



2nd Annual Diamond Route Research Conference
29th & 30th August 2011
Auditorium, De Beers Johannesburg campus

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 Family 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	Monday 29 August
08h30	REGISTRATION and TEA / COFFEE
09h00	Overview of Diamond Route properties Rob Smart, Chair of the Diamond Route
09h20	Key note speaker: Invertebrate research – an exciting future ahead... Prof. Mike Picker: Co-author of a field guide to Insects of South Africa
Species & Community Adaptations CHAIR: Richard Satekge, Tswalu Kalahari	
09h50	Dr Catherine Sole Radiation of the lacewings (Neuroptera: Nemopteridae: Nemopterinae) with special reference to <i>Derhynchia vansoni</i> , a Kalahari endemic
10h10	Shelly Edwards Are the radiations of the southern African lacertid lizards adaptive?
10h30	Samantha Scott Bird community dynamics in response to changes in food availability in a mistbelt mixed <i>Podocarpus</i> forest, KwaZulu Natal
10h50	TEA / COFFEE and Poster Session
Mammal Ecology CHAIR: Corne Anderson, Manager: Ecology and Biodiversity Management	
11h20	Dr Ingrid Wiesel Predicting the influence of land development on brown hyena, <i>Parahyaena brunnea</i> , movement and activity
11h40	Dr Bruce Page What limits elephants? A modeling approach
12h00	Dina Fagir Interrelationship between ectoparasites and two hosts from South Africa: Namaqua rock mouse, <i>Micaelamys namaquensis</i> , and Eastern rock elephant shrew, <i>Elephantulus myurus</i>
12h20	David Marneweck Behavioural and endocrine correlates to the social organization of the aardwolf, <i>Proteles cristata</i> , on Benfontein Nature Reserve
12:40	Dr Fred Dalerum Causes and consequences of mammalian resource specializations
13h00	LUNCH and Poster Session and Conference Photograph

Time Monday 29 August (continued)	
Avian Conservation CHAIR: Andrew Stainthorpe, Site Manager: Rooipoort	
14h00	Prof Les Underhill The impacts of diamond mining activities on dive success and breeding productivity of Damara Terns, <i>Sterna balaenarum</i> , in southern Namibia
14h20	Dr Rowan Martin Behavioural thermoregulation in desert birds: How might patterns of landscape use buffer the effects of climate change for Kalahari birds?
14h40	Ben Smit Physiological and behavioural responses to temperature and humidity in the White-browed Sparrow-weaver
15h00	Dr Susan Cunningham Behavioural responses of Fiscal Shrikes in the Kalahari to high temperatures – implications in the face of climate change
15h20	TEA / COFFEE
Invertebrate Conservation CHAIR: Malwande Dumeko, Site Representative: Brenthurst Garden	
15h50	Robin Lyle The Spider Diversity of Tswalu Kalahari
16h10	Astri Leroy Survey of Arachnids at Brenthurst Gardens, Preliminary Report
16h30	Dr Dawid Jacobs The Heteroptera of the Venetia Limpopo Nature Reserve with some remarks on the dynamics of insect populations
16h50	Prof Ansie Dippenaar-Schoeman Spider diversity of the Grassland Biome
17h10	Dr Mervyn Mansell Demons of the sand and other lacewings of Tswalu - towards creating an information resource
17h30	Close of Day 1
18h00	COCKTAIL FUNCTION & POSTER SESSION: DE BEERS CORNERSTONE
	Welcome: Manne Dipico, Chairman of Ponahalo Holdings
	Insights into the Diamond Route: Erwin & Nicoleen Niemand

Time	Tuesday 30 August
08h00	TEA / COFFEE
	Plant Community Studies CHAIR: Terence Mabi, Site Representative: Dronfield Nature Reserve
08h30	Dr Brian Huntley Angolan Biodiversity Conservation Strategies – the Value of Partnerships
09h50	Danie Krynauw Results of 5 years of vegetation monitoring in degraded grasslands of Ezemvelo/Telperion
09h10	Esmè Kruger Ezemvelo <i>Frithia</i> 's act as a benchmark for translocated populations of this endangered species
09h30	Melissa Whitecross Is frost a demographic bottleneck for savanna trees? Testing the effect of freeze events on <i>Colophospermum mopane</i> population structure in Limpopo Province, South Africa
09h50	Priscilla Burgoyne A new species of <i>Cytinus</i> (Cytinaceae) from the Namaqualand coast
10h10	TEA / COFFEE and Poster Session
	Culture & Education CHAIR: Duncan MacFadyen, Research and Conservation
10h40	Anna Steyn Diamond Route cultural sites – tourism and sustainability
11h00	Prof. Tom Huffman The historical archaeology of Mapungubwe: The Venda and Machete
11h20	Dr Salome Combrink The effect of a nature experience on eco-alienated and at-risk youth
11h40	Dr Taddy Blecher & Peter Mabila MERU – towards a new future in education and connection with nature
12h00	LUNCH and Poster Session
	Conservation Services CHAIR: Warwick Davies-Mostert, Conservation Coordinator
13h00	Roxanne Pride Chemical and biological Implications of acid mine drainage pollution on aquatic ecosystems in the Witbank Coalfield, Mpumalanga
13h20	Dr Hanneline Smit The possible effect of solar energy facilities on birds
13h40	Dewald Du Plessis The biology and conservation of the White-bellied Korhaan <i>Eupodotis senegalensis</i> (Vieillot 1820) in South Africa
14h00	Dr Harriet Davies-Mostert Hard boundaries influence carnivore diet and prey selection – a case study of African wild dogs in a fenced reserve in South Africa
14h20	Wendy Collinson Wildlife road traffic accidents: a new technique for counting flattened fauna
14h40	Presentation Awards Mrs Strilli Oppenheimer
14h50	Closing Duncan MacFadyen
15h00	CONFERENCE CLOSURE

Posters

Author	Titles
<u>A. S. Dippenaar-Schoeman</u> & C. R. Haddad	The South African National Survey of Arachnida (SANSA)
<u>A. R. Deacon</u> and P. J. Kotze	Aquatic biodiversity and baseline bio-monitoring assessment for Ezemvelo / Telperion, Gauteng-Mpumalanga
<u>R.E. van Dijk</u> and B.J. Hatchwell	The function of the public good of sociable weavers
G. Wilson	Conservation leadership Programme - over eleven years of developing future conservationists
<u>J.L. de Vries</u> , P.W. Bateman, N.C. Bennett, E.Z. Cameron, F. Dalerum C.W.W. Pirk	Home range sizes of aardwolves: the influence of prey abundance on an extreme specialist
<u>B. Wilson</u> , A. Sliwa, N. Lamberski, J. Herrick, A. Lawrenz	Black-footed Cat (<i>Felis nigripes</i>) research: Recent Outcomes
J. A. Shaw	Rhino conservation and the Diamond Route
<u>A. Young</u> , D. Cram, X. Harrison, L. Walker and J. York	The dynamics and implications of workload sharing in white-browed sparrow weaver societies
U. Strauss, H. Human, V. Dietermann, R.M. Crewe and <u>C.W.W. Pirk</u>	Do viruses threaten the health of our honeybees in South Africa?
J. Leeming	Invertebrate Ecotourism
<u>F.J. Jacobs</u> , G.C. O'Brien, L. Nel and P. De Villiers	Can yellowfish behaviour help us manage the Vaal River?
<u>G.C. O'Brien</u> , N. Smit and F.J. Jacobs	Are Schroda Dam Tigerfish eating themselves to death?
<u>Y. Fernández-Jalvo</u> , L.Scott, G. Gil-Romera, F. Neumann, J. Brink, L. Rossouw ⁷ , J. Carrión & G. Avery	Hyena, coprolites, pollen and past ecosystems
<u>A. Berruti</u> and S.M. Berruti	Understanding issues key to the long-term survival of Namaqua <i>Pterocles namaqua</i> and Burchell's Sandgrouse <i>P. burchelli</i>
<u>D. Campbell</u> , A. Corson, K. Garrah, K. Bergeron and C. Laurin	Developing Mine Restoration Protocols for the Hudson Bay Lowland
<u>J. Orlova</u> and B. Branfireun	Groundwater – Surface Water Interactions in Catchments of the Hudson Bay Lowlands
<u>M.E. Taylor</u> and M. Hazell	Predicting Caribou Habitat Use in the James Bay Lowlands
<u>W. Collinson</u>	Wildlife road traffic accidents: a new technique for counting flattened fauna
C. Nkabinde; D. Ogle; F. Khoele; I. Mokoena J. Maluleke; M. Tyobeka; N. Tshatshu; Q. Molapo; S. Matumbura; S. Mabunda and T. Twala	Alien Plant Species of Ezemvelo Nature Reserve
C. Nkabinde; D. Ogle; F. Khoele; I. Mokoena J. Maluleke; M. Tyobeka; N. Tshatshu; Q. Molapo; S. Matumbura; S. Mabunda and T. Twala	Soil Conservation on Ezemvelo Nature Reserve
D.Y Okubamichael, M. E Griffiths and D. Ward	Rooipoort Mistletoes on the De Beers Diamond Route

