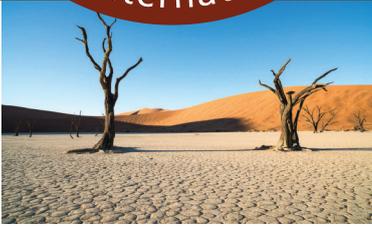


9<sup>th</sup> International

*Wildlife Ranching Symposium*



12-16 September 2016 ● Hotel Safari & the Safari Court ● Windhoek, Namibia



*Wildlife -  
The Key to Prosperity  
for Rural Communities*





# 9<sup>th</sup> International *Wildlife Ranching Symposium*

## *Arb rcl rq*

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**2<sup>nd</sup> AFRICAN BUFFALO SYMPOSIUM**



9<sup>th</sup> IWRS, 12<sup>th</sup>-16<sup>th</sup> September 2016, Windhoek, Namibia



\*information correct at time of print



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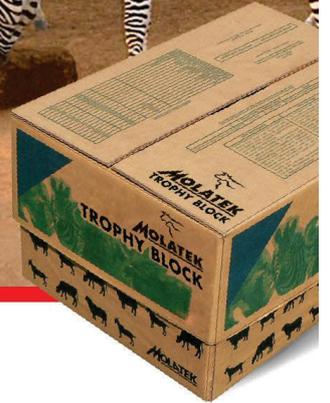
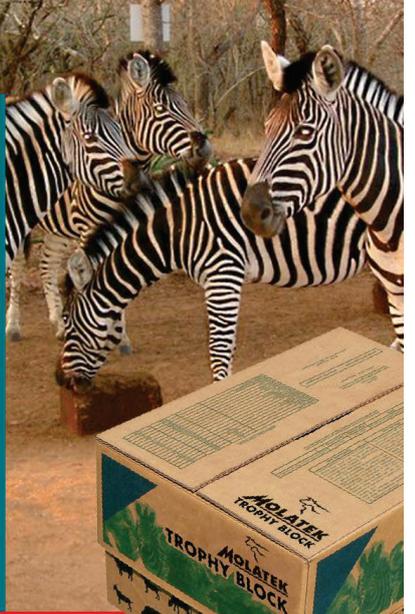
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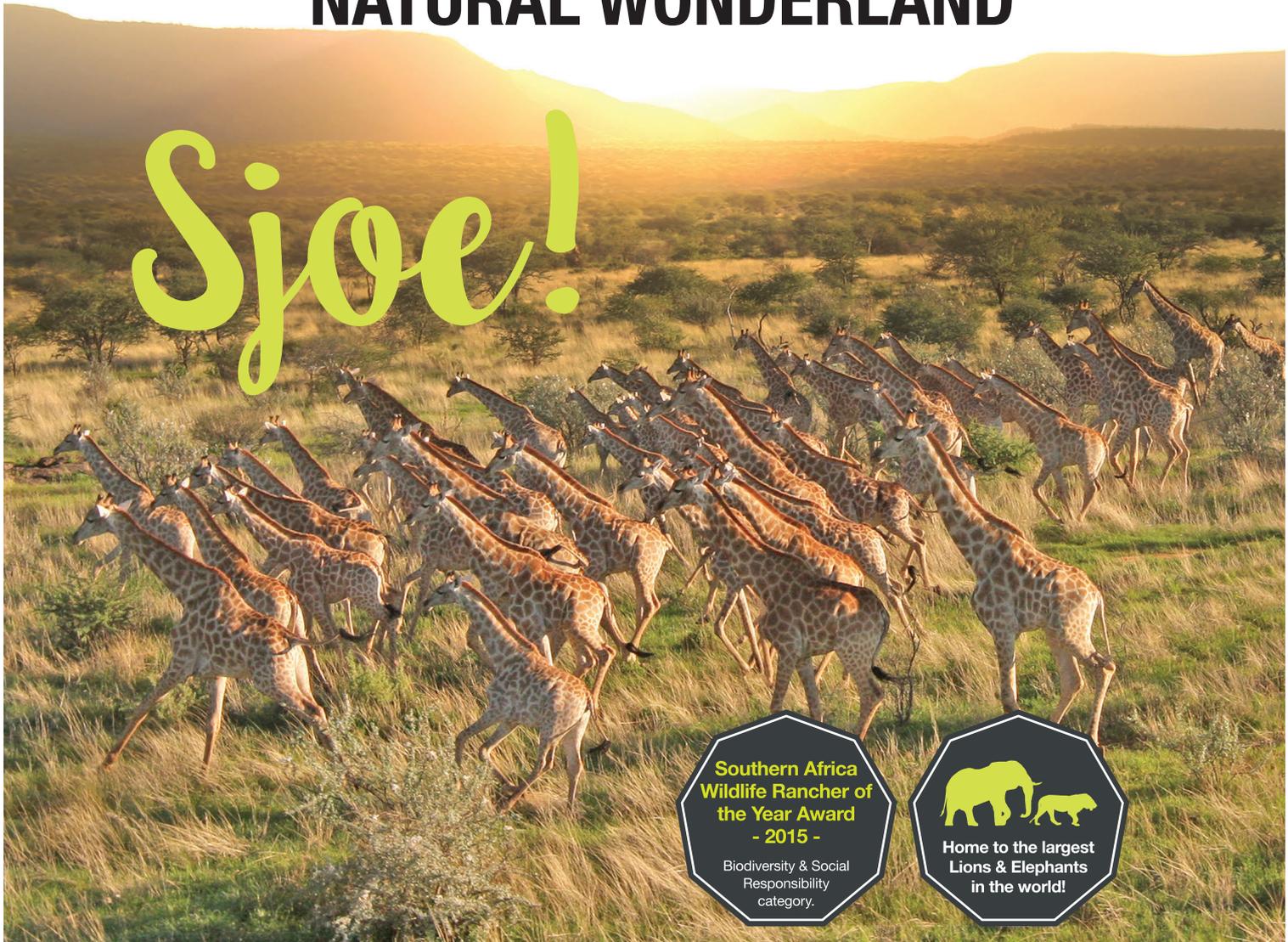
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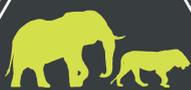


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## What is SACNASP?

SACNASP is the legislated regulatory body for natural science practitioners in South Africa.

The natural sciences encompass a wide range of scientific fields covering all of the basic sciences and many of their applied derivatives.

Our mission is to establish, direct, sustain and ensure a high level of professionalism and ethical conscience among our scientists.

Their conduct should be internationally acceptable and in the broad interest of the community as outlined in the SACNASP Code of Conduct.

## SACNASP's main objectives are to:

- Promote the practice of the natural science professions in South Africa.
- Ensure and administer the mandatory registration of natural scientists as required in terms of The Natural Scientific Professions Act of 2003.
- Exercise control over the standard of conduct of professional natural scientists.
- Monitor the standard of education and training of natural scientists.
- Set standards for the recognition of education and training natural scientists.
- Ensure that prospective registrants meet the educational standards required for registration.

## Register to be recognised

The Natural Scientific Professions Act of 2003 requires all Natural Scientific Practitioners in SA to be registered with SACNASP.

For a complete list of the current fields of practice recognised by SACNASP, visit our website at [www.sacnasp.org.za](http://www.sacnasp.org.za)

[www.facebook.com/SACNASP](https://www.facebook.com/SACNASP)

## Contact us

Physical Address: Suite L4, Innovation Hub,

Enterprise Building, Innovation Drive, 0087, Pretoria

Postal Address: Private Bag X540, Silverton 0127

Tel: +27 (0)12 748 6500

Fax: 086 206 0427

Email: [sacnasp@sacnasp.org.za](mailto:sacnasp@sacnasp.org.za) • Website: [www.sacnasp.org.za](http://www.sacnasp.org.za)

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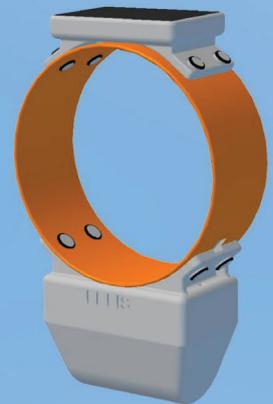
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Fieldwork 2013. Photo: Lech Iliszko



Bison

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# Welcome



The theme of the 2016 International Wildlife Ranching Symposium is: "Wildlife Ranching, the key to prosperity for rural communities"

Wildlife Ranching has shown tremendous growth in South Africa since the 1960's with more than 11 000 ranches presently registered. In other Southern African states improvement in biodiversity conservation by the private sector is also on the increase due to game ranching. Wildlife Ranching Namibia [WRN] was officially formed in 2014 and is on a positive growth with the objective to advance sustainable game production and utilization of game as a viable, economic activity. Utilization includes hunting, breeding of game (production), meat production, eco-tourism and wildlife for both local and international markets. The operational procedures of capture and translocation, veterinary research and ecological management over a wide range of species, has also made wildlife ranching a successful economic enterprise leading to increased direct foreign investments. The economic and social impact will be discussed in this symposium. This Symposium will serve to accentuate the potential of wildlife in other

regions of Africa and the world, to not only lead to the conservation of the natural environment but also to contribute significantly to the welfare of indigenous and rural communities. To function as an integral part of the framework of a Green Economy as prescribed by the Namibian Government and international agencies is not only what WRN is striving for, but Wildlife Ranching International in general.

The sustainable use of wildlife forms the basis of wildlife ranching. Sustainable use of wildlife is being practiced in many parts of the world and therefore we wish to welcome participants from many parts of the world to share experiences and practices from which all delegates can learn. In this way we can optimise the conservation of wildlife through sustainable use and encourage and support rural communities to create more long-term sustainable wildlife ranches and conservancies, particularly in those areas where the bushmeat harvesting is having serious impacts on biodiversity.

On behalf of the people of Namibia and the organizing committee of the 9th IWRS, we wish you a pleasant and enriching week.

Prof Wouter van Hoven  
Chairman: 9<sup>th</sup> IWRS Organizing Committee



## 9<sup>th</sup> International *Wildlife Ranching Symposium*

# *History, Context, Visions and Outcomes*



Why are we in Namibia and interested in the 9th International Wildlife Ranching Symposium? What will we take away from this event and into our actions? What role should the private and communal

sectors serve as stewards of lands, wild animals, and tourism in the world?

Previous IWRS were held in South Africa 3 times, Canada twice, France, the first in New Mexico USA in 1988 and I administered the 8th event in Colorado USA in 2014. These locations had significantly different needs and approaches to wildlife, nature conservation, and people management, but themes were similar. We mixed the science of wildlife conservation with the realities of physical and biological capabilities and suitability of the land, psychological and sociological parameters of people, economic and business considerations, laws and politics, and the skills, technologies, and administrative systems available to empower actions.

The Western United States and Canada has extensive, free ranging populations of wildlife, governmental custodianship of natural resources, a large and openly accessible public land base, and private interests that range from enthusiasm to conflicts with wildlife and recreationists. South Africa has a growing abundance of fenced and intensively managed wildlife that supplements and replaces livestock production and adds private nature conservation to public offerings. Europe has the longest history of human and wildlife adaptations to the land with relatively altered landscapes, larger human populations, and

different management approaches, yet wildlife, hunting and nature conservation are important.

All countries need to manage wildlife in relation to domestic landscape production and increasing human populations. Energy developments, global climate changes, and urbanizing human attitudes complicate management as human numbers continue to grow and their practical connections with land and wildlife management diminishes.

Now Namibia provides the beautiful and varied location, unique wants and needs, and their own approach to balance the presence of wildlife and humans on the land. Lessons learned will not impact Namibia alone if we allow ourselves to learn from the situations and outcomes in all countries represented. We will discuss topics that we all can agree upon and we will address topics that are controversial. We will likely resolve some conflicts and generate others. We will try to understand the needs of captive wildlife conservation in small environments along with wilder populations, and recognize that diverse methods of conservation exist. In all cases, we will emphasize practical knowledge, skills and attitudes with action outcomes to assist private and communal sectors locally and internationally.

Not all wildlife and land interests will be represented here and perhaps some persons do not appreciate what the private and communal sectors provide. Working with the diverse array of persons on the land is not easy. They might have needs and motives that are different from conventional conservation. They might not care to hear our story, but they should hear it loud and clear. Private and communal lands provide the majority of conservation potentials.

Governmentally managed parks and natural areas are important also, but will we be able to add significantly more to overcome the fragmentation of landscapes that already exist? I think not, so it is incumbent upon us to tell the world that private and communal conservation is important, it can fill fragmented gaps, and we need to include

everyone in the quest for a planet that supports wild animals, wildness, and appreciation of wild things.

Delwin E. Benson Ph. D  
Colorado State University

## *General info*

### **Safari Hotel Contact Details**

Corner of Auas & Aviation street, Windhoek  
Telephone No: +264-61-296 8000

### **Transportation**

A half-hour courtesy shuttle bus to the city centre and back is available free of charge Mondays to Fridays from 07:00 to 19:00, Saturdays from 07:00 until 13:00 and on Sundays and on request.

Avis Rent-a-Car operates its down-town offices from the Hotel's premises to allow our guests to pick up and return their hired vehicles at leisure.

