped.

Moth diversity of Waltham Place, United Kingdom

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Waltham Place is completing the first year of a two year survey in addition to a previous moth surveys, 2002-2004, and shorter one night surveys in 2008, 2013 and 2014 for National Moth Night. Our aim is to determine the species and abundance of the moth fauna of Waltham Place. Moths play an important part in the ecosystem as both pollinators and a source of food to other species. They can be considered a key indicator species and in studying them we can gain insight into the effects of pollution, changes of land use and climate change. It is one of the aims of Waltham Place to raise public awareness of these fascinating invertebrates through participating in National Moth Night and sharing information on other finds with our visitors. The 2002- 2004 survey used a combination of light traps, wine roping and torchlight surveys. The shorter surveys, 2008-2014, and the current survey have all used a combination of different light traps. Recommendations to improve the habitat for moth fauna include targeted tree planting, to provide long-term continuity of habitat, for moths already existing on site and to expand the availability of other tree species, known to support a wide range of moth species. Consideration is given to management of the rough grassland by amending the current cutting regime and increasing the herbaceous plant diversity with the addition of locally common plants known to support a wide range of moth species.

Developing a holistic grazing management process on Debshan Ranch

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Debshan Ranch changed its way of managing cattle in 2012 when it adopted the holistic approach. Since then, the grazing planning process which is a major component of the concept, has gone through a number of changes in an effort to sustain the cattle, wildlife and people. Planning grazing for animals is a process which involves all the players on the ranch as it has many variables. Exploring the complex interrelationship of all the variables and how the implementing team has adapted this to create ecological, economic and social balance has created a process which works.

Investigating the landscape time recovery to the aftermath of a flood using remotely sensed data: the case study of the 2000 and 2013 floods in the Shashe Limpopo Confluence area of South Africa

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Floods, amongst other natural disasters, control ecosystem structures and their functions and have a direct influence on the landscape and communities. Their estimation using traditional methods has proven to be time consuming, costly and at times not effective. This study explores the use of remote sensing techniques for a quicker estimation of floods and subsequent landscape recovery after a flooding event and used the 2000 and 2013 floods in the Shashe-Limpopo confluence as a case study. Rainfall data (1923-2000), archival research of year 2000 and 2013 newspaper articles and interviews were used to validate the remote sensing results. Landsat ETM Images before both flooding events (September 1999 and September 2012) were used to enable the description of the landcover of the study area under normal hydrological conditions. Landsat images after the flooding events (April, September, December) for both 2000 and 2013 were used to provide

information on flood extent, floods evolution and floods effects. The Normalised Difference Vegetation Index (NDVI) for vegetation is calculated in order to create a map indicating the health of vegetation to distinguish between thriving and under stress plants to detect the vegetation recovery time. Results from the qualitative and quantitative analysis soundly agree with each other. Impacts of both flooding events include severe damages to houses, agricultural infrastructure, schools, water and energy supply systems and road networks. The study reveals that water retreats relatively quickly in most flooded areas within the study region and that vegetation does recover to initial conditions after a period of almost twenty four months.

Remote Sensing Survey of Archaeological Sites in the Shashe-Limpopo Region

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This paper presents on the use of remote sensing in detecting archaeological sites in the Shashe-Limpopo confluence area. The Shashe-Limpopo confluence area is well known for archaeological material dating from the Early Stone Age up to the Late Farming Communities. Most changes in the landscape occurred at the time when farming communities occupied the area, as they carried out activities which altered the soil chemical composition and texture. These activities include clearing land for cultivation, building animal kraals and households, creating ash middens. Most of these actions leave signs on the landscape that are recognisable from the air. The main aim of the research is to identify indicators of archaeological site using environmental variables that carry a specific spectral signature and can therefore be detected by satellite imagery. This will help in developing a predictive model identifying some of the archaeological sites in areas which have not been surveyed before and re-analyse studied sites for new data. Above all the study will provide archaeologists and other stakeholders with much needed knowledge on spectral reflectance of archaeological material in the region.

Comparison of Survival Rates of African Wild Dogs in Two South African Protected Areas

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One factor driving the decline of African wild dogs (*Lycaon pictus*) is competition with lions (*Panthera leo*). The main objective of our project was to compare survival rates of African wild dogs in Kruger National Park, where dogs and lions interact, and the Tswalu Kalahari Reserve, where they do not. We are still in the early stages of the project, but have found, as expected, that survival rates are much higher in Tswalu, over twice as high. In the coming year, we will continue to measure survival rates and look at other possible factors behind demographic bottlenecks in the two populations.