South Africa's megadiverse insect fauna

M. D. Picker

Zoology Department, University of Cape Town, mike.picker@uct.ac.za

The South African insect fauna boasts exceptional adaptive radiation, an over-representation of relictual groups (many considered to be of Gonwanan affinity), and high levels of endemism. These elements are especially pronounced in the winter rainfall biomes of Southern Africa, the epicenter of adaptive radiation for many cosmopolitan insect families. The evolution of Southern hemisphere faunas is attributed largely to vicariance events. In South Africa the lack of any significant glaciation and the adaptive radiation of the flora, have contributed to a phylogenetically unique insect fauna. Future conservation planning and reserve selection should be more inclusive, and not rely only on plant and vertebrate data.

Radiation of the lacewings (Neuroptera: Nemopteridae: Nemopterinae) with special reference to *Derhynchia vansoni*, a Kalahari endemic

C. L. Sole¹, M. W. Mansell, J. B. Ball and C. H. Scholtz

¹Department of Zoology and Entomology, University of Pretoria, Private Bag X20, Hatfield, 0028, clssole@zoology.up.ac.za

Nemopteridae a charismatic family of lacewings characterised by uniquely extended hind wings. Seventy-two of the current 142 valid species occur in southern Africa and the vast majority of these are endemic to the Western and Northern Cape Provinces. In this study we aimed to establish the validity of the 11 currently recognised genera, as this will provide a basis for investigations into their ecology and objective criteria for their conservation. Molecular analyses support four of the 11 currently recognised genera, *Derhynchia* being one. *Derhynchia* exhibits derived morphological and behavioural traits but recent analyses indicate it may have had long evolutionary history with the Kalahari dune ecosystem

Are the radiations of the southern African lacertid lizards adaptive?

S. Edwards¹, K. Tolley¹, J. Measey¹, B. Vanhooydonck² and A. Herrel³

¹South African National Biodiversity Institute; s.edwards@sanbi.org.za

²University of Antwerp, Belgium

³Museum National d'Histoire Naturelle, Paris

Adaptive radiations are rapid lineage diversifications accompanied by adaptive phenotypic change, divergent ecological specialisation, and competition. Alternatively, non-adaptive radiation occurs when species are genetically distinct, but with little or no phenotypic and/or ecological variation. The present study is aimed at investigating whether the southern African environment (substrate type, diet) is a factor in shaping the morphological traits (limb and head traits), and thereby affecting the performance traits (sprinting speed and bite force) of the southern African lacertid lizards, as well as whether the morphological traits are phylogenetically independent. Key sites for the data collection included reserves along the Diamond Route.

Bird community dynamics in response to changes in food availability in a mistbelt mixed Podocarpus forest, KwaZulu-Natal

S.L. Scott¹ and C.T. Symes¹

¹*School of Animal, Plant and Environmental Sciences University of the Witwatersrand, Private Bag 3, Wits, 2050, samalamanam@gmail.com*

Bird diversity and exploitation of food resources at an Afromontane forest in KwaZulu-Natal were assessed during winter and summer. Carbon and nitrogen stable light isotope values of blood and faecal matter were compared with a food base of plant and invertebrate material to interpret resource partitioning of food resources. There was a significant turnover of species between seasons in response to resource availability. Stable light isotope analysis identified distinct trophic level partitioning and illustrated the dominant contribution of C3 carbon to the diet of forest birds. Forest bird communities are dynamic over time and influenced by seasonal availability of resources.

Predicting the influence of land development on brown hyena (*Parahyaena brunnea*) movement and activity

I. Wiesel

Brown Hyena Research Project, P.O. Box 739, Luderitz, 9000, Namibia, strandwolf@iway.na

Brown hyenas occur at medium to high densities along the southern Namibian coast. Their home ranges are large and they travel 20 to 30 km per night. Food is found along beaches and at mainland Cape fur seal (*Arctocephalus pusillus pusillus*) colonies. This study's aim was to establish the importance of the coastal area and to assess the impact of development on brown hyena behaviour and habitat use. GPS telemetry revealed that use of the coastal area was high and that land development influenced hyena behaviour. Environmental management programmes are therefore adjusted regularly to review disturbance and conflict related issues.

What limits elephants? A modeling approach

B.R. Page¹ and T.G. O'Connor.²

¹*Bruce Page & Associates / University of KwaZulu-Natal, brupage@gmail.com*

²*Tim O'Connor & Associates / SAEON*

In 1997 we developed an age and state model to simulate the dynamics of the elephant population in Venetia-Limpopo Reserve. We evaluated the model after 14 years in terms of predictive ability and the underlying biology. Whilst model predictions were accurate, the biological veracity was not. We attempted to refine the model by establishing the sensitivity of model dynamics to different demographic variables and the sensitivity of these to climatic influences. We thus gained a better understanding of what limits elephants, and the data requirements to predict the effects of management on future numbers.

Interrelationship between ectoparasites and two hosts from South Africa: Namaqua rock mouse *Micaelamys namaquensis* and Eastern rock elephant shrew (*Elephantulus myurus*)

D. M. Fagir¹, E. Ueckermann², N.C. Bennett¹ and H. Lutermann¹

¹Department of Zoology and Entomology, University of Pretoria, Pretoria, 0028, South Africa, dmfagir@zoology.up.ac.za

²ARC Plant Protection Research Institute, Pretoria 0121, South Africa

Like most of the wild small mammals, the Namaqua rock mouse (*Micaelamys namaquensis*) and the Eastern rock elephant shrew (*Elephantulus myurus*) are associated with number of ectoparasites that belong to different taxa of Acari and Insecta. The present study aimed to investigate the variation of parasitic infestations and the parasite community that inhabits these two species. Both the Namaqua rock mouse and the elephant shrew are widely distributed throughout the in southern African sub-region and they share the same habitats (rocky outcrops). Accordingly they can be expected to be exposed to a similar diversity of ectoparasites. A total of 264 and 66 of the Namaqua rock mice and elephant shrews, respectively, were live-trapped and examined for ectoparasites in Ezemvelo Nature Reserve. We recovered 18 species of ectoparasites associated with the two species. Our findings implicates the Namaqua rock mice and the elephant shrews as hosts for economically important ectoparasite species such as *R. appendiculatus* a known vector of several livestock diseases such as the East Coast fever in cattle. Further exploration of the host-parasite dynamics of these two species may provide key information for management policies of such diseases in livestock.

Behavioural and endocrine correlates to the social organisation of the aardwolf, *Proteles cristata*, on Benfontein Nature Reserve

D. G. Marneweck¹, F. Dalerum^{1,2} and E. Z. Cameron³

¹Mammal Research Institute, Department of Zoology and Entomology, University of Pretoria, Pretoria 0002, South Africa, davidmarneweck@gmail.com

²Centre for Wildlife Management, Pretoria 0002, South Africa

³School of Zoology, University of Tasmania, Hobart, Tasmania, Australia

The study aims to assess how behavioural and endocrine axes are related to aardwolf spatial organisation. Male aardwolves have significantly larger home ranges than females and show a high degree of overlap with females. Field observations confirm a distinct mating season with an interesting change in scent mark behaviour from the non-mating season. Male home range utilisation changes between mating and non-mating seasons in response to receptive females localized throughout their range. Scats are currently being analysed to determine temporal endocrine fluctuations. All data confirm an interesting method of mating tactics employed with respect to space use, behaviour and physiology.