### **Emergency number:**

+264 (0)48 333 5900 (Lady Pohamba Hospital ER)

### **Restaurant**

#### **The Acacia (Safari Court Hotel)**

Breakfast 06:30 – 10:00  
Dinner 18:30 – 22:00

#### **The Welwitschia Restaurant (Hotel Safari)**

Breakfast 06:30 – 10:00  
Lunch 12:30 – 14:00  
Dinner 18:30 – 22:00

### **The Steak House (Hotel Safari)**

Dinner 18:30 – 22:00

### **The Beergarden and Patio (Hotel Safari)**

Enjoy an ice-cold Namibian Beer and light meals from our à la carte menu

Lunch 12:30 – 14:00  
Dinner 18:30 – 12:00

### **Symposium information**

#### *Contact Details*

Amélia Wassenaar

SA: +27 72 369 2609 (WhatsApp)

Namibia: +264 81 851 9674 (Calls – only available from 10-17 September)

Zelda von Schauroth: +264 81 127 7578

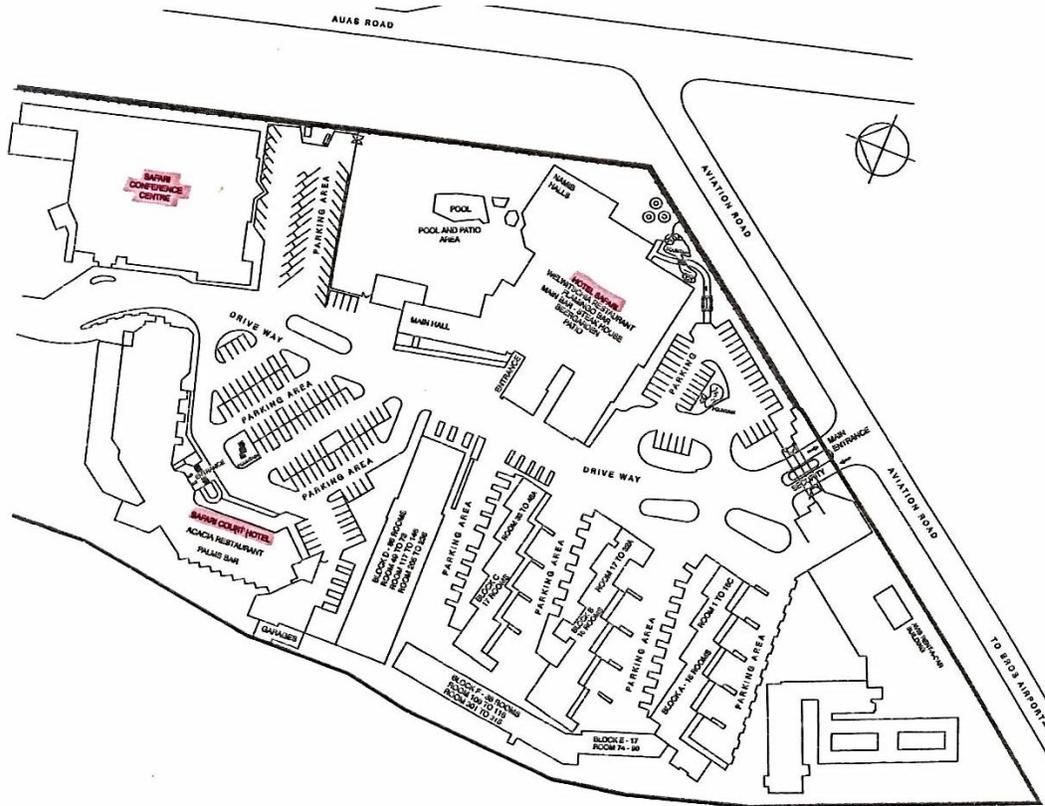
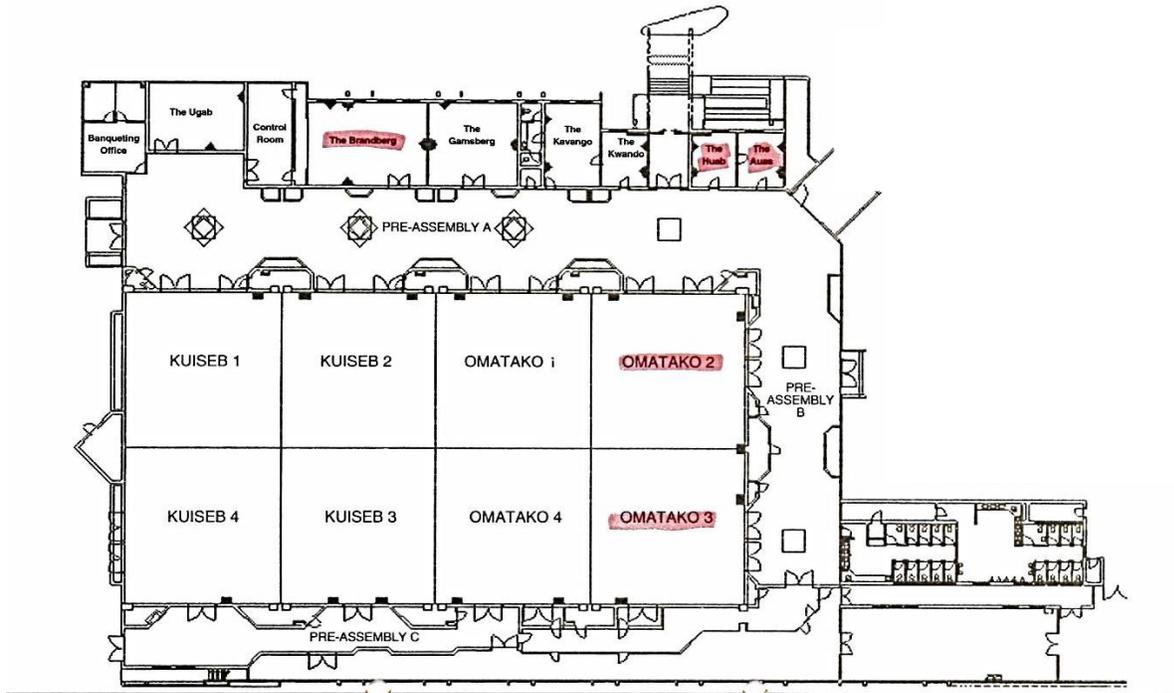
### **Venue (Safari Court Conference Centre)**

Plenary sessions - Omatako 1 & 2

Parallel sessions

1. Wildlife Management – Omatako 1
2. Sustainable use of wildlife – Omatako 2
3. 2<sup>nd</sup> African Buffalo Symposium –Brandberg

# Safari Court Conference Centre



SITE PLAN OF COMPLEX

# Field Trips

We invite delegates to join a mid-Symposium break on Wednesday, 14 September 2016.

**Register before 14:00 on 12 September to secure your place.**

Field trips will depart from the parking area in front of Safari Court Hotel.



## Visit an extensive game farm (full day)

If you're looking for an authentic, unadulterated, and unforgettable game viewing experience, take a good look at Namibia. ... And of all the awesome options in this magnificent country, Erindi Private Game Reserve offers the widest selection of exciting species (in the greatest numbers), the most dynamic and informed guides, the finest cuisine, the best facilities, and the friendliest welcome you could imagine. Animals roam extensively and are managed in an extensive manner on this specific farm. Delegates will travel from Windhoek and drive around with game viewing vehicles. Lunch will be enjoyed at the lodge.

*R800 per person*

*Depart: 14 September, 07:30*

## Visit an intensive game breeding farm (½ day)

Visit a game breeding farm in Namibia with sable antelope, roan antelope, golden wildebeest, tsessebe & nyalas. Animals are managed in a semi-extensive manner. Delegates will travel from

Windhoek to the venue. Smaller camps where animals are bred for sustainable use can be viewed. Lunch will be enjoyed at a nearby lodge. Fees include transfers from Safari Hotel, a tour of the game breeding farm & lunch.

*R600 per person*

*Depart: 14 September, 08:30*

## Scenic Flight over Sossusvlei (½ day)

Scenic flight over Sossusvlei, Diamond Camps, Eduard Bohlen Shipwreck and Pelican Point, with lunch at Swakopmund. This tailor made trip is not offered by any other tour operator. Please note that seats are limited. Fees include scenic flight, lunch in Swakopmund and return shuttle from airport to restaurant in Swakopmund.

*R8100 per person*

*Depart: 14 September, 07:30*



## Windhoek City Tour (½ day)

Discover Windhoek city with an English tour guide which includes a panoramic view of the city, Tintenpalast, Christuskirche, the Alte Feste, Klein Windhoek / Aegams, the shebeen littered streets of Katutura, a traditional market, Funky Town and the old location, the architectural fusion of Independence Avenue, craft market, the Diamond works and lunch at Stellenbosch Wine Bar & Bistro.

*R500 per person*

*Depart: 14 September, 09:00*

# *Programme: Wildlife - the Key to Prosperity for Rural Communities*

## **Sunday, 11 September 2016**

14:00 **Registration commences**

18:00 **Welcome by Mr Mike Bredenkamp – President: Wildlife Ranching Namibia and cocktail at Safari Hotel swimming pool**

## **Monday, 12 September 2016**

### **Plenary session 1 (Omatako 1&2): Session Chairman - Prof Wouter van Hoven**

08:00 **Last-minute registrations**

08:30 **Introduction**

Mr Mike Bredenkamp - *President: Wildlife Ranching Namibia*

08:40 **Welcome and introduction: Minister Pohamba Shifeta, Ministry of Environment and Tourism**

Prof Wouter van Hoven - *Chairman: 9<sup>th</sup> International Wildlife Ranching Symposium*

08:55 **Namibian National Anthem and African Union Anthem**

09:00 **Opening of the 9<sup>th</sup> International Wildlife Ranching Symposium**

Minister Pohamba Shifeta - *Ministry of Environment and Tourism*

09:30 **The Sustainability of Wildlife Ranching in Southern Africa – a Business Ethics Perspective**

Dr Willem Moore - *Therapeutic Informatics*

10:00 **Tea break**

10:30 **Game Ranching in South Africa: Its Contribution to the Economy, to Conservation and to Biodiversity**

Dr Peter Oberem – *Deputy President: Wildlife Ranching South Africa*

11:00 **Game ranching activities in Kenya with an emphasis on community game ranching and /or how communities benefit from game ranching**

Prof David Hopcraft - *Swara Plains Conservancy, Kenya*

11:30 **Game management under ranching and farming condition in the Czech Republic and Europe**

Dr Radim Kotrba - *Czech University of Life Sciences, Prague*

12:00 **Conservation through Commerce in the United States and the exotic industry's economic impact on rural USA**

Mr Charly Seale - *Exotic Wildlife Association, Texas*

12:30 **Lunch**

## **Plenary session 2 (Omatako 1&2): Session Chairman - Mr Pelham Jones**

- 13:30 **Ensuring the future of Africa's rhinos**  
Dr Michael Knight - *Chairman: IUCN SSC African Rhino Specialist Group*
- 14:00 **Assisted reproduction in wildlife with particular reference to rhino**  
Dr Morné de la Rey - *Embryo Plus*
- 14:30 **Key issues to consider in deliberations on a legal trade in rhino horn**  
Dr John Hanks
- 15:00 **Tea break**
- 15:30 **Rhino ranching and wildlife for sustainable use and community empowerment**  
Mr Dipati Benjamin Maenetja - *Secretariat: Balepye Community*
- 16:00 **Rhinos: Economics, Trade and Politics**  
Mr Michael 't Sas-Rolfes - *University of Oxford*
- 16:30 **The impact of poaching and role of private reserves in South African rhino conservation**  
Mr Pelham Jones - *Private Rhino Owners Association*
- 17:00 **Panel discussion (Chairman-Pelham Jones): Ensuring the future of Rhinos**
- 17:30 **End of day programme**
- 18:30 **Depart for dinner at Joe's Beerhouse (depart from parking in front of Safari Court Hotel)**
- 19:00 **Dinner at Joe's Beerhouse**

## **Tuesday, 13 September 2016**

### **Plenary session 3 (Omatako 1&2): Session Chairman - Dr Delwin Benson**

- 08:00 **Poster session**
- 08:10 **Launch: Wildlife Advocacy Group**
- 08:30 **Investing in Sustainable Wildlife Ranching – Biosecurity Threats and Opportunities**  
Dr Guy Preston - *Department of Environmental Affairs, South Africa*
- 09:00 **The role of tourism in the sustainable use of wildlife**  
Prof Melville Saayman - *Tourism Research in Economic Environs & Society, North-West University*
- 09:30 **The Botswana wildlife industry and consequences of ban on hunting**  
Mr Rudie de Wet - *Botswana Game Ranchers Association*
- 10:00 **Tea break**
- 10:30 **How the farming of endangered species can save them from extinction**  
Mr Ross Hyland - *University of Auckland, New Zealand*
- 11:00 **Verifying conservation in wildlife ranches**  
Dr Francis Vorhies - *Earthmind*
- 11:30 **Country Foods Development Initiative in the Arctic: A Resource Sustainability and Value-Added Processing Strategy for Aboriginal People**  
Dr Lyle Renecker
- 12:00 **Sustainable use as a function of Biodiversity and Agriculture Development: Exploring the impacts of dysfunctional international conservation jurisprudence**  
Dr Gert Dry - *International Wildlife Ranching Symposium*
- 12:30 **Lunch**

## Parallel sessions

**1. Wildlife Management (Omatako 1): Session Chairman - Prof Wouter van Hoven**

**2. Sustainable use of Wildlife (Omatako 2): Session Chairman - Dr Peter Oberem**

**3. IUCN 2nd African Buffalo Symposium (Brandberg): Session Chairman: TBC**

- 13:30
- 1. The impact of predation losses on wildlife ranches in Limpopo Province, South Africa**  
Prof HO de Waal
  - 2. Sustainable Agriculture and Wildlife Resources in Sub Saharan Africa and the Relationship to Country Foods and Food Security**  
Dr Lyle A. Renecker
  - 3. A Framework for Evaluating the Impacts of the Removal of the Namibia-Botswana Border Fence on Wildlife Movement and Habitat Use**  
Dr Russell Taylor
- 14:00
- 1. Implementation of Biodiversity Economy Strategy in the Eastern Cape Province: the preliminary lessons learnt**  
Dr Thabiso M Mokotjomela
  - 2. Management of free-ranging hunted wild reindeer (*Rangifer tarandus*) in Norway**  
Prof Torstein Storaas
  - 3. Analyzing herbivore movements in relation to resource availability in the Savuti-Mababe-Linyanti Ecosystem (SMLE) in Northern Botswana**  
Mr Keoikantse Sianga
- 14:30
- 1. Wildlife management practices drives hybridization in South Africa: Conservation implications**  
Miss Nicole Benjamin-Fink
  - 2. Zebra: more than just stripes**  
Prof Louwrens C. Hoffman
  - 3. Discussion: Ecology & Conservation of the African Buffalo**
- 15:00 **Tea break**
- 15:30
- 1. Lessons in managing wild ungulates in an urbanized environment**  
Mr Bob van den Brink
  - 2. Crocodile Farming – A fresh approach**  
Mr Robert Reader
  - 3. Effects of divergent migratory strategies on access to resources for Cape buffalo (*Syncerus caffer caffer*)**  
Dr Emily Bennitt
- 16:00
- 1. Livestock or wildlife in western Ngamiland, Botswana? Who dares wins**  
Prof Jeremy Perkins
  - 2. The benefits of responsible hunting to sustainable wildlife ranching**  
Mr Johann W van de Giessen

**3. Surface water availability and cattle herding practices shape the human-wildlife interface at the edge of a protected area**

Dr Alexandre Caron

16:30 **1. Demography and morphometry of an important mesopredator (black-backed jackal – *Canis mesomelas*) in southern Africa**

Prof HO de Waal

**2. Trophy hunting and sustainability: temporal dynamics in trophy quality and harvesting patterns of wild herbivores in a tropical semi-arid savanna ecosystem**