Causes and consequences of mammalian resource specializations

F. Dalerum^{1,2}, N.C. Bennett¹, E.Z. Cameron³, L. De Vries¹, A. Ganswindt¹, R. Kotze, C.W.W. Pirk¹,
D. Marneweck¹ and C. Theron¹

¹Mammal Research Institute, Department of Zoology and Entomology, University of Pretoria, Pretoria 0002, South Africa, davidmarneweck@gmail.com

²Centre for Wildlife Management, Pretoria 0002, South Africa

³School of Zoology, University of Tasmania, Hobart, Tasmania, Australia

The strategies with which animals utilize available food resources have received ample attention in ecological research. We conduct a field study on two ant and termite feeding specialists, the aardwolf (*Proteles cristatus*) and the bat-eared fox (*Otocyon megalotis*) on Benfontein to examine the evolutionary background for these mammals radiating into a specialized foraging niche, but also the ecological, physiological and behavioural consequences of their resource utilization.. I will summarize our first two years of research, and exemplify how a comparative field study can yield insights into ecological and evolutionary questions beyond what can be achieved with single species studies.

The impacts of diamond mining activities on dive success and breeding productivity of Damara Terns *Sterna balaenarum* in Southern Namibia

J. Braby¹, L. G. Underhill¹, R. E. Simmons and J-P. Roux

¹*Percy FitzPatrick Institute, University of Cape Town, Private Bag X3, Rondebosch 7701, South Africa,*

The Damara Tern *Sterna balaenarum* is a Near-threatened seabird that breeds in small colonies along the south-west African coastline. It is near-endemic to Namibia, and the breeding range includes the "Sperrgebiet", a restricted diamond mining area along the southern coast of Namibia that has recently been proclaimed a national park. A study was initiated to assess the impacts of mining, particularly the effects of associated sediment discharge into the sea, on the foraging success and breeding productivity of the Damara Tern at one mined locality, Elizabeth Bay. The study was conducted over two breeding seasons (2007/08, 2008/09) and at four breeding localities to compare dive success and breeding productivity between the mined locality, and three un-mined breeding localities. Parameters monitored were dive success, chick condition, breeding success and colony size. Elizabeth Bay held the smallest colony of breeding Damara Terns; nest numbers fluctuated significantly between the two breeding seasons at all four breeding localities. Discharging sediment into the sea where Damara Terns feed did not negatively affect dive success or body condition of chicks at Elizabeth Bay. Damara Terns dived more successfully in relatively clear waters at Elizabeth Bay indicating lower sediment discharge levels are favoured.

Behavioural thermoregulation in desert birds: How might patterns of landscape use buffer the effects of climate change for Kalahari birds?

R.O. Martin¹, S.J Cunningham¹, P.A.R. Hockey¹

¹*Percy FitzPatrick Institute, DST/NRF Centre of Excellence, University of Cape Town, Private Bag X3, Rondebosch 7701, South Africa, rowan.martin@uct.ac.za*

Climate models predict increasing temperatures in many of the world's hot deserts. To buffer high environmental temperatures, many desert birds adjust their behaviour to exploit fine-scale variation in microclimates within the landscape (e.g. patches of shade). However, with increasing temperatures birds are increasingly forced to trade-off thermoregulation against other activities, such as foraging. Using a combination of behavioural observations and measurements of microclimates within the landscape, we investigate the influence of temperature on landscape use in a variety of species in the Kalahari. These findings are used to develop predictions for the consequences of climate change for desert bird communities.

Physiological and behavioural responses to temperature and humidity in the White-browed Sparrow-weaver

B Smit¹, C Harding² and A.E McKechnie¹

¹*DST/NRF Centre of Excellence at the Percy Fitzpatrick Institute, Department of Zoology and Entomology, University of Pretoria, Pretoria, South Africa, smitbe@gmail.com*

²*DST/NRF Centre of Excellence at the Percy Fitzpatrick Institute of African Ornithology, University of Cape Town, Cape Town, South Africa*

Warmer temperatures associated with climate change could severely impact many bird species. We investigated physiological and behavioural responses to environmental variables in White-browed Sparrow-weavers in Tswalu Kalahari Reserve. Our findings show that body temperature and heat dissipation behaviours increased significantly with daily maximum temperature (range 25° to 38°C) and humidity. Daily field metabolic rate decreased significantly on hot days and is correlated with reduced activity levels. Daily water flux decreased significantly with temperature and increased significantly with humidity. Our results suggest that both temperature and humidity have significant effects on thermoregulation, water balance and daily activities.

Behavioural responses of Fiscal Shrikes in the Kalahari to high temperatures – implications in the face of climate change

S.J Cunningham¹, R.O. Martin¹, P.A.R. Hockey¹

¹*Percy FitzPatrick Institute, DST/NRF Centre of Excellence, University of Cape Town, Private Bag X3, Rondebosch 7701, South Africa, rowan.martin@uct.ac.za*

Global climate change has resulted in range and abundance changes, including extinctions, of species worldwide. Desert birds could be especially vulnerable to increases in temperature because many already live near the limits of their thermal tolerances. A case study of desert-dwelling Fiscal Shrikes (*Lanius collaris subcoronatus*) indicates that at higher air temperatures a shift in adult behaviour can result in a reduction in the rate of growth of chicks. These effects of temperature are already evident under current climatic conditions and suggest a mechanism by which birds of this type may be vulnerable to further climate change.

Spider Diversity of Tswalu Kalahari Reserve

R. Lyle¹ and A. S. Dippenaar-Schoeman²

¹*Ditsong Museum of Natural History, Pretoria, robin@ditsong.co.za*

²*ARC-Plant Protection Research Institute, Pretoria*

Tswalu Kalahari is the largest privately owned game reserve in South Africa form part of the Savanna Biome. It has been sampled for arachnids on several occasions. The most recent of trip was for the second phase of the South African National Survey of Arachnida project (SANSA), which aims to provide an inventory of the arachno-fauna for South Africa. To date 27 families represented by 48 genera and 58 species have been recorded from Tswalu. Of these 39 species (67%) are wanderers and 19 species (33 %) web dwellers. Of the wanderers 20 species are ground dwellers including some interested species of the families Ammoxenidae and Idiopidae while 19 species live on the plants including members of the Oxyopidae and Thomisidae. The biodiversity of Tswalu is compared with the rest of the Kalahari

Survey of Arachnids at Brenthurst Gardens, Preliminary Report

A.E.J. Leroy¹ and J-M. P. Leroy¹

¹*Spider Club of South Africa, info@spiders.co.za, leroyjmp@global.co.za*

In February 2011 a survey of the arachnids at Brenthurst Gardens was started. It is proposed to run to end in March 2012 so that all seasons are covered. Adult spiders are collected, photographed and catalogued and voucher specimens will eventually be deposited in the National Collection of Arachnida. The initial objectives are to produce first a checklist of spiders and other arachnids and later an illustrated booklet of those found there. The garden guides are being taught basic spider identification and a reference handbook for them has been started and will be added to as new species are identified.

The Heteroptera of the Venetia Limpopo Nature Reserve with some remarks on the dynamics of insect populations

D.H. Jacobs

Tshwane University of Technology, dawidhj@mweb.co.za

The Heteroptera (true bugs) are a large and diverse group of insects with 57 families and about 2200 species recorded from southern Africa. The Venetia Limpopo Nature Reserve and adjacent areas was surveyed on three occasions during 2009/11. During the surveys 300 species belonging to 36 families were recorded and a further 5 species were collected by Duncan MacFadyen. This indicates an unexpectedly high biodiversity in the region. It is estimated that they represent about 75% of the species occurring in the area. At least 7 (and possibly about 13) of the species are undescribed and 7 represent new records for South Africa. The host plants of many species (several unknown before) and other biological data were also recorded. The surveys of February 2010 when 158 species were recorded and February 2011 when 190 species were recorded are compared. Sixty three of the species recorded in 2010 were not found in 2011 and 95 of the species recorded in 2011 were not collected in 2010 (95 species were recorded in both surveys). This result indicates that different species are present or dominant in different years and denotes unpredictable population dynamics. It is concluded that surveys should be done in more than one year in order to reflect the biodiversity of an area.