Mr Victor K. Muposhi

**3. Discussion: Ecology & Conservation of the African Buffalo**

17:00 **End of day programme**

19:00 **Dinner at leisure**

**Wednesday, 14 September 2016 – day at leisure**

Field trips depart from parking area in front of Safari Court Hotel

17:00 **IWRS Advisory Committee Meeting**

Prof Wouter van Hoven

**Thursday, 15 September 2016**

**Parallel sessions**

**1. Wildlife Management (Omatoko 1): Session Chairman - Dr Gert Dry**

**2. Sustainable use of Wildlife (Omatoko 2): Session Chairman - Prof Peet van der Merwe**

**3. IUCN 2<sup>nd</sup> African Buffalo Symposium (Brandberg): Session Chairman: TBC**

08:00 **1. The impact of predation losses on beef cattle in South Africa**

Prof HO de Waal

**2. How Sustainable is Sustainable Wildlife Tourism? Examples from protected areas in South Africa**

Michael R Brett

**3. Comparative Analysis of Forest Buffalo Grouping Patterns In Central Africa**

Dr Mario Melletti

08:30 **1. Endangered Bontebok and small game survival: a quest of palaeontology, climate change, consumptive use and biodiversity management in southern Africa**

Mr Deon Furstenburg

**2. Do we really understand accommodation preferences of visitors to the Kruger National Park?**

Prof Martinette M Kruger

**3. Social dynamics in the African buffalo (*Syncerus caffer*): socio-ecologic drivers and eco-epidemiological implications**

Dr Daniel Cornélis

- 09:00
1. **The implementation of modern genetic improvement methods in wildlife**  
Dr Mike Fair
  2. **Inspiring Change in Wildlife, Livestock and Land Management in Rural Communities. Stories from Zimbabwe & Zambia**  
Dr Astrid Huelin
  3. **Evolutionary history of the African buffalo (*Syncerus caffer*) at continental scale based on mitochondrial and nuclear molecular markers**  
Dr Johan Michaux
- 09:30
1. **The Angolan experience and how this can be done in the Congo (DRC)**  
Prof Wouter van Hoven
  2. **Wild and free: What are we conserving and how do we measure it?**  
Dr Jeanetta Selier
  3. **Discussion: Genetics, Conservation & Management**
- 10:00 **Tea break**
- 10:30
1. **Institutions, Governance, and the Economic Performance of Protected Areas in Southern Africa**  
Mr Alex Chidakel
  2. **Fallow deer in southern Africa: a potential meat source or is it just an invasive species?**  
Prof Louwrens C. Hoffman
  3. **Genetic variability of Cape buffalo populations in South Africa**  
Ms Lené van der Westhuizen
- 11:00
1. **The working and introduction of the Wildlife Estate Label in the European Union**  
Mr Bob van den Brink
  2. **Back to basics: "HUNT FOR FOOD" – Wildlife Industry to regulate game meat**  
Dr Maretha van der Merwe
  3. **Population genomics of the Cape buffalo subspecies (*Syncerus caffer caffer*) of the Southern African region based on SNP markers**  
Miss Nathalie Smitz
- 11:30
1. **Creating Voluntary Payment Programs to Promote Endangered Wildlife Recovery: Effective Program Design and Ranchers' Willingness to Conserve Florida Panther Habitat**  
Dr Elizabeth F. Pienaar
  2. **Game meat production on private land in South Africa: current scale and potential for the future**  
Dr Andrew Taylor
  3. **Feeding buffalo: Improving production, reproduction and health in intensive, semi intensive and extensive game farming systems in southern Africa**  
Mr Craig Shepstone
- 12:00
1. **Application of an abundance index tool to monitor long term changes in ungulate population trends: an example from Cawston Game Ranch, Zimbabwe**

Mr Vernon Booth

**2. Game meat as alternative food source for Africa: A distributor perspective**

Prof Elmarie Slabbert

**3. Discussion: Genetics, Conservation & Management**

12:30 **Lunch**

**Parallel sessions**

**1. Wildlife Management (Omatako 1): Session Chairman - Mr Mike Bredenkamp**

**2. Sustainable use of Wildlife (Omatako 2): Session Chairman - Prof Louw Hoffman**

**3. IUCN 2<sup>nd</sup> African Buffalo Symposium (Brandberg): Session Chairman: TBC**

13:30 **1. TBC**

TBC

**2. Does age influence biltong hunters' behaviour?**

Prof Peet van der Merwe

**3. Sustainably Managing Buffalo Trophy Quality**

Dr Kevin Robertson

14:00 **1. Diseases of special importance to the wildlife industry in Namibia**

Dr Ulf Tubbesing

**2. Sustainable versus unsustainable trends in wildlife ranching in Africa**

Dr Wilhelm J Schack

**3. Health and demographics of African buffalo (*Syncerus caffer*) in Ruaha National Park, Tanzania**

Dr Annette Roug

14:30 **1. Phylogeography and conservation genomics of the African lion (*Panthera leo*) at a continental and local scale based on mitochondrial and nuclear molecular markers**

Miss Nathalie Smitz

**2. The Local Meat Hunter: Backbone or bane of the game rancher's business**

Mr Stephen Palos

**3. Discussion: Diseases in African Buffalo**

15:00 **Tea Break**

15:30 **1. Wildlife Ranching with the Mini Antelope Species of southern Africa**

Mr Arnaud le Roux

**2. Guideline booklet for game harvesting and processing**

Dr Diana van Schalkwyk

**3. Primary production drives eco-physiological cascades in African buffalo**

Mr Hendrik J Combrink

16:00 **1. Rabies in Kudu and Eland – Its impact on game ranching in Namibia**

Dr Ulf Tubbesing

**2. Elands under intensive husbandry: fattening and meat quality in comparison to cattle**

Dr Radim Kotrba

**3. Escherichia coli populations sharing and antibioresistance gradient at a buffalo/cattle interface in Southern Africa**

Dr Alexandre Caron

16:30 **1. TBC**

**2. TBC**

**3. Discussion: Diseases in African Buffalo & Poster session**

**17:00 End of day programme**

**18:30 African Braai at Safari Hotel swimming pool**

**Friday, 16 September 2016**

**Plenary session 4 (Omatoko 1 & 2): Session chairman - Mr Ross Hyland**

08:00 **How do Government regulations and institutional decisions affect our wildlife, communities and green economy?**

Mrs Adri Kitshoff-Botha - CEO: Wildlife Ranching South Africa

08:30 **Can cheetahs and wildlife ranchers ever live in co-existence?**

Dr Laurie Marker – Cheetah Conservation Fund

09:00 **The Zimbabwe wildlife industry**

Mr Nick la Grange - Zimbabwe Wildlife Association

09:30 **Hunting & Sustainable Utilization in Sabi Park, Mozambique**

Dr Kevin Robertson

10:00 **Tea break**

10:30 **The controversy surrounding the conservation value of captive-bred lions**

Prof Pieter Potgieter - President: South African Predator Association

11:00 **Manyara Ranch: A Potential Model for Wildlife Management in Tanzania**

Dr Alistair Pole

11:30 **American Bison: relic symbol, domesticated novelty, rewilding dream**

Dr Delwin Benson - Colorado State University

12:00 **Concluding remarks & closing**

Dr Delwin Benson

12:15 **Lunch**

**Poster presentations:**

**1. Ecological trends, experiences and lessons learnt of game ranching for trophy hunting in Zimbabwe**

Thandiwe Sibanda, Juliet Johnstone, Daniel Cornelis and Peter Mundy

**2. Serum chemistry panels as indicators of health: Establishing normal ranges for African Buffalo & assessing variability across season, age and sex.**

Claire Couch, Morgan Movius, Brianna Beechler

**3. South African consumers' attitudes toward game meat**

Anjolize Wassenaar, Prof E.L. Kempen, Dr T.S. van Eeden

**4. Passive capture of wild animals: latest methods and technology**

Wilhelm J Schack

# Plenary Speakers

## Dr Willem Moore - *Therapeutic Informatics*



After completing his theological studies in 1982 and acting as head of the Language Laboratory of the University of Stellenbosch from January 1983 until July 1988, Willem took up the position of Minister of the

Dutch Reformed Congregation of Suiderhof in Windhoek in August 1988. He left the service of the Church in 2002 and started lecturing Philosophy and Medical and Business Ethics at the University of Namibia in 2003. Willem obtained his DPhil in Ethics from the University of Stellenbosch in 2010 and left the service of the University of Namibia in 2013 to head Therapeutic Informatics, a company that specialises in spiritual consultations and in the lecturing and application of Medical and Business Ethics. He currently lectures Professional Ethics at the University of Namibia School of Medicine and has also recently been appointed as a Research Associate of the Stellenbosch University School of Medicine. Willem is a member and Certified Ethics Officer of the Ethics Institute of South Africa.

### *The Sustainability of Wildlife Ranching in Southern Africa – a Business Ethics Perspective*

Although wildlife ranching has grown into a multi-million venture in Southern Africa in the past ten years, the industry according to the newly elected President of WRSA, Wiaan van der Linde, finds itself at a critical junction where the socially acceptable and responsible actions of its members will amongst others determine the successful future of wildlife ranching as a business. Against this background, the paper will provide a Business Ethics perspective on the sustainability of wildlife ranching in Southern Africa in terms of the King III

recommendations that an organisation's board should ensure that it understands the implications of risks taken by management in pursuit of returns, as well as the potential impact of risk-taking on shareholders and other stakeholders and that a thorough risk assessment, using a generally recognised methodology, is performed at least annually and used continually.

## Dr Peter Oberem – Deputy President: Wildlife Ranching South Africa/Afrivet

Dr Peter Oberem is a veterinarian with post-graduate qualifications in parasitology. He is a private game rancher since 1994 and owner of Afrivet, Southern Africa's biggest locally owned animal health company.



*Game Ranching in South Africa: Its Contribution to the Economy, to Conservation and to Biodiversity*  
Wildlife ranching in South Africa is a relatively young industry which has grown at unforeseen rates to an industry bigger than the dairy or the sugar industries in this country. Its history, development, the contribution, as a sustainable form of agriculture, made to the South African economy, decent job creation, food security and to conservation and biodiversity is discussed. Future possible contributions, as future goals of Wildlife Ranching South Africa, are also enunciated.

## Prof David Hopcraft - Swara Plains Conservancy, Kenya

*Game ranching activities in Kenya with an emphasis on community game ranching and /or how communities benefit from game ranching*

**Dr Radim Kotrba - Czech University of Life Sciences, Prague / Federation of European Deer Farmers Associations**



Dr Radim Kotrba is researcher and the principal lecturer in field of wildlife management at Czech University of Life Sciences Prague at the Faculty of Tropical AgriSciences. He focuses on breeding of indigenous animal species in the tropics, game ranching and animal sciences. He supervise eland and guanaco farm at the University. Moreover, Radim is researcher at Institute of Animal Science in Prague focusing on deer species. He is secretary general of Federation of European Deer Farmers Associations and active also in national board for deer and private farming in the Czech Republic. His passion to game husbandry has resulted in founding of own small scale family farm including red deer, guanacos and moorland sheep kept in agroforestry complex. He is included under European Endangered Species breeding Programme for Indochina sika deer.

*Game management under ranching and farming condition in the Czech Republic and Europe*

Seasonal breeding of indigenous game species in fenced areas was documented from Upper Paleolithic time in some parts of Europe known as winter foddering of red deer, but expansion of fenced hunting game parks, where game was permanently present, has become widespread from Middle Ages. Nowadays, we can recognise in some countries of Europe two type of breeding of fenced game, extensive called as deer/game parks or estates and intensive game farms with majority of deer farms. The deer farming as industry in Europe is recognised from early seventies last century in the most countries even some small hobby breeders has been always present. In general, game kept in parks and estates serve mainly for conservation of species and habitats

and of course for trophy hunting. On the contrary deer is bred in farms mainly for meat production because of stable and controlled quality and for live sales because of outstanding quality. Nevertheless, we can recognise broad diversity of approaches based on game historical use, legislation and also environmental condition across Europe. Therefore, game is broadly considered and managed as wild under extensive fenced system and as domestic livestock with some exemptions on game farms. Historically, game in fenced areas owned by nobility helped to preserve indigenous species, but very often was also as place for introduction of exotics. Recently to release exotic species in wild or to keep them in game parks is prohibited by legal conditions in most countries, but usually permitted in farms. To recognise, what is exotic species is usually based on historical presence. Therefore, some ungulates originated in Asia or North America introduced one or more hundred years ago to game park, which established local populations in wild after escape, become hunted game in wild and in fenced areas as well and generally accepted. Talk will overview game management approaches, problems and challenges in Europe based on hunter's and/or meat producer's perspective frame it in conservation effect and giving examples not only from the Czech Republic.

**Mr Charly Seale - Exotic Wildlife Association, Texas**



Charly Seale has been actively involved with the Exotic Wildlife Association for 15 years. He obtained degrees in Agribusiness and Police administration. Charly is a full time rancher raising whitetail deer, gemsbok, axis, blackbuck, and scimitar horned oryx.

*Conservation through Commerce in the United States and the exotic industry's economic impact on rural USA*

The beginning of the Exotic Industry in the United States and its effect on the rural economy.

**Dr Michael Knight - South African National Parks (SANParks) / IUCN SSC African Rhino Specialist Group (AfRSG) / SADC Rhino Management Group (RMG)**



Trained as a wildlife ecologist, I have spent most of my career within South African National Parks. This saw me start as a scientific officer based in the southern Kalahari, then the regional ecologist for numerous

parks, to head of Research for our inland parks, to my current position as General Manager for Park Planning & Development. This involves expanding the SANParks protected area system based upon best conservation planning science. My experience is in large mammal ecology, eco-physiology, park planning & conservation planning in Southern, Eastern & north Central Africa. I have been involved in rhino conservation for the last 20 years. I have been the Chairman of the SADC Rhino Management Group (RMG) for the last eight years, and from 2011, the Chairman of the IUCN SSC African Rhino Specialist Group. He is also a member of the IUCN SSC Antelope Specialist Group and has published extensively.

*Ensuring the future of Africa's rhinos*

Rampant poaching of Africa's rhinos for their horn is on the point of pushing the continent's populations of 25,600 animals into decline – threatening to reverse this iconic conservation success story. This achievement was built upon a whole suite of actions inclusive of protection, biological management, monitoring, coordination,

communication, cooperation, economic and social sustainability, public backing, political support, adequate resources (human and financial) and innovation along with the willingness to experiment. Current international and national responses to the rhino crisis have seen a heavy emphasis of law enforcement in both range and consumer states, together with a focus on trying to reduce consumer demand for the product. This has realized a shift back to a protectionist paradigm, potentially alienating communities around rhino reserves and undermining their livelihoods. Rhinos are certainly under pressure, but there is much more at stake.