Spider diversity of the Grassland Biome

A. S. Dippenaar-Schoeman¹, C. R. Haddad² and R. Lyle³

¹*ARC-Plant Protection Research Institute, Pretoria, DippenaarA@arc.agric.za*

²*Department of Zoology & Entomology, University of the Free State*

³*Ditsong Museum of Natural History, Pretoria*

The Grassland Biome is found on the high central plateau of South Africa, including large parts of Gauteng, Mpumalanga, Free State, parts of North West, the inland regions of KwaZulu-Natal and the Eastern Cape. This biome is dominated by a single layer of grass and absence of trees, except in a few localised areas in grassland plains, and hillsides and riparian habitats. There are many unique spiders found having adaptations in body form, colour and web and retreat construction. After completing the second phase of the South African National Survey of Arachnida (SANSA), information is now available on the diversity of the spiders of the Grassland Biome. A total of 56 families represented by 245 genera and 636 species are presently known from the grassland with a total of 72 species from 25 families been grassland endemics. A total of 310 Grassland Biome sites have been sampled including several long term surveys. Ongoing studies include a long term survey in Sani Pass sampling spiders from 16 gradient sites to look at the effect of climate change on spiders. Surveys are also underway looking at spider assemblages in leaf litter, tree and shrub foliage in grassland. A book on the spiders of the Grassland Biome is being prepared.

Demons of the sand and other lacewings of Tswalu - towards creating an information resource

M.W. Mansell, C.H. Scholtz, C.L. Sole and J.B. Ball

Scarab Research Unit, Department of Zoology & Entomology, University of Pretoria, Pretoria, 0002, mansel@mweb.co.za

Tswalu Kalahari Reserve has a rich and diverse fauna of antlions and other lacewings (Insecta: Neuroptera). This order comprises insects that all play significant roles in the maintenance of ecosystems through their two major constituent functional groups, pollinators and predators, as well as providing sensitive indicator species for conservation assessments. Results of preliminary surveys of the lacewings of Tswalu were presented at the previous Diamond Route Conference in 2010. The current presentation aims to present a discussion model for a resource to provide easy access to information on the Tswalu lacewings. It also reviews some protocols for ethical scientific sampling of biological entities and the subsequent processing of specimens, their preparation, curation and ultimate documentation.

Angolan Biodiversity Conservation Strategies – the Value of Partnerships

B.J. Huntley

Private, brianjhuntley@googlemail.com

Angola is a country slightly larger than South Africa, with the greatest diversity of WWF eco-regions of any African country – from the ultra-desert of the Namib to the rainforests of Cabinda, across extensive miombo and mopane woodlands and with isolated Afromontane forests along the Angolan escarpment. Preliminary surveys of the entire country conducted in the early 1970s revealed the need for at least 10 new protected areas in biodiversity hotspots across the country. Based on the prior studies, and further field work since 1992, a protected areas expansion strategy has recently been approved by the Angolan Cabinet. These proposals are now being followed by detailed multi-taxa surveys of selected sites, through the cooperation of several universities, research institutes and independent professionals. With significant logistic and operational support from De Beers Angola Prospecting, two expeditions, to the Huila/Namib and Lunda Norte, were successfully completed in early 2009 and in May 2011. This presentation will outline the biodiversity of Angola and indicate future lines of approach to support the Angolan Ministry of Environment in the preparation of detailed proposals for a further 10 protected areas.

Results of 5 years of vegetation monitoring in degraded grasslands of Ezemvelo / Telperion: A critical assessment

D.J. Krynauw^{1,2} and D. G. C. du Plessis²

¹*Tshwane University of Technology, Department of Nature Conservation: Krynauwdj@tut.ac.za*

²*South African Vegetation Services*

In modern wildlife management monitoring is regarded as a key management strategy, needed by wildlife managers to try and understand and track the effects of management actions and natural events. Monitoring of vegetation is not easy, as it requires robust techniques, and substantial inputs by trained dedicated personnel. A unique vegetation monitoring program was initiated on Ezemvelo and Telperion in 2007, inspired and supported by the Diamond Route. These surveys are done annually at the end of summer with a team of selected TUT Nature Conservation students. One of the major and most dynamic plant communities in Ezemvelo-Telperion is the Degraded Grassland plant community. This is a key plant community in terms of management, heavily impacted by game, and subject to substantial successional and invasive ecological processes. These areas were seriously degraded in the past, mainly due to agricultural activities, and are now hopefully on their way to recovery under a wildlife management regime. It was considered crucial to monitor this plant community in detail, and to assess the ecological trends and dynamics within this plant community, as well as its rate of recovery. This presentation discusses the findings obtained regarding the changes within this key plant community, as recorded over a 5 year period of vegetation monitoring. Aspects covered include herbaceous layer changes and dynamics, invasion of woody problem plants, assessments of the veld condition, radical veld recovery after destructive events, and the influence of climatic and edaphic factors on the vegetation.

Ezemvelo frithias act as benchmark for translocated populations of this endangered species.

E.Kruger¹, S.J. Siebert¹

¹*School for Environmental Sciences and Development, Northwest University Potchefstroom Campus, 20569912@nwu.ac.za*

A population of *Frithia humilis*, growing on a licensed mining plot near Witbank, was saved from obliteration in 2009. These red listed (endangered) succulent plants had to be translocated to three new, suitable habitats. Monitoring has been conducted since 2010 to determine the success of the translocation project. Data on population composition, flowering and fruiting were gathered. The natural frithia population at Ezemvelo Nature Reserve is being used as a control population, doubling as a benchmark for the translocation project, while simultaneously providing valuable statistics for reserve management. Thus far, however, translocated populations are far from reaching the target.

Does frost damage impact the growth of *Colophospermum mopane* in Limpopo Province, South Africa?

M A Whitecross

University of the Witwatersrand, mwhitecross@googlemail.com

The mechanisms behind *Colophospermum mopane* damage and recovery after a frost event in the Venetia Limpopo Nature Reserve were investigated. An elevation gradient was used to represent a gradient of increasing frost severity and to determine the extent of frost damage, and the consequences for tree structure and demography along this gradient. Smaller, coppicing trees were found at lower elevations; with taller, non-coppicing trees at higher elevations. This suggests that trees exposed to frequent frosts suffer repeated top kill which decreases height over time. Frost influences the structure of this *C. mopane* population and may be linked to the absence of *C. mopane* at high latitudes in Southern Africa.

Describing the new species of *Cytinus visseri*, Namaqualand

P.M. Burgoyne^{1,2}

¹*South African National Biodiversity Institute, Private Bag X101 Pretoria, 0001, South Africa*

²*Research Fellow UNISA, Department of Agriculture and Environmental Sciences, College of Environmental Sciences, Private Bag X6 Florida, 1710, Roodepoort, South Africa, p.burgoyne@sanbi.org.za*

When describing the new species of *Cytinus visseri* Burgoyne from Long Tom Pass all herbarium material of *Cytinus* was requested on loan from the Cape herbaria. Once this material had been examined it was discovered that a few of the sheets comprised plants that were much more robust than the material known as *C. sanguineus* (Thunb.) Fourc. Fresh material of this new species was sought for years along the Namaqualand coast with no luck, but in 2010 herbarium specimens and pickled material was found, thus enabling a description of this new species together with characters distinguishing it from *C. sanguineus*. In this paper these aspects of this new Namaqualand species will be discussed.