**Dr Morné de la Rey - Embryo Plus**



Dr Morné de la Rey qualified as a veterinarian from Onderstepoort in 1994 where after he joined his father at Embryo Plus. Embryo Plus specializes in embryo flushing, embryo transfers and artificial

insemination in livestock. He did the first embryo sexing in cattle in Africa in 1995, however got international recognition for the first cloning in Africa in 2003 of the Holstein calf Futhi. He has been involved on various international committees representing Africa and is active in recent years with assisted reproductive techniques (ART) in wildlife large ungulates working with his favourite animals Sable Antelope and Buffalo and also Roan Antelope and Blue Wildebeest. 6 years ago he produced the first Sable antelope embryo calves and in 2016 produced the first IVF Cape Buffalo calves in the world. Hopefully one day will be doing his part to save endangered species like the Giant Sable, Bongo or Northern White Rhino.

*Assisted reproduction in wildlife with particular reference to rhino*

### **Dr John Hanks**



John Hanks is a zoologist by training with his first degree in Natural Sciences from Magdalene College, Cambridge, followed by a PhD on the reproductive physiology, growth, and population dynamics of the

African elephant in the Luangwa Valley, Zambia. He has 45 years of experience in a wide variety of applied conservation management and research projects, working in several African countries, including Angola, Botswana, Ethiopia, Kenya, Mozambique, South Africa, Zambia and Zimbabwe. His major most important postings have been: Chief Professional Officer for the Natal Parks Board; Professor and Head of the Department of Biological Sciences, the first Director of the Institute of Natural Resources at the University of Natal; the Director of the Africa Program for WWF International (based in Gland, Switzerland); the Chief Executive of WWF South Africa; the first Executive Director of Peace Parks Foundation. He has published over 150 scientific papers.

#### *Key issues to consider in deliberations on a legal trade in rhino horn*

Africa's rhinos face an insecure future in the continent's designated protected areas with no solutions in sight in the foreseeable future for securing the required substantial increase in funding for adequately equipped and trained staff. The presentation will review the present and proposed option to reduce rhino poaching with particular reference to their realism and sustainability, and the vital importance of community-led solutions to tackling wildlife crime. The advantages and benefits of a legal trade in rhino horn will be summarized, stressing that an essential prerequisite for the trade is to stop the developed world dictating to Africa on how to manage its wildlife.

### **Mr Dipati Benjamin Maenetja - Balepye Community**

Benjamin Maenetja is Secretariat of the Balepye Community and Member of Balepye Royal Family,



a social activist, community activist and specialist tax practitioner. He is passionate about wildlife ranching and conservation. Furthermore, he is a strategist, community negotiator, community advisor and pioneer of Rhino ranching

and wildlife for sustainable use and community empowerment. Director of Surgoway Pty Ltd, Director of Balepye Investment Holdings, Director of the Greater Balepye Nature Reserve Pty Ltd. Advisor for the Marula Factory Plant Design and Implementation in Phalaborwa. He has a B.Sc degree in Physics and Chemistry.

#### *Rhino ranching and wildlife for sustainable use and community empowerment*

International trade in rhino horn was banned in the 1970's and this ban has had the same effect as the prohibition of alcohol did in the US by creating a black market. Banning trade has only contributed to increasing poaching as also evidenced by South Africa's ban of domestic trade in rhino horn being followed by a spike in poaching. Legalising trade will take away control of trade from black markets and let regulated markets take over thus crippling criminal syndicates and curbing rhino poaching. The ban on international trade of rhino horn and all other interventions, including anti-poaching units and awareness campaigns, have failed to effectively protect rhinos. Sustainable utilisation of rhinos is the only logical option left to save rhinos. Sustainable utilisation requires legalizing trade and has been proven in the past to be effective as seen with animals such as ostriches, crocodiles and others. Sustainable use of South America's vicuña has resulted in the animal being saved from

extinction while contributing to conservation and alleviating poverty, the same can be achieved with rhinos through legalisation of trade. For this reason rhino horn can be sustainably utilised by harvesting it regularly through dehorning without killing the animal. When harvesting you get about 30 to 60 kilograms of rhino horn from a single rhino that is kept alive over a period of time. Through poaching or pseudo hunting you only get about 1-3kg and at times even 6kg from a full grown adult and the rhino is killed.

### **Mr Michael 't Sas-Rolfes – University of Oxford**



Michael 't Sas-Rolfes is a conservation economist with industry experience since the 1980's.

*Rhinos: Economics, Trade and Politics*

At the forthcoming CITES Conference of Parties the future of trade in several key species – rhinos, elephants and lions – will be bitterly contested. Swaziland's proposal to establish a legal trade in rhino horn will most likely be rejected, primarily for political reasons. Despite an apparent 'success' period of a decade from the mid-1990s, the CITES trade ban on rhino horn has mostly been a conservation failure since it was first established in the 1970s. The resurgence of poaching over the last decade presents a serious threat to wildlife ranchers and state parks agencies alike.

Whereas some might regard the high value of rhino horn as an opportunity for wildlife ranching and the development of new community-based enterprises, various NGOs and governments only see it as a threat. Accordingly, their focus is on increased law enforcement supported by so-called demand reduction campaigns and they reject the notion of legal rhino horn trade as a possible

solution. Why is this so and what are the implications for the wildlife ranching industry?

My presentation will consider these questions by outlining both the economic and political factors at play. After explaining the motivations of legal trade opponents, I will outline the hurdles that the wildlife ranching industry must overcome, not only to ensure the future of rhinos, but to ensure the future of the wildlife ranching industry as a whole, which is now under threat from the current public mood and international policies that increasingly favour preservation and prohibition over sustainable use and trade.

### **Mr Pelham Jones - Private Rhino Owners Association**



Pelham has over 30 years' experience in conservation and is the founder of the Private Rhino Owners Association (PROA). He is involved in all aspects of rhino conservation

from security to serving as a member of the Committee of Inquiry (CoI) appointed by the Minister of DEA. He serves on the NATJOC as well as a director of RAGE and a panelist of MySchool MyVillage MyPlanet which allocates funding to rhino conservation projects.

#### *The impact of poaching and role of private reserves in South African rhino conservation*

Private reserves in South Africa with rhino extend over 2 million ha and are home to 33% of the nation's rhino population (some 6200 animals, more than the rest of Africa combined). This conservation effort is carried out with no government assistance and very limited NGO assistance at huge sacrifice to reserve owners and their staff.

The presentation covers the impact of poaching on private reserves, interventions to negate the risk and actions of poachers as well as addressing some of the successes achieved in reducing this transnational criminal activity.

The need for trade in rhino horn is discussed to bring much need revenue back to support conservation efforts.

**Dr Guy Preston - Deputy Director-General: Environmental Programmes, Department of Environmental Affairs, South Africa**



Dr Preston is the DDG: Environmental Programmes in the Department of Environmental Affairs in South Africa. He is responsible for programmes that enhance the environment, including Working for Water (clearing invasive species), Working on Fire (managing wild fires), Working for Wetlands (rehabilitating wetlands), Working for Wetlands (restoring wetlands), Working for Wildlife (promoting the wildlife economy), Environmental Monitors (protection of the environment, and specifically focusing on rhinos), among many others. He is also responsible for Biosecurity in South Africa, and leads the process to regulate the prevention and control of invasive species. This is the main focus of his input.

*Investing in Sustainable Wildlife Ranching – Biosecurity Threats and Opportunities*

Invasive alien species are probably the single greatest threat to the sustainability of wildlife ranching in southern Africa. This talk will illustrate the exponential growth of invasives; their impacts (grazing/browsing; water security; wild fires; erosion; disease, and more), and options for their control. It will also talk to the compounding impacts of climate change, and associated bush

encroachment. The opportunities to link these to other measures of sustainability (e.g. wild-fire management), and the creation of jobs (including the utilization of the biomass), will be highlighted.

**Prof Melville Saayman - Director: Tourism Research in Economic Environs & Society, North-West University**

Prof Melville Saayman is currently director of the research focus area TREES



(Tourism Research in Economic Environs and Society) formerly known as the Institute for Tourism and Leisure Studies, at the North-West University (Potchefstroom Campus) in

South Africa. Until March 2009, he had also been head of the tourism programme at the same university for a period of 17 years. He served on several boards as a director, including the South African Tourism Board (SATOUR), North-West Parks and Tourism Board, Institute of Environment and Recreation Management, National Zoological Council, South African National Recreation Council (SANREC), North-West Recreation Council (PROREC-NW) and North West Development Corporation. At an international level, he is a member of the executive committee of the Association of International Experts in Tourism (AIEST) and also serves on the World Tourism Organisation's panel of experts. He became the first South African to be nominated as resource editor of the leading tourism journal, *Annals of Tourism Research*. He also serves on various other editorial boards and has published in most of the major national and international tourism journals. Currently he is active in the field of tourism and leisure economics and development. He became the first National Research Foundation (NRF) rated researcher in tourism in South Africa. From his pen, numerous leisure and tourism books (20), scientific

articles (130), technical reports (350) and in-service training manuals (8) have been published. He was study leader and promoter to 90 master's and doctoral students and he has also presented more than 100 papers at international conferences. In 2011 and 2012 he was awarded researcher of the year North-West University. He is married to Andrea and they have two daughters – Dominique and Anaïs.

#### *The role of tourism in the sustainable use of wildlife*

The game farming industry has experienced rapid growth over the past 20 years. We have seen an increase in the number of game farms, job opportunities, breeding programmes, auctions, hunting and number and value of game in general. South Africa has also, over the same period, experienced a significant increase in the number of tourist arrivals to the country, with approximately 10 million tourists visiting our shores per annum. Most of these tourists come to experience South Africa's nature and wildlife in one form or another, which links back to the products offered by the game farming industry. One of the key issues facing the future of game farms as well as the tourism industry in general, is sustainability. The complexity of sustainability lies in the fact that it has to do with not only financial, but also environmental, social and economic sustainability. In other words, how can we as a game farming industry achieve sustainability in all its forms and levels? The purpose of this presentation is to highlight the important role of tourism in game farm management. Currently one of the biggest generators of revenue for game farms is hunting, whilst tourism has played a less important role. One of the reasons for this is ignorance in terms of how tourism and tourism trends can be used as a source of revenue, since game farms lent themselves to different forms of tourism activities,

which should be exploited. As in the case of agriculture, it would be beneficial for game farm managers to diversify their products and also their sources of revenue. The paper will highlight the change in sources of income for game farms over the past 20 years and in addition, the paper will also highlight threats to not only the game farms, but the industry as a whole, and possible solutions to managing these threats.

#### **Mr Rudie de Wet - Botswana Game Ranchers Association**



Rudie is the chairman of the Botswana Wildlife Producers Association. He has grown up in Botswana and is still part of the Dewet Drilling family business which was established in 1948 in that country. Since his childhood

days he has seen the up's and down's of conservation efforts in Botswana. He is a passionate game rancher and is a believer that consumptive use is the best conservation tool. He is also an Honorary Wildlife Officer with the Botswana Department of Wildlife and National Parks. He holds a Botswana Professional Hunters License. He obtained his Bachelors in Architecture from the University of Pretoria.

#### *The Botswana wildlife industry and consequences of ban on hunting*

Botswana is one of the success stories globally in terms of conservation. If you look at the ratios of land that is dedicated to conservation it ranks among the best in the world. We have a government which appreciates the value of conservation and the preservation of that. This effort also contributes to the popularity of Botswana's tourism sector as Botswana is rated as one of the best tourist destinations in the world.

The game ranching industry in Botswana is relatively in its infant shoes as it started in the early 2000's. We have over a 100 registered game ranches with an average size of 9,000 hectares. The number of game animals on the ranches is currently a quarter of the total population of all Botswana's game numbers. Bearing in mind that the ranches cover 1% of Botswana's land mass and 8% of the combined areas including National Parks and Game Reserves.

The ban of hunting had a huge effect on the game ranch industry as it is perceived globally that there is no hunting in Botswana, although it is permitted on registered game ranches. When hunting of big game was allowed in the concession areas we had a huge spin off from clients who wanted to hunt plains game on the ranches. It is currently very difficult to market Botswana as a hunting destination.

The ban of hunting also had a huge effect on the communities who benefitted from that. I agree that it make sense to convert certain concession areas into photographic areas as it is ideally suited for that. But Botswana is a vast country and certain areas are not suited for photographic tourism. Hunting in those areas will ensure proper management where communities can benefit from it and also ensure survival of species as there will be proper anti-poaching measures put in place.

There is also an increase in human animal conflict in Botswana after the ban of hunting where predators especially are affected.

Botswana needs to relook at the ban to ensure a sustainable conservation effort.

## Mr Ross Hyland – University of Auckland, New Zealand



Ross spent 16 years as CEO and Managing Director of one of New Zealand's largest feed milling operations, Seales Winslow until 2011. He was also involved with project management from large scale

deer & dairy farm conversions to the building of multi-million dollar manufacturing factories with high levels of automation. He is chairman of the University of Auckland AgriTech & AgBio Investment Committee.

### *How the farming of endangered species can save them from extinction*

My focus will be on three ranching operations in New Zealand (NZ).

1. Ngamatea (33,000 Hectares, 80,000 acres) is located south of Lake Taupo in the central North Island. Ngamatea is a large sheep and cattle farm and in addition have a tremendous commercial hunting and fishing operation. The 1500 wild Sika deer on Ngamatea a very rare in NZ and Hunting Manager Bruce Bates says that since developing managed programmes, the average Sika carcass weights have nearly doubled.

2. Mesopotamia (26,000 Hectares, 64250 acres) is located at the headwaters of the Rangitata River in Canterbury NZ. 5000 Ha's is dedicated to commercial farming of Merino sheep, cattle and red deer for meat and velvet. Mesopotamia has a hunting concession over a further 21,000 hectares of the rugged Southern Alps of NZ. where they breed and manage the very rare Himalayan Thar. These amazingly agile animals are incredibly elusive and spend most of their time high up in the jagged mountains of the 'Two Thumbs Range'.

3. HighPeak-(4000 Hectares,10,000 acres) is located North of Lake Coleridge in NZ's Southern Alps. Commercially farm sheep, beef and deer with an additional 4,500 acre Red Deer trophy hunting block. Highpeak has some of the greatest Red Deer anywhere in the world, but it is the owner's attention to detail and management of their deer populations that result in such magnificent trophies for their clients.

### **Dr Francis Vorhies – Earthmind**



Dr Francis Vorhies has more than three decades of international experience in sustainable development and sustainable business, particularly with respect to biodiversity conservation. This includes setting up the economics and business programmes at the International Union for Conservation of Nature and working for the African Wildlife Foundation and the Earthwatch Institute. He is the founder and executive director of Earthmind which focuses on the nexus between commerce and conservation.