Diamond Route Cultural Sites, Tourism and Sustainability: Recognizing the importance of Local History on Diamond Route Properties

A. Batchelor-Steyn

Private, anna.steyn@gmail.com

Landscapes have been shaped by people, and visitors are excited at meeting the signs of people from the past, including the more recent past. Yet many objects and features that could remind us of the more recent past are removed from reserves as part of cleaning up actions to return the reserves to 'pristine' landscapes. In addition, a rift remains between the official perception of the history of the reserve, as viewed by officials, and the full story. While the main aspects and more obvious cultural features encountered on the reserves are recognized in management plans, the local stories that exist in the memories of the people who lived on the land, and features associated with them, are often overlooked and do not receive appropriate recognition or protection. In landscapes such as the Limpopo valley, Tswalu and Ezemvelo the more dramatic natural features and episodes of history are recognized, while the documentation of signs, memories and cultural practices of recent people fail to receive prominence. It is essential that such initiatives should receive formal allocation within the management framework and that the resultant documentation should receive recognition within the evaluation framework. Recognition of the importance of the history of local people is likely to result in personal value attribution among participants and to a sense of stewardship that will strengthen sustainability.

The Historical Archaeology of Mapungubwe: The Venda and Machete

T. N. Huffman and J. du Piesanie

School of Geography, Archaeology & Environmental Sciences, University of the Witwatersrand, Johannesburg, Thomas.huffman@wits.ac.za

In the Mapungubwe landscape, the Khami phase grades into the Historic period. However, in contrast to the several thousand people living on cattle posts and in agricultural villages during the Khami period, 19th century Venda capitals virtually housed the entire chiefdom, totalling only some 350 people. A slow process of acculturation led the Venda-speaking Machete chiefdom to become Sotho. Along with acculturation, the Machete chiefdom was affected by various events: internal strife, the purchase of farms in the 1870s, the Anglo-Boer War from 1899 to 1902 and the search for diamonds shortly thereafter. When Mapungubwe was discovered in the early 1930s, the chiefdom had already disintegrated, and the people spoke Sotho.

The effect of a nature experience on eco-alienated and at-risk youth

S. Combrink¹ and N. de Crom²

¹*Karos & Kambro Youth Development Organization, scombrink@lantic.net*

²*Department of Nature Conservation, Tshwane University of Technology*

This study explores the influence of exposure to nature on the well-being of youth at risk: young individuals from dysfunctional families and communities. Karos and Kambro act as a driving force to expose these young people to nature to establish a behaviour change. The main objective is to profile the personal and social meaning of an integrated nature/cultural experience on youth-at-risk. The majority of participants experienced a spiritual connection while being in nature, learning by applying characteristics from nature to their own lives. Through contact with nature and interpretation of its features, troubled youth are able to heal, develop new skills and contribute to bettering their lives and their communities.

MERU - pioneering Consciousness-Based education in business and environmental management education.

T. Blecher¹ and P. Mabila¹

¹*Maharishi Ezemvelo Rural University, Maharishi Institute, tblecher2002@gmail.com*

Research conducted in Community Individual Development Association in 9 township schools in Alexandra Township, in CIDA City Campus, Maharishi Institute, and compared with international benchmark research covered in peer-reviewed scientific journals. Community Individual Development Association has a 30-year history which has included creating several free-access educational institutions, including the Maharishi Institute (2007) and CIDA City Campus (2000, now independent). Over this period, over 5,500 young people in South Africa out of poverty, who are now working in jobs, earning over R230 million together in annual salaries. The paper presented will show research conducted by the organisation in different contexts and compare findings with international benchmarks, explore scientific findings in the context of a unified field of natural law connecting the human genus as well as all other species and explore the relationship of these 'ultra-modern learning approaches' with the development of ethics, values, and an appreciation of the environment and love of nature.

Chemical and Biological Implications of Acid Mine Drainage Pollution on Aquatic Ecosystems in the Witbank Coalfield, Mpumalanga

R .S. Pride¹ and R. G. Antrobus²

¹ *University of the Witwatersrand, Independent Consultant, roxanne.pride@knotion.net*

² *University of the Witwatersrand, Prime Resources*

Contaminated mine water, formally known as acid mine drainage (AMD), that drains from operating and defunct coal mines result in a number of detrimental effects on aquatic ecosystems. The main objective of this study was to assess the chemical and biological state of the Kromdraai and Saalklapspruit sub-catchments. With different intensities of contamination, these two sub-catchments feed into the Wilge River which flows through Ezemvelo Nature Reserve, and ultimately flows into the Olifants River. This study showed that the Kromdraaispruit was heavily polluted by AMD and the Saalklap system showed considerable variation depending on the presence of and distance from mining activity.

The possible effect of solar energy facilities on birds

H. A. Smit¹, J. J. Smallie² and A. R. Jenkins³

¹ *E-mail for correspondence: Conservation Manager/ Oppenheimer Fellow of Conservation, BirdLife South Africa, conservation@birdlife.org.za*

² *Wildlife Energy Programme, Endangered Wildlife Trust*

³ *Avisense Consulting*

South Africa is one of the top ten countries in the world most suited for the generation of solar energy; this is due to the high percentage of incoming shortwave radiation. South Africa has also been identified as one of the top ten developing countries which need to significantly reduce its carbon emissions. BirdLife South Africa supports the use of renewable energy resources, including that of solar energy generation. There are however, aspects of the current avifaunal impact assessments for Solar Energy Facilities which are, not in the best interests of the country's birds. The main concerns with the Photo Voltaic and Concentrated Solar Plant farms are the associated displacement, or the exclusion, of nationally and/or globally threatened, rare, endemic, or range-restricted bird species from important habitats.

The biology and conservation of the White-bellied Korhaan *Eupodotis senegalensis* (Vieillot 1820) in South Africa

D. du Plessis^{1,2}, C. T. Symes¹ and H. A. Smit²

¹*School of Animal, Plant & Environmental Sciences, Faculty of Science, University of the Witwatersrand, kwagga.vrystaat@gmail.com*

²*BirdLife South Africa, P.O. Box 515, Randburg 2125, Gauteng, South Africa*

This study seeks to address issues of conservation priority for the local subspecies of White-bellied Korhaan *E. s. barrowii* (J.E. Gray 1829), whose grassland habitat is under threat. Its biology, its taxonomic status, and the interplay of environmental and anthropogenic factors that affect its continued survival and long-term conservation will be investigated. By understanding the different aspects of the biology, as well as the taxonomic status, of this species in South Africa, biologists, conservation bodies and decision-makers will be able to make informed decisions about the conservation of this important grassland species and related habitats in which it occurs.

Hard boundaries influence carnivore diet and prey selection – a case study of African wild dogs in a fenced reserve in South Africa

H. T. Davies-Mostert¹, M. G. L. Mills³ and D. W. Macdonald²

¹*Endangered Wildlife Trust, Johannesburg, South Africa & Wildlife Conservation Research Unit, Recanati-Kaplan Centre, Department of Zoology, Oxford University harrieta@ewt.org.za,*

²*Wildlife Conservation Research Unit, Recanati-Kaplan Centre, Department of Zoology, Oxford University*

³*Kgalagadi Cheetah Project, Tony and Lisette Lewis Foundation*

This study investigated the influence of perimeter fences on the diet and prey selection of a reintroduced population of African wild dogs *Lycaon pictus* at the De Beers Venetia Limpopo Nature Reserve (316 km²). Perimeter fences enable wild dogs to capture animals of bigger size classes and better condition than they would otherwise. By enabling coursing predators like wild dogs to capture prey that would otherwise have escaped, fences are likely to reduce the compensatory nature of predation, causing shifts in predator-prey dynamics that could influence the ability of small reserves to support predator populations in the long-term.