#### *Verifying conservation in wildlife ranches*

The presentation introduces the Verified Conservation Area (VCA) Approach and its usefulness for the wildlife ranching industry. The VCA Approach offers an innovative way for land managers to demonstrate their efforts to conserve nature. It consists of an online Registry of VCAs; a Standard for conservation planning, reporting and auditing; and a Toolkit of best practice. The VCA Approach enables conservation outside of protected areas to be visible, accountable and marketable. It offers the wildlife ranching industry a way to inform investors, clients, authorities, local communities and other stakeholders on how their ranches are conserving nature.

### **Dr Lyle Renecker - Palace Hillside Farm Group**



Dr Lyle Renecker is a wildlife animal scientist who heads Ag Innovation in Value-added Country Food Processing with Palace Hillside Farm Group. He has vast experience in meat quality research, applied applications and extensive cross cultural experience in food security applications. Lyle operates a livestock/cash crop farm in southern Ontario, Canada and is a consultant that works with indigenous peoples in Arctic regions of Canada and sub-Saharan, Africa to develop sustainable, value-added country food options.

#### *Country Foods Development Initiative in the Arctic: A Resource Sustainability and Value-Added Processing Strategy for Aboriginal People*

Food insecurity in northern aboriginal communities has been identified. The WHO defines food security when all people have access to good food to maintain life. An Inuit Health survey in 2007-08 has shown that about 68-69% of preschool children lived in food insecure homes. In order to achieve a level of food security where people have physical, social, and economic access to sufficient, safe and nutritious food is a problem circumpolar. Most often, food insecurity results from a lack of access to food rather than one of availability. Quality, acceptability (in terms of traditions and culture), and long-term stability are also considered important aspects of food security.

Natural food resources are an important cultural aspect of life for circumpolar aboriginal communities. An abundance of fish, sea mammals, birds, and berries exist for sustainable harvest, however, residents often lack the tools and training to turn these resources into hygienic, nutritious food products for community nutrition

and markets. However, through value-added processing an even wider product spectrum can be manufactured in regional communities. At the same time, residents do not have the skills – both hard and soft - to operate such facilities in northern settings to meet the taste requirements of their palates.

Initiatives have been implemented in the Arctic north to assist Inuit to become more food secure using country foods. Resource development in the north generally involves harvest of raw material for individual households or village use. There is minimal amount of extra value applied to material through further processing and packaging because such facilities and trained personnel are lacking. In order to maintain healthy and sustainable fish and wildlife stocks, there is a need to harvest sufficient numbers of a species in order to maintain a balance between a population and its' food resources. However, without the ability to process product, there is an inability to often fill the available quotas and maintain resource balance. As a result, opportunity is lost economically, ecologically, nutritionally, and culturally. This paper will discuss how Alaska, Arctic Canada (in conjunction with Palace Hillside Farm Group), Greenland, Scandinavia, and Russia have addressed these challenges

### **Dr Gert Dry - International Wildlife Ranching Symposium**



Dr G.C. Dry started his corporate career with Eskom (Electrical Supply Company South Africa) where he spent 19 years of his working life. His career started in industrial engineering and he was promoted through the ranks to Engineering Projects Executive, responsible for building power

stations, transmission lines, substations, facilities and life extension projects. In 1991, he joined Amalgamated Banks of South Africa (Absa) as a group executive and retired from Absa Group as Managing Executive: Real Estate Asset Management in October 2004. He served two terms as the President of Wildlife Ranching South Africa (WRSA), was the director of Diluculo Investments and Chairman of Absa DevCo, and served as a Board Member for SA National Parks Board and University of Pretoria Veterinary Faculty. Dr Dry is a Wildlife Rancher in the Vaalwater District, Limpopo, South Africa.

### *Sustainable use as a function of Biodiversity and Agriculture Development: Exploring the impacts of dysfunctional international conservation jurisprudence*

Game ranching in the RSA takes place on 20 million ha of agricultural land and makes a far bigger contribution to biodiversity than dated conservation (preservation) regulatory regimes 'enforced' on agricultural land that is not, and never will be, conservation land.

CoP17, CITES, IUCN or the South African NEMBA do not recognise or count any animals in game ranching on semi-extensive and game-fenced agricultural land as "wild animals", e.g. the Red List data recently released. This means, in effect, that game farmed on semi-extensive land does not reside under the international intent, governance, conventions or resolutions.

The above mentioned agencies do not count any farmed game on private game ranches, given their definitions of "wild animals" in the "wild". This year for instance, the USA Fish and Wildlife Services advised South Africa that in terms of the USA ESA listing, stricter measures to import hunted lion or bontebok trophies, will be enforced regardless whether wild or captive bred. The hunter must now

be in a position to prove “enhancement in the wild”.

The Architect of the Universe stopped making land; not humanity. Land will be shared by growing populations, agricultural development and conservation ideology. Key wildlife recovery in Africa is not technical or ecological, but carefully crafted legal and performance measures to ensure sustainable use. International dysfunctional jurisprudence leads to declining conservation and community development on the African continent, and is not self-correcting.

**Mrs Adri Kitshoff-Botha - CEO: Wildlife Ranching South Africa**



Adri Kitshoff-Botha, Chief Executive Officer, WRSA (Wildlife Ranching South Africa) is well-known in the South African and international wildlife circles. Adri started her career with the KwaZulu-Natal Hunting &

Conservation Association in 2001 and held the position of Chief Executive Officer since 2006. Whilst Adri represented KZNH&CA as an affiliated association to the Board of CHASA (Confederation of Hunting Associations of South Africa) she was elected during 2007 to the position as CHASA Vice chairperson, as position she held until the end of 2009. On 1 January 2010, Adri was appointed as the Chief Executive Officer of PHASA (the Professional Hunters Association of South Africa). By then she was already well-known in industry and government forums and it was not too long before she represented PHASA on international forums as well. Adri joined WRSA (Wildlife Ranching SA) as Chief Executive Officer on 1 December 2015 where she has already made a significant contribution. Adri is well-respected not only in South Africa, but also internationally, for

advocating and promoting responsible sustainable utilisation and wildlife management practices. She is the recipient of various awards, including the CHASA Golden Award, Serbian Hunting Federation Award for her role in promoting responsible sustainable utilization, Safari Club International (USA) Presidents Award for leadership and the PHASA Coenraad Vermaak Award for distinguished service to the professional hunting industry.

*How do Government regulations and institutional decisions affect our wildlife, communities and green economy?*

There were trends over the past few years where decisions by Governments, wildlife services and parastatals had a direct negative effect on our wildlife, communities and green economy. These included bans on trophy hunting, imports and transports. On the other hand, there are also government departments introducing enabling legislation to the benefit of our wildlife and communities.

**Dr Laurie Marker – Cheetah Conservation Fund**



Dr. Laurie Marker is Founder and Executive Director of the Cheetah Conservation Fund (CCF). Having worked with cheetahs since 1974, Laurie set up the not-for-profit Fund in 1990 and moved to Namibia to

develop a permanent Conservation Research Centre for the wild cheetah.

Dr. Marker helped develop the U.S. and international captive program, establishing the most successful captive cheetah-breeding program in North America during her 16 years (1974-1988) at Oregon’s Wildlife Safari in the USA. Laurie first came to Namibia in 1977 to conduct cheetah research and learned about the conflict

between livestock farmers and cheetahs in Namibia. For the next ten years, she continued traveling to Africa to learn more about the wild cheetah's problems and what could be done to assist wild populations.

In the early 1980's, with collaborators at the National Zoo and National Cancer Institute (USA), Dr. Marker helped identify the cheetah's lack of genetic variation, thus causing the species greater problems for survival. In 1988, in collaboration with these two institutions she became the Executive Director of the Centre for New Opportunities in Animal Health Sciences, based at Smithsonian Institution's National Zoo. She continues to serve as a NOAHS Research Fellow. In 1996 she was made a vice-chair of the World Conservation Union's (IUCN) Species Survival Commission's (SSC) Cat Specialist Group and now serves as a member on the core management group. In 2002, Laurie received her doctorate from Oxford University, England and has received numerous awards including the 2010 Tyler Prize and in 2015 the E.O. Wilson Environmental Conservation Award as well as the Eleonore Roosevelt Val Kil Award. The Cheetah Conservation Fund last year celebrated its 25th anniversary and is a recognized center of excellence for research and education.

### *Can cheetahs and wildlife ranchers ever live in co-existence?*

Large carnivores are currently facing severe threats and are experiencing substantial declines in their populations and geographical ranges around the world (Ripple et al., 2014). Human-wildlife conflict is a risk to 31% of the global carnivore species (IUCN Red List, 2016). The vast majority of Namibia's cheetahs (*Acinonyx jubatus*) (over 90%) and other large carnivores reside outside of national parks. Namibia is made up of a mosaic of land uses which includes both privately owned

mixed livestock and wildlife unfenced farms, fenced game farms, and open communal and commercial conservancies. Fences are meant to protect biodiversity however; fences have an ecological impact by blocking migration movements especially in arid ecosystems. The fences confine individuals in turn carnivore abundance may exceed their available resources leading to a potential rapid decline of the population or local extinction. Commercial farmers have utilised game fences to keep and protected their game which equates to their livelihood. However, game fenced farmers catch more cheetahs than that of livestock farmers (Marker et al. 2010). As more game fences are erected, the rate of human-wildlife conflict has increased, which is an issue not only for the cheetah but all large carnivores across Namibia.

CCF's research over the years has uncovered the complex relationships between individual cheetahs, their competition such as leopards and their prey base. By understanding these relationships it is possible to share information on how these influences affect cheetahs on game ranching farms and in turn how farmers can farm in co-existence. CCF's Future Farmers of Africa (FFA) project is a multifaceted integrated programme as it aims to help farmers with both human and environmental issues through education. CCF has created a set of integrated programmes aimed at addressing the principle threats to the cheetah by developing simple techniques through their FFA's programme and farmer training workshops. These tools include; livestock guarding dogs and swing gates that allow free movement of animals across game farms. These tools have already reduced the rate of human-wildlife conflict and help to maintain a viable population of carnivores across Namibia's conservancies. Through education CCF believes

that both commercial and communal farmers can successfully live together with large carnivores across Namibia now and in the future.

### **Mr Nick la Grange - Zimbabwe Wildlife Association / African Wildlife Management & Conservation**



Nick la Grange is involved in a game capture and translocation business based in Zimbabwe, and has had experience throughout the region. Nick's father was a game warden in the Zimbabwe National Parks and

was instrumental in moving many of the rhino out of the Zambesi Valley in the 80's. Mike started the game capture business after leaving National Parks, which Nick and his sister, (a vet) and brother-in-law have continued. Following the recent challenges faced by the Zimbabwean industry, Nick has been involved with setting up the wildlife association of Zimbabwe. This comprises members from all aspects of the industry, but primarily wildlife producers (ranchers).

#### *The Zimbabwe wildlife industry*

1. History - Brief overview of the origins of the wildlife industry in Zimbabwe, including Operation Noah, and the formation of the Parks and Wildlife Department.
2. Introduction of the 1975 Parks and Wildlife Act – what this meant for the industry and what the consequences of this decision were.
3. CAMPFIRE - The Act was amended to include communal areas and the people living in those areas, which allowed the birth of CAMPFIRE.

4. Growth of the Industry – private landowners invested heavily in wildlife, hunting and tourism boomed, Zimbabwe became an example of what could be done.
5. Role of the Veterinary Department - regulating movements of certain animals became necessary; policies were established to protect EU beef exports. Formation of Wildlife Unit.
6. Changing policies – the effects of the land redistribution drive. Formation of new policies, and the subsequent changing face of the industry.
7. Current Role Players – the various groups involved, the motivation out of passion for wildlife. Zimbabwe Wildlife Association.
8. Conservancies – highlighting the success of large areas designated for wildlife use, the challenges and opportunities.
9. Cecil! The aftermath, consequences, and the power of social media.
10. Ethics and transparency – with the spotlight now on us, we need to be careful.
11. Looking forward – what lies ahead will be determined by the attitudes and determination of those involved. Zimbabwe relies heavily on the tourism and hunting industry, and so we need to find ways of supporting the wildlife industry through unity and a common goal.

Zimbabwe – once a proud leader in the wildlife industry- has lost its place on the pedestal of world conservation. However all is not lost. Through the passion and determination of its people, Zimbabwe is trying to reclaim its rightful place again. As humans and wildlife struggle for existence at the coal face, the things that are

beneficial, and those that are detrimental, become apparent. The lessons learnt will help carry the industry forward, and others will be able to draw on our experiences.

### **Dr Kevin Robertson - Southern African Wildlife College**



Dr Kevin Robertson is currently the manager of the Southern African Wildlife College's Sustainable Utilization & Field Guiding business unit. This business unit offers Dangerous Game Guiding and an 18 month professional hunting courses. Based within the greater Kruger National Park makes the location of this training facility ideal for such purposes.

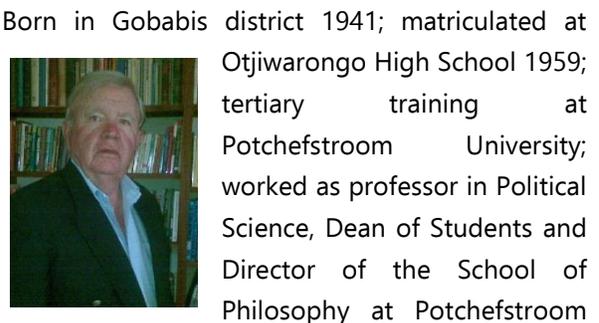
A best-selling author and veterinarian, Kevin has also been a Zimbabwe licensed professional hunter for more than two decades. Along with buffalo, the conservation of Africa's wildlife through its sustainable utilization has long been Kevin's passion.

#### *Hunting & Sustainable Utilization in Sabi Park, Mozambique*

Sabi Game Park is a hunting concession in Mozambique. 28 000 ha in size, it borders the south-eastern boundary with, and is open to the Greater Kruger National Park. A well-managed, scientifically monitored sport hunting operation generates the funds needed to sustainably run this property. These funds are also used to drive an aggressive anti-poaching operation and they are sufficient to support financially as well, the local community. Only when the local community comes to realize the economic benefits of wildlife conservation will it protect it. This is a concept which Sabi Game Park is in the process of putting into place and the results thereof are now being seen. This presentation gives the hunting

operation's facts and figures and explains how, through strategic partnerships and community governance support, this conservation initiative is possible.

### **Prof Pieter JJS Potgieter - President: South African Predator Association**



Born in Gobabis district 1941; matriculated at Otjiwarongo High School 1959; tertiary training at Potchefstroom University; worked as professor in Political Science, Dean of Students and Director of the School of Philosophy at Potchefstroom University, later Northwest University. Currently President of the SA Predator Association.