Wildlife road traffic accidents: a new technique for counting flattened fauna

Wendy Collinson^{1,2}, Harriet Davies-Mostert¹, Ric Bernard², Dan Parker², Brian Reilly³

¹*Endangered Wildlife Trust, South Africa; wendyc@ewt.org.za*

²*Wildlife & Reserve Management Research Group, Department of Zoology & Entomology, Rhodes University, South Africa*

³*Department of Nature Conservation, Tshwane University of Technology, South Africa*

Despite recognition that roads are a threat to biodiversity, road density and traffic volumes continues to increase. Huge budgets are devoted to the construction and upgrading of roads with little or no allocation to mitigation measures to protect fauna. There is much data on human road casualties, but little statistical data is available in South Africa at present on wildlife roadkill. The Endangered Wildlife Trust's Roadkill Research and Mitigation Project (EWT-RRAMP) has developed a Rapid Assessment Protocol for the detection of roadkill. This is the first time a method for roadkill detection has been standardised. The Rapid Assessment Protocol outlines the most economical and time-saving approach to assessing Wildlife Road Traffic Accident (WRTA) rates. This includes the best speed at which to drive, direction in which to travel, time of day to sample, and how frequently to drive as well as how far to drive. The Rapid Assessment Protocol is currently being tested in order to obtain baseline WRTA rates in one important conservation area in South Africa, namely the Greater Mapungubwe Transfrontier Conservation Area.

The South African National Survey of Arachnida (SANSA)

A. S. Dippenaar-Schoeman¹ and C. R. Haddad²

¹ *Agricultural Research Council, Plant Protection Research Institute, Pretoria, dippenaar@arc.agric.za*

² *Department of Zoology and Entomology, University of the Free State, Bloemfontein*

The South African National Survey of Arachnida (SANSA) was initiated in 1997, with the main aim of documenting the arachnid fauna of South Africa at a national level. This inventory and conservation assessment project was dedicated to unify and strengthen biodiversity research on spiders, and the other arachnid fauna of South Africa. Due to extensive collecting done by SANSA field work managers, specimen by-catches from other research projects, student projects, and public participation in collecting specimens, more than 40 degree square grids were sampled in previously been poorly sampled areas. All these data were used to compile this first atlas of the spider species of South Africa, including maps of each species. Following SANSA II, 70 spider families, 463 genera and 2010 species are presently known from South Africa, representing 4.8% of the world fauna. Of the 2010 spider species, 1220 (61%) are endemic to the region, one of the highest endemism levels in the world. During the SANSA II, a total of 116 new species were discovered and described, and more than 50 are in the process of being described. Information on habitat requirements showed that the Savanna Biome is the most diverse, with 1207 species from 62 families, followed by the Grassland Biome with 645 from 56 families. Several actions are planned, such as Red Listing of species; a handbook series for all the biomes; publication of the atlas; and several scientific papers.

Aquatic biodiversity and baseline bio-monitoring assessment for Ezemvelo and Telperion Nature Reserve, Gauteng-Mpumalanga (2008 to 2009)

A. R. Deacon¹ and P. J. Kotze²

¹ *Private Ecological Consultant, andrewd@mpu.co.za*

² *Clean Stream Biological Services*

Biological communities reflect overall ecological integrity by integrating different stressors over time, thereby providing a broad measure of their aggregate impact. The monitoring of biological communities therefore provides a reliable ecological measure of fluctuating environmental conditions. In order to determine ecological integrity of the rivers in the vicinity of Ezemvelo-Telperion Nature Reserve (ETNR), a baseline biomonitoring survey was conducted on selected sites during the dry and wet seasons of 2008/9. Various protocols were used to assess riverine habitat condition, water quality, in-stream toxicity, aquatic macro-invertebrates (SASS5), fish assemblages and riparian fauna (frogs, reptiles, birds and mammals). This study highlighted some areas of concern, which pose a risk to the aquatic ecosystems inside ETNR, and provided baseline information against which future changes can be measured.

The function of the public good of sociable weavers

R.E. van Dijk and B. J. Hatchwell

*Department of Animal and Plant Sciences, University of Sheffield, United Kingdom,
R.van.Dijk@sheffield.ac.uk*

The tragedy of the commons is a widespread phenomenon, observed at many levels of social organisation. Yet, it is still poorly understood how the tragedy may be averted through interactions within a social group. Our aim was to investigate the function of the extraordinary communal nests of sociable weavers, *Philetairus socius*, and the factors influencing access to this public good. We demonstrate a within-colony spatial structure of the thermoregulatory benefits of the communal nest. Additionally, we show that older birds occupy the best positions, indicating competition for access to the public good, which may profoundly influence the colony's social organisation.

Conservation Leadership programme – over eleven years of developing future conservationists

G. Wilson

Conservation Leadership Programme, Endangered Wildlife Trust, Parkview, 2122, graemew@ewt.org.za

In 2000, the Endangered Wildlife Trust (EWT) created the Conservation Training Project and over its eleven years of operation has become a flagship project for mentorship and skills development for future conservationists. The project aims to prepare young conservation students with the necessary sector required skills and experience to take up positions within the sector and make a lasting conservation impact. The Conservation Training Project skills development activities were moved to have taken place on Telperion since 2008. Around 64 nature conservation students have contributed from this growing EWT / Diamond Route Partnership. The skills development activities conducted on the nature reserve comprise of issues such as soil conservation, alien plant management, fire management and natural resource survey techniques. These activities are of mutual benefit to both parties.

Home range sizes of aardwolves: the influence of prey abundance on an extreme specialist

J.L. de Vries¹, P.W. Bateman², N.C. Bennett¹, E.Z.Cameron³, F. Dalerum⁴ and C.W.W. Pirk⁵

¹*Mammal Research Institute, Department of Zoology and Entomology, University of Pretoria, Pretoria, 0002 South Africa, jldevries@zoology.up.ac.za*

²*School of Veterinary and Biomedical Sciences, Murdoch University, Murdoch WA 6150, Australia*

³*School of Zoology, Hobart Campus, University of Tasmania, Tasmania, Australia*

⁴*Centre for Wildlife Management, Hatfield Experimental Farm, University of Pretoria, Pretoria, 0002 South Africa & Mammal Research Institute, Department of Zoology and Entomology, University of Pretoria, Pretoria, 0002 South Africa*

⁵*Social Insect Research Group, Department of Zoology and Entomology, University of Pretoria, Pretoria, 0002 South Africa*

Despite extensive knowledge on the diet of aardwolves the effect of variations in prey availability on home range sizes has not been reported. Home range sizes were determined by calculating 95 % kernels for five individuals and comparing this to the number of termite mounds within each home range. Results indicate the density of termite mounds had an effect on the sizes of home ranges occupied by individuals and that home range sizes increased with decreased prey abundance. In addition we found overlaps in home ranges between neighbouring individuals and den sharing between males, results not previously found.

Black-footed Cat (*Felis nigripes*) research: Recent Outcomes

B. Wilson¹, A. Sliwa², N.Lamberski³, J. Herrick⁴ and A.Lawrenz⁵

¹*Black-footed Cat Working Group, Zoology Department, McGregor Museum, Kimberley, RSA, berylwa@museumsnc.co.za or berylwa@gmail.com or bfc.sightings@gmail.com*

²*Cologne Zoo, Cologne, Germany*

³*San Diego Wild Animal Park, California, USA*

⁴*University of Illinois, Illinois, USA*

⁵*Wuppertal Zoo, Wuppertal, Germany*

The black-footed cat is a small, vulnerable felid restricted to southern Africa. It is listed on Appendix 1 of CITES, and ranked as the most vulnerable of the Sub-Saharan cat species by the IUCN/Species Survival Commission Cat Specialist Group. The species has been the focus of a multifaceted investigation on Benfontein since 2004. Interesting behavioural data was collected during the past 6 months on denning, home range locations and reproduction for 3 females; dispersal of a young male, and ranging via GPS satellite tracking of a mature male. The first soft-release of captive cats was overseen by Dr Sliwa on Ezemvelo Nature Reserve.

Rhino conservation and the Diamond Route

J. A. Shaw¹

¹*Centre for African Ecology, School of Animal, Plant and Environmental Sciences, University of the Witwatersrand, Wits, 2050, korannaberg@gmail.com*

South Africa currently holds approximately 90% of the continental white (*Ceratotherium simum simum*) and 80% of the black (*Diceros bicornis*) rhinoceros populations. Since 2007 there has been a dramatic increase in illegal killing of rhinos for their horns. These poaching losses can be mitigated to some extent by biological management of existing populations and establishment of new populations to maximise overall growth rates. Black and white rhino are currently present on two Diamond Route properties and there is potential for introduction to a third area. A series of investigations are being designed to assess black and white rhino habitat capacity and potential for population growth within these areas. Maximum productive habitat capacity for black rhino will be assessed using a model developed at Tswalu Kalahari Reserve. Collaboration in rhino monitoring and security activities between Diamond Route reserves will also facilitate management decisions and capacity building. Private landowners have been identified as key role players in meeting regional and national rhino conservation goals. Development of rhino conservation management plans integrating biological management, monitoring and protection of rhino populations, will enable Diamond Route properties to continue to aid the ongoing survival of these magnificent species.

The dynamics and implications of workload sharing in white-browed sparrow weaver societies

A. Young, D. Cram, X. Harrison, L. Walker and J. York

Centre for Ecology and Conservation, University of Exeter Cornwall Campus, Tremough, Cornwall, TR10 9EZ, a.j.young@exeter.ac.uk

In cooperatively breeding societies, non-breeding group members typically help to rear the offspring of the dominant breeding pair. While the short-term effects of such helping for parents and offspring are well studied, their downstream consequences for life-time reproductive success are poorly understood. Addressing this shortfall in our understanding is one of the central aims of our long-term field study of cooperatively breeding white-browed sparrow weaver societies in Tswalu Kalahari Reserve. Our work has already demonstrated that helpers increase the total care provided to broods, but that they also allow parents, particularly mothers, to lighten their own workloads. This workload lightening has a marked effect on the reproductive success of mothers by allowing them to lay more clutches per year and to lay heavier eggs in each – the first finding of its kind. Our ongoing work now seeks to understand (i) how ‘helped’ offspring benefit in the short and long-term from hatching from a heavier egg and receiving more care as nestlings, and (ii) how this workload lightening impacts upon the survival of mothers and their rates of ageing. Given its unusual tractability for long-term integrative research of this kind, the sparrow weaver project is ideally placed to advance our understanding of the implications of sociality for the fitness of individuals.

Occurrence of *Varroa destructor* and various diseases in *Apis mellifera scutellata*, South Africa

U. Strauss¹, H. Human¹, V. Dietermann^{1,2}, R.M. Crewe¹ and C.W.W. Pirk¹

¹ Social Insect Research Group, Department of Zoology and Entomology, University of Pretoria, Pretoria 0002, South Africa; cwwpirk@zoology.up.ac.za

² Swiss Bee Research Centre, Agroscope Liebefeld-Posieux Research Station ALP, 3003 Bern, Switzerland.

The ectoparasitic mite *Varroa destructor*, diseases and environmental factors have been identified as possible causes of honeybee colony losses worldwide. In South Africa, no large-scale colony losses have been observed thus far despite the presence of *Varroa* mites and honey bee diseases. *Varroa* mites were introduced into South Africa 14 years ago and even though *Varroa* mite infestation levels were very high during the initial stages after introduction, honeybees of South Africa are currently considered to be resistant towards these mites. We assess the current health status of *Apis mellifera scutellata* colonies in terms of pest and disease prevalence by testing for 9 viruses, 11 other diseases and pests as well as determine the *Varroa* infestation levels.

Invertebrate Ecotourism

J. Leeming

Scorpion Adventures CC, Jonathan@scorpions.co.za

As lodges in big 5 areas compete for getting “bums-in-bed” there is a need to offer guests more than just chasing big 5 from a vehicle. More sophisticated interests as a result of wildlife documentaries, magazine articles and the growth of natural history books means that today’s tourist is more educated than ever before. Expectations from guests have also broadened to include not only larger animals but also the smaller aspects of nature that have been traditionally overlooked. The sheer number of invertebrates in every environment offers a fascinating aspect to enhance the guests experience and offer real value. We investigate invertebrate ecotourism in terms of implementation, guidelines and benefits to Southern African lodges.

Can yellowfish behaviour help us manage the Vaal River?

F.J. Jacobs¹, G.C. O'Brien¹, L. Nel² and P. De Villiers³

¹*School of Environmental Sciences and Development, North West North University, Potchefstroom Campus, Private Bag X6001, Potchefstroom, 2520; 20718659@student.nwu.ac.za*

²*Centre for Aquatic Research, Department of Zoology, University of Johannesburg, P.O. Box 524, Auckland Park, 2006*

³*Scientific Services, Cape Nature, Private Bag X5014, Stellenbosch, 7600*

The Vaal River is one of Africa's most utilised river ecosystems, providing water to, and removing wastes from, the so-called economic heart of South African economy namely Gauteng. Although the social and economic values of the Vaal River are widely documented, the ecological value of the system is relatively unknown. Due to excessive use, some components of the Vaal Rivers ecosystem are under threat. This includes the sustainability of some populations of fishes in the system. The Vaal River yellowfishes provide economic and social values to users and are of great ecological value to South Africans. One of the two species of yellowfish that occur in the Vaal River, the Orange-Vaal largemouth yellowfish (*Labeobarbus kimberleyensis*), is currently listed as a threatened or protected species. In addition both yellowfishes are currently used as indicator species in the management of various components of the Vaal River ecosystem. In this study biotelemetry methods using radio telemetry have been carried out to characterize the behaviour of the Vaal River yellowfishes (*L. kimberleyensis* and *L. aeneus*) for the conservation and management of the Vaal River.

Are Schroda Dam Tigerfish eating themselves to death?

G.C. O'Brien¹, Nico Smit¹ and F.J. Jacobs¹

¹*School of Environmental Sciences and Development, North West North University, Potchefstroom Campus, Private Bag X6001, Potchefstroom, 2520 gordon.obrien@nwu.ac.za*

Tigerfish (*Hydrocynus vittatus*) were relocated into the Schroda Dam in the 1991 to establish a refuge population of this now threatened species for conservation regional conservation purposes. Within five years the pioneering population began to breed successfully and now in 2011 a large healthy population of Tigerfish occupies the dam. Although the population is currently considered to be in a healthy, stable state numerous individuals have been captured that are in a poor condition. This study was carried out to assess the suitability of Schroda Dam for Tigerfish with specific reference to the feeding biology of the Tigerfish population. Findings of the study reveal that although the Tigerfish population is currently in a healthy state, excessive predation has caused the population to become dependent on external sources of protein. This includes migrating African Palm Swifts which actively targeted. These findings suggest that the population viability may not be stable and that management intervention may be required to stop local Tigerfish population from eating themselves to death.

Hyena, coprolites, pollen and past ecosystems

Y. Fernández-Jalvo¹, L. Scott², G. Gil-Romera³, F. Neumann^{4, 5}, J. Brink⁶, L. Rossouw⁷, J.S. Carrión⁸ and G. Avery⁹

¹*Department of Palaeobiology. Museo Nacional de Ciencias Naturales (CSIC). Madrid. Spain*

²*Department of Plant Sciences. University of the Free State, Bloemfontein. South Africa*

³*Instituto Pirenaico de Ecología (CSIC). Zaragoza, Spain*

⁴*Bernard Price Institute for Palaeontological Research, University of the Witwatersrand. South Africa*

⁵*Forschungsstelle für Paläobotanik, University of Münster, Germany*

⁶*Florisbad Quaternary Research, National Museum. Bloemfontein. South Africa*

⁷*Department of Archaeology, National Museum, Bloemfontein, South Africa.*

⁸*Department of Plant Biology, Faculty of Biology, University of Murcia, Spain.*

⁹*Natural History Dept, Iziko South African Museum, Cape Town, South Africa.*

Coprolites (fossil dung) have previously been considered as pollen traps representing past conditions in changing ecosystems. The main objective of our project in Tswalu Kalahari is to describe seasonal changes in pollen contents in modern scats as an aid to interpretation of coprolites. Firstly, we look for possible differences between pollen contents (diversity and abundance) in scats and the dust/soil near them. This is seen as equivalents for coprolites and sediment in which they occur in fossil sites and will elucidate the nature of pollen trapping in coprolites. Secondly, we compare outermost layers, of scats, which most likely are influenced by airborne pollen that settles on the scat surface, and the inner content that is coming from the animal's diet and represents different pollen sources.