#### *The controversy surrounding the conservation value of captive-bred lions*

The conservation value of captive-bred lions is seriously questioned by most conservation minded people – to such an extent that they refuse to admit that these lions can make an enormous contribution towards the enhancement of the lion in the wild. Reasons offered range from alleged genetic contamination to captive-bred lions' alleged inability to adapt to conditions in the wild, including their alleged inability to acquire the social skills to function successfully in a pride. These allegations seem to be inspired by either a lack of understanding of the realities driving the decline of lion populations in Africa or a misunderstanding of the objectives and intentions of the captive-bred lion industry of South Africa or both.

Notwithstanding unethical conduct and practices by lion farmers uncovered from time to time the industry at large is functioning on the principle of sustainable use. It exploits, by consumptive as well as non-consumptive use, a very esteemed and

iconic game species economically, thereby generating a livelihood for self and for local communities. However, the industry is acutely aware of its responsibility to contribute to the survival and welfare of the lions in the wild. This responsibility is operationalised through various projects, including scientific research, financial support for lion conservation and, ultimately, the re-establishment of lions in areas in Africa where they have become extinct.

### **Dr Alistair Pole - African Wildlife Foundation**



Alistair Pole is the Land and Habitat Management Program Director for the African Wildlife Foundation as well as the owner of Zambezi Hunters, a high end safari company based in Zimbabwe. He started his

involvement with conservation in Africa in 1993 when he completed his honors project on Black rhino which led to a PhD through Aberdeen University on African Wild Dogs in the Save Conservancy and Gonarezhou National Park, Zimbabwe. The conservation project he started for the wild dogs on Save Conservancy is still very active today and Alistair has maintained strong links to the Save Conservancy to date, being on their executive committee for more than 10 years and Chairman of the Technical Advisory Committee for 5 years.

After completing his PhD, Alistair became Managing Director for Chishakwe Ranch in Save Conservancy and helped to develop the property as a wildlife ranch over a four year period. On leaving this he spent 2 years as a wildlife management consultant working for a wide range of private companies and NGO's throughout southern Africa. In 2007 he became Managing Director of Zambezi Hunters, one of the oldest and

most reputable Safari Companies in Zimbabwe, eventually taking over full ownership of the company in 2012. Alistair is still the majority shareholder in Zambezi Hunters although not involved in the day to day operations of the company.

Alistair joined AWF in 2014 to become their Director for Land and Habitat Management. In this role he has been involved in projects in eight different African countries ranging from West/Central Africa, east Africa and Southern Africa. He has gained experience of working with a wide range of Governments and Government officials, communities, NGO's and private sector players within the African Conservation arena. He is the inaugural Chairman of an Advisory Committee established by the Ministry of Environment, Water and Climate Change in Zimbabwe to provide technical input to the Ministry on issues relating to the Wildlife Industry.

### *Manyara Ranch: A Potential Model for Wildlife Management in Tanzania*

Tanzania is a country blessed with incredible natural resources and abundant wildlife. It has the potential to have one of the most successful and viable wildlife industries in Africa. However, its policies do not support local level user rights and it has no models on which to base successful wildlife ranching. It is believed that the country would benefit enormously from an established model of a successful wildlife ranch which can then also have an influence on policy formulation to create the right environment for the growth of a wildlife industry.

Manyara Ranch provides an ideal opportunity to achieve this. It is a 45,000 acre ranch in the Masai Steppe of northern Tanzania that forms a critical corridor for wildlife movement between Tarangire National Park, Lake Manyara National Park and

Lake Natron to the north in one of the continents most recognised and game rich landscapes. As a result, it has good wildlife populations with some being resident but most migrating through the area. Manyara Ranch is held in Trust for the benefit of its neighbouring communities but has suffered decades of mismanagement and poor performance as a mixed wildlife and livestock operation.

In 2013 the African Wildlife Foundation took over management of the ranch and much has been done to improve the situation and develop a plan for the future development into a model wildlife and livestock operation. Critical to this has been the re engagement with the neighbouring communities and gaining their trust and support.

#### **Dr Delwin Benson - Colorado State University**



Dr. Benson is Professor and Extension Wildlife Specialist in the Department of Fish, Wildlife, and Conservation Biology at Colorado State University since 1975. Education, research and outreach about nature, outdoor activities, and wildlife conservation on private lands are part of his offerings. He worked for the provincial wildlife agency in Ontario Canada (1973-1975), studied socio-economic wildlife values on private lands in South Africa where he has consulted and led tours, and reviewed hunting and nature conservation on private lands in Australia, South America, and Europe. His approach to education is to encourage stewardship of nature by multiplying his efforts through community action, workshops, courses, presentations, publications, conservation organization development, and via the Internet: <http://www.LandHelp.info>.

He has 6 online courses that are available anywhere in the world about wildlife and natural resources law, policy, and administration; communications and leadership; wildlife habitat management on private lands; Aldo Leopold; and actions for sustainable behaviors. In each course, students study on their own and complete practical exercises applying knowledge gained from books, study guides, assignments, and independent research into real-life situations.

Dr. Benson received awards from The Wildlife Society (4), Rocky Mountain Center on the Environment, Colorado Wildlife Federation, CSU Cooperative Extension, and CSU Service Learning, for his educational programs, presentations, publications, and citizen-based organizational activities. His most recent book "Wildlife Stewardship and Recreation on Private Lands" won the education award from The Wildlife Society in 2000. He was inducted into the Hunter Education Hall of Fame by the International Hunter Education Association in 1987. He was chairman of the 8th International Wildlife Ranching Symposium called "Congress for Wildlife and Livelihoods on Private and Communal Lands: Livestock, Tourism, and Spirit in Colorado USA in 2013.

#### *American Bison: relic symbol, domesticated novelty, rewilding dream*

The US Congress and President unanimously agreed on a national mammalian symbol with the National Bison Legacy Act of 2016. The law is entirely symbolic and could mean nothing to socially and ecologically rewild bison which might have totaled 30-60 million: the last clause of the bill reads "Nothing in this act or the adoption of the North American bison as the national mammal of the United States shall be construed or used as a reason to alter, change, modify, or otherwise affect any plan, policy, management decision,

regulation, or other action by the federal government."

Approximately 500,000 bison (20,000 plains and 10,000 wood bison) live in 62 conservation herds in the Great Plains and boreal forests of North America. Perhaps 15,000 bison are free-ranging and able to function ecologically. Relic extant populations persisted since near extirpation during the 1800s in Yellowstone National Park (4,900), and were restored on other public lands. Most numbers, 90 percent, were introduced to fenced private and tribal lands, bred for meat, husbanded as novelties and exhibits, or fostered for ecological and social considerations.

The rewilding dream is limited by human populations and infrastructures, land uses, fragmented suitable landscapes, and attitudes that are incompatible with free-roaming wild herds of ½ to one ton ungulates. Managers with governments, tribes, organizations, and private lands seek uncertain futures for bison considering legislation, land use alternatives, economics, social perspectives, dreams, and actions that not all can agree. Must we accept symbolic management of relics or ecologically rewild our dreams.

## *Parallel Session Abstracts*

### **1. Wildlife management**

#### **The impact of predation losses on wildlife ranches in Limpopo Province, South Africa**

*Anche Schepers, Walter van Niekerk, Nicolette Matthews & HO de Waal*

Predation losses on sheep and goats in five South African provinces were estimated at more than ZAR 1.39 thousand million annually and for beef cattle in seven provinces it was more than ZAR 383 million per year. Predation losses have been ascribed to black-backed jackal *Canis mesomelas*, caracal *Caracal caracal*, leopard *Panthera pardus*, brown hyaena *Parahyaena brunnea*, cheetah *Acinonyx jubatus* and vagrant dogs *Canis familiaris*. This study quantified predation losses on wildlife ranches, specifically the Limpopo Province. Management on wildlife ranches requires specific methods to assess changes in wildlife numbers, namely: physically counting of animals by means of aerial counting, drive census and known groups, Rand value (ZAR) based on live animal sales,

trophy hunting, biltong hunting, comparing animal numbers with the previous year and the number of wildlife available to hunt. Baseline information was calculated for three different categories of wild antelope species. Wildlife ranchers can use the baseline information and calculate their own financial losses; for example: if nyalas *Tragelaphus angasii* are kept on 5 000 ha, the estimated total cost of predation losses is ZAR 593 765/year. Similarly, a wildlife rancher who keeps blesbok *Damaliscus pygargus phillipsi* on 12 000 ha can expect to incur a total cost of ZAR 668 103/year and for a wildlife rancher who keeps black impala *Aepyceros melampus* and Livingston eland *Tragelaphus oryx* on 6 000 ha, the total cost is ZAR 11 957 637/year. The information from these studies are now used to inform the development of meaningful coordinated predation management strategies.

## **Implementation of Biodiversity Economy Strategy in the Eastern Cape Province: the preliminary lessons learnt**

*Thabiso M Mokořjomela, Nomatile Nombewu & Dean M Peinke*

Conservation of biodiversity has become a priority matter due to its excellent boost to socio-economic development through ecotourism. The Eastern Cape Parks and Tourism Agency is responsible for the management of the provincial protected area network in South Africa. The Protected Area Expansion Strategy for the Agency is currently looking to improve biodiversity conservation using different mechanisms such as the Game Industry Transformation Strategy. The study elucidates how Game Industry Transformation Initiative as part of the national biodiversity economy strategy has a potential to promote biodiversity conservation whilst also addressing the socio-economic issues in Eastern Cape Province, South Africa. An invitation for Expression of Interest for Game Farming Transformation Initiative - GFTI (REP No: 03/15/16) was published widely on media over a period of one month as per South African government protocol. A total of 20 (N) applications were received comprising 90% of the targeted previously disadvantaged individuals (PDIs), and 10% were the institutions supporting the initiative. An estimated total area greater than 5000 hectares may benefit protection for biodiversity through GFTI. Out of the total PDIs (n = 18), 44% had landownership with verifiable title deeds, 12% relied on communal land while 44% relied on land leased from the government. There were significantly few participants (22%) with full capacity (i.e. game infrastructure) to roll out the incubation phase of the initiative within one year. A few lessons learnt include: 1. land ownership will remain a major challenge in the future; 2. infrastructural capital is limiting factor; and 3. a few

people were interested thereby suggesting a need for more campaign for wildlife economy in the PDIs in South Africa.

## **Wildlife management practices drives hybridization in South Africa: Conservation implications**

*Nicole Benjamin-Fink and Brian K. Reilly*

Historically, wildlife translocations assisted in re-establishing species in areas of extinction and are currently employed in over 50 countries. Ironically, they may be responsible for the extinction of pure genetic lineages, thereby negatively impacting endangered, indigenous, and rare species worldwide. The need to intensely manage populations is accelerating and the use of translocation as a practice is rapidly utilized within the wildlife ranching industry. We hypothesize that black and blue wildebeest translocation practices are detrimental, likely to persist in their current form, and policies facilitate hybridization. 6,929 translocated wildebeest from 275 private ranches and three provincial protected areas, across 5 South African provinces, were documented over five years. We analysed dispersal patterns of two translocated species that hybridize: the endemic black wildebeest and the more common blue wildebeest, sustainability of the translocation practice (indicated by generated revenue), and links between policies and hybridization. Translocations facilitate hybridization by overlapping previously ecologically and geographically isolated species, from multiple origins. Key findings indicate that blue wildebeest males of reproductive age are primarily translocated, wildebeest are introduced to the private and commercial industry from multiple sources (1-34), generated revenue from wildebeest accounted for 20.8%, and spatial disconnectivity and separate feeding grounds are correlated with

decreased hybridization. This raises concerns for ecological integrity, location of genetically pure populations, genetic swamping, and regulatory efficiency. We coin the concept of an Ecological Sustainable Network (ESN) certificate and propose transparent and accountable procedural frameworks that standardize wildlife translocation practices for wildlife managers in the game ranching industry.

### **Lessons in managing wild ungulates in an urbanized environment**

*Bob van den Brink*

Wild ungulates in the Netherlands were for many decades almost extinct and some species even temporarily absent. In some remote areas small populations of roe deer and wild boar did survive but numbers remained low. After World War II, due to a rapid urbanisation and the construction of a dense infrastructure, survival chances for ungulates only decreased.

The realization of an ecological network and stricter protection laws led since 1990 to a sharp reversal for the wild ungulates. The numbers of red, fallow, roe deer and wild boar started to increase sharply. And this increase continues. There are more wild deer now in the Netherlands than there have been since centuries. The wild boar population is now expanding strongly towards new areas and it appears impossible to put a hold on this expansion.

However, this increase in numbers yielded new problems for human safety and the economy. It led to an increase of collisions with traffic, agricultural damage and effects of over grazing. Especially fallow deer and wild boar show up more often in built-up areas and become a nuisance for residents.

There has been a learning process how to manage ungulate populations to avoid conflicts with humans. A search for socially and economically acceptable measures to control populations, care for animal welfare and reducing risks for both humans and animals. There are a lot of cases with different solutions to be presented.

### **Livestock or wildlife in western Ngamiland, Botswana? Who dares wins**

*Perkins, J.S., Brooks, C., Bradley, J. and S. Bourquin*

Land use planning in North-western Botswana has reached a critical juncture. Key wildlife movements from the Okavango Delta System to the drier Kalahari have almost been cut-off by linear development, settlement expansion and dryland farming, along the margins of the Okavango Panhandle and Okavango Delta. Botswana's burgeoning elephant population is expanding outwards to an unprecedented degree, damaging fences and infrastructure and causing high levels of Human Elephant Conflict. Saline groundwater and an abundance of *Dichapetalum cymosum* has limited livestock expansion and currently vast areas of effectively 'empty savannah' burn every year. Mobility is the key for the persistence of all the key wild ungulate populations and when this was lost in the Kalahari System thirty five years ago more than a half million blue wildebeest and red hartebeest perished never to recover. Fenced game and livestock ranches offer no substitute to an open system in which large ungulates are able to move between the Zambezian and Kalahari floristic domains. Game ranched populations cannot meaningfully contribute to the restocking of the free ranging populations as they become water dependent and behaviourally unable to survive in the harsh Kalahari environment. A hierarchy of options exist from visionary connectivity of north-western Botswana to the

broader KAZA-TFCA, to the sectoral prioritisation of a heavily subsidised beef sector. It would be a tragedy if the resolution of this natural resource management conflict followed that of the Kalahari System last century, where who dared won.