Understanding issues key to the long-term survival of Namaqua *Pterocles namaqua* and Burchell's Sandgrouse *P. burchelli*

A. Berruti¹ and S.M. Berruti^{1,2}

¹*African Gamebird Research Education and Development Trust, agred@netdial.co.za*

²*School of Environmental Sciences & Development, North-West University*

The low breeding success of Namaqua Sandgrouse (about 10%) is regarded as the key issue in its long-term survival. However, variable rainfall may produce very successful breeding events (66%) This study aims to assess 'average' recruitment by identifying 1st year birds using soft-part face colouration, allowing rapid sampling of populations at waterholes over time. Initial work shows recruitment rates of 22% in Burchell's Sandgrouse at Tswalu. In both species at Tswalu, diet is simple, comprising mainly 3-4 legumes. Identification of these legumes is a critical precursor to assess the impact of extensive game and domestic stock ranching on food availability to sandgrouse in a further three-year study.

Developing Mine Restoration Protocols for the Hudson Bay Lowland

D. Campbell, A. Corson, K. Garrah, K. Bergeron and C. Laurin

Mirarco and Department of Biology, Laurentian University, Sudbury, Canada, dcampbell@mirarco.org

The Hudson Bay Lowland is a vast subarctic peatland occupying 3.5% of Canada. It also has an active diamond mine, the De Beers Canada Victor Mine, and promising deposits in the nearby Ring of Fire for chromium, nickel, copper and gold. Our objective is to develop mine restoration protocols for this region. Here we present a summary from four studies that begin this process at the Victor Mine: 1) peatland restoration trials, 2) reference conditions for new uplands, 3) developing a soil from diamond mine wastes, and 4) selecting suitable native species for restoration. These studies are providing a sound foundation for future research.

Groundwater – Surface Water Interactions in Catchments of the Hudson Bay Lowlands

J. Orlova¹ and B. Branfireun²

¹Dept. of Geography, University of Western Ontario, London, Ontario, N6A 3K7, jorlova@uwo.ca

²Dept. of Biology, University of Western Ontario, London, Ontario, N6A 3K7

The hydrology of extensive peatlands in the Hudson Bay Lowlands in Canada's North remains relatively unexplored. The study site near the De Beers Victor Mine in the Attawapiskat River basin is characterized by a continuous peat layer underlain by low conductivity overburden, overlying a Silurian limestone aquifer. Geology controls the complex relationship between groundwater and surface-water systems. This study addresses the relative contributions of peatland runoff and deep groundwater to streams in peatland catchments, using a chemical mixing approach. Assessing variability in stream water chemistry and water sources provides insights into the sensitivity of these catchments to observed and projected changes in climate and land-use.

Predicting Caribou Habitat Use in the James Bay Lowlands

M.E. Taylor and M. Hazell

AMEC Earth & Environmental, mark.e.taylor@amec.com

Radio telemetry data from boreal woodland caribou (*Rangifer tarandus*) in the James Bay lowlands were collected from 2004 to 2010. All animals were collared within 60 km of the Victor Mine, located 100 km inland from James Bay. Daily location data were collected and downloaded via the Argos satellite system. The home ranges of these 21 animals extended from the shores of James Bay and Hudson Bay as far west as the Nelson River, Manitoba, and ranged from approximately 6,000 to 113,000 km². Female caribou showed strong fidelity to calving grounds, using the same core areas year after year and these calving areas occurred in two general areas. However, the same level of site fidelity was not observed in over-wintering areas which were spread across the lowland areas. The poster examines the similarities of overwintering areas and calving areas between the two groups of animals over this five year period.

Wildlife road traffic accidents: a new technique for counting flattened fauna

Wendy Collinson^{1,2}, Harriet Davies-Mostert¹, Ric Bernard², Dan Parker², Brian Reilly³

¹Endangered Wildlife Trust, South Africa; wendyc@ewt.org.za

²Wildlife & Reserve Management Research Group, Department of Zoology & Entomology, Rhodes University, South Africa

³Department of Nature Conservation, Tshwane University of Technology, South Africa

Despite recognition that roads are a threat to biodiversity, road density and traffic volumes continues to increase. Huge budgets are devoted to the construction and upgrading of roads with little or no allocation to mitigation measures to protect fauna. There is much data on human road casualties, but little statistical data is available in South Africa at present on wildlife roadkill. The Endangered Wildlife Trust's Roadkill Research and Mitigation Project (EWT-RRAMP) has developed a Rapid Assessment Protocol for the detection of roadkill. This is the first time a method for roadkill detection has been standardised. The Rapid Assessment Protocol outlines the most economical and time-saving approach to assessing Wildlife Road Traffic Accident (WRTA) rates. This includes the best speed at which to drive, direction in which to travel, time of day to sample, and how frequently to drive as well as how far to drive. The Rapid Assessment Protocol is currently being tested in order to obtain baseline WRTA rates in one important conservation area in South Africa, namely the Greater Mapungubwe Transfrontier Conservation Area.

Alien Plant Species of Ezemvelo Nature Reserve

C. Nkabinde; D. Ogle; F. Khoele; I. Mokoena J. Maluleke; M. Tyobeka; N. Tshatshu; Q. Molapo;
S. Matumbura; S. Mabunda and T. Twala

Maharishi Ezemvelo Rural University, Maharishi Institute, bergovoy@gmail.com

The Maharishi Ezemvelo Rural University (MERU) is located in the Ezemvelo Nature Reserve. Part of the grassland biome, regarded as the third-richest area in terms of plant species diversity, it was used for agricultural purposes for decades until bought by the Oppenheimer's in the 90's and is currently being restored to its original status. During the time the land was being farmed, many invasive and alien species of plants were introduced and allowed to flourish. With the introduction of a species that can multiply and spread faster than the native species, the balance is changed and the resources that would have been used by the native species are now used by an invader. This has an impact on the ecosystem and changes its composition of organisms and their use of available resources, especially in the case of grasslands, our rare water supply. MERU students, in co-operation with the Endangered Wildlife Trust, are learning to identify which species of plants and trees are native and have set about to remove those which are not. This is an on-going project.

Soil Conservation on Ezemvelo Nature Reserve

C. Nkabinde; D. Ogle; F. Khoele; I. Mokoena J. Maluleke; M. Tyobeka; N. Tshatshu; Q. Molapo;
S. Matumbura; S. Mabunda and T. Twala

Maharishi Ezemvelo Rural University, Maharishi Institute, bergovoy@gmail.com

Among the most endangered ecosystems today are the world's grasslands, home of the Maharishi Ezemvelo Rural University (MERU). Threats menacing them include overgrazing, soil erosion, urbanization, and replacement of natural vegetation with agricultural fields and tree plantations. Grasslands absorb rainwater and release it gradually to streams, rivers, and lakes, greatly reducing the risk of extreme cycles of floods and droughts. The land at Ezemvelo is now being restored to its natural state after decades of agricultural use. Soil conservation is a key component of this. Soil conservation is a set of management strategies for prevention of soil being eroded or becoming chemically altered. Soil conservation seeks to maintain the appropriate soil pH level and salinity levels, the indigenous microorganisms, and proper water flow. The MERU students, in cooperation with the Endangered Wildlife Trust, are working toward identifying soil issues and correcting them.

Rooipoort Mistletoes on the De Beers Diamond Route

D.Y. Okubamichael, M. E. Griffiths and D. Ward

University of KwaZulu-Natal, School of Biological and Conservation Sciences, Pietermaritzburg, dessu81@gmail.com

Mistletoes are aerial hemiparasitic plants that infect a range of host plants. In Rooipoort we recorded only one species of mistletoe, *Viscum rotundifolium*. Interestingly, this mistletoe parasitises only *Ziziphus mucronata*, although there were at least nine potential host species present there. Mistletoe preferred *Z. mucronata* which is not the most abundant host species and had the most negative water potential at predawn and midday. This indicates that this mistletoe is locally host specific. Mistletoes can be a keystone species in many ecosystems, thus with regard to management plans, the direct and indirect effect of mistletoe infestation should be evaluated.