### **Demography and morphometry of an important mesopredator (black-backed jackal – *Canis mesomelas*) in southern Africa**

*HO de Waal*

Predation losses on livestock and wildlife ranches are more than ZAR 2 thousand million per year. The black-backed jackal *Canis mesomelas* is an important mesopredator in South Africa and Namibia and implicated for much of these losses. Despite control over decades, little is known about their demography and morphometry. Information was collected by farmers and specialist predator hunters during a period of 21 months. Time of year hunted (age relative to whelping), eruption of the permanent teeth and the wear of incisors were used to categorise 4 age groups: <0.5 years (pups), 0.5–1 years (juveniles), between 1–2 years (yearlings), and ≥2 years (adults). The 455 males and 411 females did not support the assumption that hunted (stressed) populations respond by producing more females to increase reproductive fitness of the species. Except for significantly more females in the age group 1-2 years (yearlings), their sex ratio was not skewed. Sexual dimorphism was evident with males weighing consistently more than same age females; the heaviest adult male and female weighed 12.5 kg and 11.5 kg, respectively. Growth and development of black-backed jackals occurred mostly in the first 6 months of their lives, thereafter decreasing gradually. Sexual dimorphism was also displayed by morphometry and total body length, body length and tail length of males were consistently more than for females. Predation management of

black-backed jackals must be informed by good knowledge of the interface between its biology and management; this information is now used to develop meaningful coordinated predation management strategies.

### **The impact of predation losses on beef cattle in South Africa**

*Conrad Badenhorst, Walter van Niekerk, Dirkie Strydom, Henry Jordaan & HO de Waal*

Predation losses on livestock farms and wildlife ranches in South Africa are poorly quantified. Recently predation losses on sheep and goats in five provinces were estimated at more than ZAR 1.39 thousand million annually. Predation losses were mostly ascribed to black-backed jackals *Canis mesomelas* and caracal *Caracal caracal*. In the present study predation losses for beef cattle in seven provinces were estimated at more than ZAR 383 million annually. The random sample of 1 344 beef cattle farmers ascribed predation losses mostly to black-backed jackals, followed (in different order of ranking for provinces) by leopard *Panthera pardus*, caracal, brown hyaena *Parahyaena brunnea*, cheetah *Acinonyx jubatus* and vagrant dogs *Canis familiaris*. Only in Limpopo Province leopards were implicated as the major predator, followed by black-backed jackals. Beef cattle farmers have fewer methods available to manage predators than small livestock farmers. Non-lethal methods used were herdsman, electric fences, kraaling, and livestock guard animals. The lethal methods included hunting (farmers and specialist hunters), cage traps, foothold traps, and hound packs. No non-lethal or lethal method, used individually or combined with other methods, served as a magic general solution for predation on beef cattle. The total direct and indirect costs of predation varied between provinces; for South Africa it was: total cost for lethal control – ZAR

39.522 million; total cost for non-lethal control – ZAR 89.175 million; total cost of predation losses – ZAR 254.447 million. This information is now being used to inform the development of meaningful coordinated predation management strategies.

**Endangered Bontebok and small game survival: a quest of palaeontology, climate change, consumptive use and biodiversity management in southern Africa**

*Deon Furstenburg*

Bontebok enhancement and survival as species came into question with the US Fisheries & Wildlife Services from an attack by the US Humane Society on permits for bontebok trophy imports in October 2015. A comprehensive report that enlightens the origin, development and reasons for the genetic bottleneck of the sub-species was compiled by the author. DNA genetics provides valued insight in the bontebok's heterozygosity when linked to historic palaeontology of the southern African coast line and the climate conditions and different vegetation as now indicated from radio-isotope from dental measurement of skeletons and fossils found in the Karoo Basin and along the southern coastline. An assessment of governmental attempts of protection verses the translocation of Bontebok out of its past natural distribution range in the Western Cape to alternative more suitable habitat in the Eastern Cape and the Free State are discussed. The impact of breeding on private land and the establishment of the WRSA Bontebok Breeding Group and the newly registered Bontebok Breeders Association (GAZETTE notice 690, 10 Jun 2016) as part of the Wildlife Production Association under the Animal Improvement Act (Act 62 of 1998) of the South African Department of Agriculture, Fisheries & Forestry is highlighted against the contradictory

IUCN Red data listing. A difference in number of 1,200 versus 8,000 bontebok and the application to other game species are discussed.

**The implementation of modern genetic improvement methods in wildlife**

*Frederick Nesor, Mike Fair, Japie van Wyk, Paul Lubout, Charné Josling & HO de Waal*

In recent times the economic value of wildlife has extended beyond merely hunting and eco-tourism. The demand for exotic and alternative meat sources worldwide has resulted in a shift on emphasis placed on the improvement of production and reproduction traits in the wildlife sector. This trend is in line with the current genetic improvement of commercial farm animals. However, the over emphasis placed on single trait selection, like horn length and colour, without considering the genetic correlations that exist between all possible traits, could have detrimental effect on the important traits of fertility and adaptation. Unfortunately these traits are normally difficult to measure, lowly heritable and negatively correlated with production. To overcome these obstacles it is necessary to have proper phenotypic and genomic data to implement modern genetic evaluation methodologies. To avoid mistakes made in the traditional livestock industry, the defining of sustainable and balanced selection goals is of paramount importance. Apart from the benefits of genetic improvement, conservation and diversity can also be maintained and improved, while inbreeding can be monitored and controlled.

**The Angolan experience and how this can be done in the Congo (DRC)**

*Prof Wouter van Hoven*

The 27 year long civil war in Angola has devastated the national parks and wildlife

populations of this country. In cooperation with the Angolan government we planned the return of many locally extinct species including elephant. All animals had to be airlifted, including elephant in family groups and giraffe plus 12 other species. The wildlife was all released into a Special Conservation Area within the Kissama national Park. The operation will be discussed, how it was planned, and the ecology behind it, the benefit to the local communities, and where it stands today.

Wildlife in the Democratic Republic of the Congo has been devastated during the past years of civil war. The Kiala Community Land just north of the Angola border together with private land form a natural area of 500 000 ha. We are planning with the community to fence the first 75 000 ha and reintroduce wildlife in order to start a conservation plan based on ecotourism and the sustainable use of natural resources. Can we repeat the Angola project in DRC?

### **Institutions, Governance, and the Economic Performance of Protected Areas in Southern Africa**

*Alex Chidakel*

Though wildlife enjoys an economic comparative advantage in dryland areas of southern Africa, public and private investment in this land use varies significantly. This variation exists both between countries with different institutional regimes for wildlife, and between land ownership categories within countries. From an institutional economic perspective, allocation of resources to wildlife-based land uses, and value generated in consequence, is hypothesized to be in relation to the degree to which rights to own wildlife and responsibility for management are devolved to the scale at which wildlife is produced. Within and between country variation in tenurial and management arrangements therefore presents an

opportunity to test predicted relationships with economic efficiency and to explore the implications of institutions on the equity of value distribution. Economic impact analyses, which measure local value in terms of production, income, jobs, and value added, are becoming increasingly common of national parks, though their application to non-public protected areas (PAs) is rare. In this study, impact analysis is applied to both sets of PAs through an ongoing cross-sectional comparison of the economic value of public, private, and communal protected areas of the Greater Kruger Area of South Africa, and of the southern Luangwa Valley in Zambia. It's hypothesized that the value of PAs to which resources are allocated by the state is greater than that of PAs on private and communal land where institutions for wildlife are centralized (Zambia), and vice versa where institutions are devolved (South Africa). Only results for the Luangwa system are here described.

### **The working and introduction of the Wildlife Estate Label in the European Union**

*Bob van den Brink, on behalf of the European Landowners Organisation*

Small and large estates all over Europe represent major partners in the conservation of biodiversity; they provide space, shelter and living conditions for some of our most iconic species. From the running white-tailed deer of Finland to flights of migrating birds in Spain, estates often provide room for such animals to thrive.

The Wildlife Estates project aims to establish a network of exemplary estates. These estates/territories will showcase the simple principles of good management and conservation of wildlife estates all over Europe.

After 10 years of experience, more than 150 estates in 17 countries and close to 1.000.000 ha labelled, the Wildlife Estates (WE) Label has perfected its method of creating biodiversity, which in turn generates economic, social and ecological stability.

Our objective is simple. Use the land to its fullest potential, in a respectful manner, so as to create long term benefits. Apart from a highly beneficial exchange of experience, the initiative has established simple but precise principles for the good territorial management and conservation of 'wildlife' territories throughout Europe, divided up according to the different biogeographical regions of the European Union.

The WE label has been developed to recognize and admit good and exemplary management of territories. It creates a system which ensures and demonstrates that the management and the use of natural resources on relevant estates comply with biodiversity and nature conservation principles and aims to be flexible and reproducible.

This is why the WE Label is vital; to combine careful management practice with conservation – a private commitment to working for the public good.

All those who commit to our principles do so on a voluntary basis, not because their hand is forced by regulation, but because they have a healthy respect for the maintenance of biodiversity. In many cases, this is not only good for nature, but a diverse and healthy estate can provide even more benefits like increased pollination, especially when the aims of the WE Label are combined with those of our Pollinator Network initiative.

### **Creating Voluntary Payment Programs to Promote Endangered Wildlife Recovery:**

### **Effective Program Design and Ranchers' Willingness to Conserve Florida Panther Habitat**

*Melissa M. Kreye, Elizabeth F. Pienaar, José R. Soto & Damian C. Adams*

Landowner resistance to Endangered Species Act (ESA) regulations is a key challenge to endangered species protection and recovery. Payments for Ecosystem Services (PES) strategies have been promoted as an effective market-based strategy for conserving imperilled species and offsetting ESA regulatory pressure on private landowners. The U.S. Fish and Wildlife Service (USFWS) recently proposed that a mix of PES and regulatory assurances be implemented in Florida to encourage cattlemen to engage in Florida panther recovery efforts. To identify cattlemen's preferences for the proposed programs we conducted a mail-based survey employing a choice experiment typically used in marketing research (i.e., best-worst scaling). We found that the utility associated with an incentive program depends on both the type and level of incentive offered and contract features that impact personal autonomy. Our findings suggest that voluntary conservation programs are most likely to enrol politically conservative landowners if these programs (1) provide per-acre payments or tax reductions, (2) are of shorter duration, (3) are based on norms of reciprocity, and (4) do not require overly intrusive or restrictive levels of monitoring to ensure program compliance.

### **Application of an abundance index tool to monitor long term changes in ungulate population trends: an example from Cawston Game Ranch, Zimbabwe**

*Vernon Booth and Peter A Johnstone*

Cawston Game Ranch, located in Matabeleland Province in Zimbabwe, has operated as a trophy

hunting destination since its inception in 1987. The ranch is situated in a semi-arid region with limited arable soils and subject to high rainfall variability. The ranch is surrounded by resettlement and subsistence farmers and their families. Vegetation is dominated by *Colophospermum mopane* – Acacia species on basalt soils. There are no perennial river systems requiring the maintenance of an extensive artificial game water supply system strategically located across the ranch. The 128km<sup>2</sup> property is surrounded by a 2.4 m high, 13 strand game fence.

A mixture of grazers and mixed feeders make up the 17 species of ungulates with large predators limited to leopard and brown hyena. There are no buffalo, lion or elephant. Approximately 9,000 animals have been harvested over a 20-year period. Rifle and bow trophy hunting and cropping are main source of revenue together with irregular live sales of impala, giraffe, sable, wildebeest, kudu and warthog.

The founder populations have been monitored annually using robust road strip count surveys since 1997. These data have been analysed using the programme DISTANCE (Buckland, S.T., Anderson, D.R. Burnham, K.P. and Laake, J.L. 1993) to monitor changes in population estimates. A relationship using an abundance index for different species to estimate population numbers has been developed that provides game ranch managers with a simple tool to track population changes and hence establish sustainable quota offtakes without necessarily having to use complex and expensive survey techniques.

### **Diseases of special importance to the wildlife industry in Namibia**

*Dr Ulf Tubbesing*

### **Phylogeography and conservation genomics of the African lion (*Panthera leo*) at a continental and local scale based on mitochondrial and nuclear molecular markers**

*Nathalie Smitz, Olivia Jouvenet, Laura Bertrand, Fredrick Ligate, Dennis Ikanda, Philippe Chardonnet, William-George Crosmay, Daniel Cornélis, François Gillet, Mario Melletti, Alessandro Fusari, Johan Michaux*

The African lion (*Panthera leo*) is listed as “vulnerable” by the IUCN Red List, mainly threatened by indiscriminate killing, primarily as a result of retaliatory or pre-emptive killing to protect human life and livestock, and prey base depletion. Habitat loss and conversion has led to a number of subpopulations becoming small and isolated. With the weakened connectivity between the main strongholds, genetic drift and loss of genetic diversity could affect the genetic health of the species. In the present study, we investigated the evolutionary history of the species at different scales of time and space. A total of 182 samples were used, including a larger number of 77 samples from Tanzanian protected areas. The mitochondrial cytochrome b gene was sequenced and the specimens were genotyped for 11 microsatellites and more than 9,000 SNPs. The preliminary results indicate that the lion is structured into two lineages at the continental scale (West-Central vs South-Eastern), a pattern observed within many other large African savanna species displaying large distribution ranges. Pleistocene climatic oscillations and biogeographical barriers were proposed as the main factors to have driven the lineage sorting. The first results based on microsatellites highlighted that the Tanzanian population displayed good level of genetic diversities with no signs of inbreeding. Indication of isolation-by-distance nevertheless highlighted a potential future impact of fragmentation on the population

genetic health. SNPs allowed to identify 3 populations of lions in Tanzania, geographically structured. Using various molecular markers, the present work will further explore the taxonomy and the evolutionary history of the African lion for bringing insights in its conservation requirements.

### **Wildlife Ranching with the Mini Antelope Species of southern Africa**

*Arnaud le Roux*

The main objective for a Small Antelope Breeding Industry (SABI) is to promote the conservation of all the small antelopes in their natural habitats in southern Africa. One of the biggest threats to small antelope species is habitat loss and fragmentation. While captive breeding may contribute towards achieving the goals of the SABI, there is also a risk that providing captive breeding as an option will result in more land transformation and habitat loss based upon the perception that animals on land suitable for development can simply be removed and put into a captive breeding facility. This may ultimately work against the objectives of small antelope conservation, especially considering that the success of rehabilitation of captive bred animals into the wild has not been well tested. Captive breeding must therefore only be seen as a management tool to ultimately support the return of animals into natural habitat, and must not be seen as a conservation tool in isolation to

conserving small antelope species in their natural habitats.

Source animals are from (1) a population that is 'doomed' i.e. population is under imminent threat of extinction due to land use change or poaching, and where there are no options for natural movement of animals to contribute to a larger metapopulation, (2) a population at or above maximum productivity carrying capacity (i.e. at or above 75% of ecological carrying capacity) or a level at which Provincial conservation agencies are prepared to grant a capture permit, or (3) animals that are injured or imprinted and are hence non-releasable.

The purpose is to ensure that there are no extra negative impacts on wild populations; it is undesirable to remove animals from wild populations where these populations are below carrying capacity, or where options exist to translocated animals to other areas of natural habitat.

In all cases status of populations (doomed populations, populations above maximum productivity carrying capacity, and non-releasable animals) is to be assessed by an authorized representative.

### **Rabies in Kudu and Eland – Its impact on game ranching in Namibia**

*Dr Ulf Tubbesing*

The World Health Organization defines food security when all people have sustained access to good food to maintain life and can do so in socially and culturally acceptable ways. The food should be good in quantity and quality to maintain

## **2. Sustainable use of Wildlife**

### **Sustainable Agriculture and Wildlife Resources in Sub Saharan Africa and the Relationship to Country Foods and Food Security**

*Lyle A. Renecker*

a healthy life. However, Sub Saharan Africa is entangled and controlled by a rain-fed agricultural scenario. Food insecurity and poverty cannot be tackled without first addressing the issues of sustainable agriculture and rural development in this region. Conversion of agricultural development agendas and wildlife management strategies into genuine action on the ground requires total political and resource commitment. Socioeconomic and technological characteristics of country food Ag-innovation strategies probably hold part of the answer to mitigation and adaptation to nutritional problems of the region. From Nigeria to southern Africa, many people rely on cattle and wildlife production for their economic livelihoods and nutritional stasis, however overuse of the communal grazing areas and suboptimal grazing practices threaten the long-term viability of the land and contribute to persistent food insecurity. To increase the productivity of livestock and other animals using the land, programs must be designed to help communities improve their livestock practices, address rangeland degradation, add shelf stability to country food processing methods, and improve market access and most importantly feed people. This presentation will discuss how the adaptation ag-innovation and the use of ready to eat processing technology will be applied to improve the sustainability of resources in target central and southern African regions. However, application of technology will go hand-in-hand with personal and cultural empowerment. Lessons learned in similar circumstance of food insecurity in Canada's Arctic will be applied in projects in Sub Saharan Africa.

### **Management of free-ranging hunted wild reindeer (*Rangifer tarandus*) in Norway**

*Torstein Storaas*

In Europe, wild reindeer was an important source of human food during the last glaciation. Presently the last remnants of the wild European mountain-living reindeer survive in southern Norwegian mountains where they move nomadically between summer and winter ranges. The reindeer ranges belong to different counties and municipalities and are owned by private persons and public institutions. The ranges are threatened by human development, and reindeer is a hunted species. The landowner has the hunting rights on own grounds.

During a long political process, each reindeer mountain range has been defined, and regional development plans with zones of no development, buffer zones and zones with some development have been approved. A board of landowners and a national board with members from each municipality manage the reindeer according to the plan and National regulations. The national board has the right to oppose all development plans inside the reindeer ranges and will usually be heard by National authorities. The landowner board make harvest plans that must be approved by the national board. In this talk, I will describe the management system that is one example of how a vulnerable hunted species and its habitat crossing private and political borders may be managed.

### **Zebra: more than just stripes**

*LC Hoffman*

Zebra (*Equus quagga burchellii*) are growing in number in southern Africa, with the meat from surplus animals holding potential to contribute to food security and economic stability. Despite being consumed locally and globally, little information exists on the composition of zebra meat. This study aimed to determine the proximate composition of zebra meat as well as

the fatty acid composition of the intramuscular (IMF) and subcutaneous (SCF) fat.

Zebra longissimus lumborum muscle was shown to have a high mean protein content (22.29 g per 100 g) and low mean fat content (1.47 g per 100 g). High proportions of polyunsaturated fatty acids (PUFAs) were found in the IMF (41.15%) and SCF (37.71%), mainly comprising  $\alpha$ -linolenic (C18:3n-3) and linoleic (C18:2n-6) acids. Furthermore, the IMF and SCF had favourable PUFA/saturated fatty acid ratios (>0.4) and omega-6/omega-3 ratios (<4), indicating that both components are healthy lipid food sources.

This study has shed new light on the nutritional value of zebra meat, which will not only be important for food product labelling, nutritional education and incorporation into food composition databases, but will also be indispensable for marketing and export purposes.

### **Crocodile Farming – A fresh approach**

*Robert Reader*

South Africa Crocodile Farmers are generally in a favourable position regarding the farming of this protected natural resource. It has eliminated the risks of the potentials of extinction of this prehistoric animal and ensured sustainable farming practises through good farming practises. The situation is now that this animal can be traded in theory similar to any stock domestic animals. Traceability is however a future requirement and we are measured by end consumer.

The demand for high quality skins is still there and farmers can obtain good margins on these skins. The other grades are where the demand is met with low prices but eventually all skins are consumed in the manufacturing environment but here we are price takers. Can we do better?

The following are matters which require further discussion:-

- At what price is it still economically to produce second grade skins?
- Rising energy cost has forced crocodile farmers to look for alternative ways of effectively heating and cooling facilities
- Structure design- Indoor /intensive farming or external/ semi extensive farming
- Integrated systems versus specific concentration
- Pro biotic
- Free food/chicken mortalities, dry mix or combination
- Abattoir or not
- Export of wet or tanned skins
- Quality or quantity
- DEAT or Agriculture
- Own Breeder Stock or hatchling/ yearling purchasing
- Agent or own marketing
- The role of co operation
- Lessons from the poultry Industry

### **The benefits of responsible hunting to sustainable wildlife ranching**

*W.J. van de Giessen & E.J. Nel*

Recent studies on the economic contribution of hunting to the GDP of African countries where hunting takes place, put it at over a billion US\$ annually, contributing in excess of 50 000 jobs. Looking at South African specifically, visiting trophy hunters and local consumptive hunters alternatively contribute over US\$ 200 million and over US\$ 600 million to the South African GDP, almost 10% of the total tourism GDP contribution, with processed products contributing an additional US\$ 300 million annually.

Sustainable and responsible hunting clearly contributes to the Millennium Development Goals of the UN, and has the potential to increase this contribution, to illustrate: the consumptive hunting GDP contribution in South Africa has grown by 35% from 2013 to 2015.

Hunting incentivises extensive wildlife ranching, contributing to its profitability, contributing to ecosystem services. These extensive areas has the potential to contribute 43 job opportunities per 1000 Ha, of which 17 will be permanent jobs, while mostly maintaining the ecological integrity of the area. Extensive wildlife ranching may in the long run compete with mining as a viable alternative land use option.

However there are risks that may prevent the positive contributions from realising, like: an unsupportive regulatory environment, unsustainable ranching practices, environmental and climatic changes, reputational risks associated with national and international views on current hunting practices.

Management of these risks can include the development of industry standards, an effective green certification or labelling scheme and common sense and uniform regulations.

### **Trophy hunting and sustainability: temporal dynamics in trophy quality and harvesting patterns of wild herbivores in a tropical semi-arid savanna ecosystem**

*Victor K. Muposhi, Edson Gandiwa, Paul Bartels, Stanley M. Makuza and Tinaapi H. Madiri*

We explored the trophy quality and trends in harvesting patterns (i.e., 2004-2015) of buffalo (*Syncerus caffer*), elephant (*Loxodonta africana*), kudu (*Tragelaphus strepsiceros*) and sable (*Hippotragus niger*) in Matetsi Safari Area,

northwest Zimbabwe. We used long-term data on horn and tusk size, age, quota size allocation and offtake levels of selected species. We used linear mixed models to analyse the effect of year, area and age on the trophy size, quota size and offtake levels. One sample t-test was used to compare observed trophy size with Safari Club International (SCI) minimum score. Trophy sizes for buffalo and elephant were below the SCI minimum score. Kudu trophy sizes were within the minimum score threshold whereas sable trophy sizes were above the SCI minimum score between 2004 and 2015. Age at harvest for buffalo, kudu and sable increased whilst that of elephant remained constant between 2004 and 2015. Quota size allocated for buffalo and the corresponding offtake levels declined over time. Offtake levels of elephant and kudu declined whilst the quota size did not change in the same period. The quota size for sable increased whilst the offtake levels fluctuated without changing for the period 2004-2015. The trophy size and harvesting patterns in some species pose a conservation and management dilemma on the sustainability of trophy hunting. We recommend: (1) temporal and spatial rotational resting of hunting areas to create refuge to improve trophy quality and maintenance of genetic diversity, (2) introduction of variable trophy fee pricing system based on trophy size.

### **How Sustainable is Sustainable Wildlife Tourism? Examples from protected areas in South Africa**

*Michael R Brett*

The first formal protected area in Africa was proclaimed in June 1894 in the Zuid-Afrikaansche Republiek (ZAR). This protected area was followed four years later by the forerunner of the Kruger National Park. In 1926 the second national park in Africa was proclaimed in the eastern Lowveld of

South Africa, and named after Paul Kruger, a former president of the ZAR. In the following year a total of three cars visited the park, and by 1979 visitors had increased to 400,000 per annum. Visitor numbers doubled from 1956 to 1963, between 1963 and 1980, and from 1980 to 1995. In 2014 a total of 1.6 million visitors entered the national park. Of this figure, day visitors comprise 77 percent of the total.

Visitor facilities in the Kruger National Park currently comprise 4048 beds and 653 campsites in 25 rest camps, 805 kilometers of tarred roads and 1720 kilometers of gravel roads. Since 2002 a total of 334 beds in 17 concession lodges have been added. Visitor numbers are increasing at between 6 and 7 percent per annum, and will double within 11 to 12 years. During peak holiday periods, this equates to 2.5 overnight visitors per km of road, compared to 1.4 overnight visitors per kilometre for Hluhluwe-iMfolozi Game Reserve. In the southern half of the Kruger Park, where 70 percent of accommodation is concentrated, densities increase to 2.97 overnight visitors per km of road.

Given the rapid increase in accommodation in the past years, the question should be asked if this is sustainable. Will the Kruger Park be able to accommodate 3.2 million visitors by 2025 and 6.4 million visitors by 2036?

Can the national park continue absorbing increasing numbers of visitors and what will the environmental impact be of such an action? Can wildlife tourism be sustainable when human populations and economies continue to grow? If accommodation and roads cannot be extended indefinitely, what, then, are the alternatives? Are there too many visitors, or is the problem one of inadequate management of visitors? And what

lessons can be learned from high-density tourism destinations in other parts of the world?

Can government be expected to establish new protected areas and visitor facilities in countries where there are so many urgent socio-economic needs? And what role can private protected areas and game ranches play in meeting the growing demand for nature-based tourism?

This paper examines these issues and proposes a course of action for the future.

### **Do we really understand accommodation preferences of visitors to the Kruger National Park?**

*Martinette M Kruger, Peet P van der Merwe, Melville M Saayman and Elmarie E Slabbert*

Accommodation plays such an important role in the tourist's experience, and one would imagine that many studies concerning this topic have been conducted. However, surprisingly very few studies have been carried out on this subject despite the growth in both demand and supply. This gap or lack of research led to the present exploratory study that addressed the question: what are visitors' accommodation preferences when they select accommodation in the Kruger National Park (KNP)? Based on a visitor survey in the Northern region of the Park during December 2015 where 295 fully completed questionnaires were administered, respondents were segmented based on their accommodation preferences (self-serviced, serviced and safari). Three distinct clusters were identified, Self-service seekers, Service seekers, and Safari, service seekers. These clusters differ regarding their socio-demographic characteristics and especially regarding the factors they regard as important when selecting accommodation and campsites. This was the first time that the accommodation preferences of

visitors to the flagship national park in South Africa were analysed. The results show that while visitors to the KNP appear homogeneous regarding their demographic profile, they differ significantly when it comes to accommodation needs and preferences. The findings from the research are valuable to park management especially when developing and expanding accommodation options in the park as it shows the preferences of each distinct market. This research furthermore makes a contribution to the current literature regarding ecotourism and ecotourists' accommodation preferences.

### **Inspiring Change in Wildlife, Livestock and Land Management in Rural Communities - Stories from Zimbabwe & Zambia**

*Astrid C. Huelin, Rolf Shenton*

Rural communities in Zimbabwe and Zambia are being inspired to work together to restore land and rivers by changing wildlife, livestock and land management practices. There is improved rural community resilience & prosperity in the face of climate change. The Catchment Approach is low-input, simple, practical & duplicatable. The results seen are due to community ownership and empowerment to manage their own wildlife, livestock and land resources for the long term. Stories from Zimbabwe: In 2012, The Mwalanga River in Sizinda Community Matabeleland North, started flowing above ground from December to December. For 20 years this river only flowed during the rainy season. Grasslands are being restored, perennial grasses are increasing and wildlife and livestock are being managed with solutions focused thinking. Ngarazi Village of Chief Chisunga area in Mushumbi Pools have set aside a 6000hectare community conservancy. Recognising the need to improve rainwater infiltration into the soil the community is applying simple regenerative

agricultural techniques to manage their area. Muhlangueni, Chilonga and Gondweni villages of Chief Sengwe area, Mazvingo Province, Zimbabwe are excited to start changing wildlife, livestock and land management practices to restore their grasslands to health. Stories from Zambia: Communities of the Kafue floodplains are creating solid social management structures to manage their wildlife, livestock, land and rivers.

### **Wild and free: What are we conserving and how do we measure it?**

*Matthew F. Child, S.A. Jeanetta Selier, Andrew Taylor, Frans Radloff, Mike Peel, John Power, Lizanne Nel, David Mallon, Mike Hoffmann, Coral Birss, Brent Coverdale, Daan Buijs, Peter Goodman, Dean Peinke, Michele Pfab and Harriet Davies-Mostert*

Saving a species from extinction is the minimum goal for conservationists. Ideally, we should conserve wild, flourishing, adaptive and self-sustaining populations. The IUCN recognises this ideal and states that only wild subpopulations can be considered for Red Listing. But what is wild? The absence of a measurable definition of wildness results in inconsistent Red Listing and thus inaccurate conservation progress reporting. As wildness exists along a spectrum from captive-bred to completely free-roaming and many mammal species are subject to intensive breeding and production, which exist on a spectrum from purely commercial ranching to conservation-orientated management, a framework that can unambiguously measure the conservation value or wildness of a subpopulation, regardless of the management system or philosophy is needed. Following two expert workshops, we designed a framework, comprising five variables relating to short-term subpopulation viability and four variables influencing long-term population

resilience, to measure the species-specific wildness of subpopulations subject to varying management interventions. We used this framework to assess populations under various management systems and extrapolate adjusted Red List statuses for currently threatened species. The framework is a first attempt at providing a consistent and objective method to identify subpopulations that possess conservation value. As such, it will provide a foundation for policy-makers to provide different incentives to landowners focusing on biodiversity conservation versus commercial production. Importantly, developing an overall wildness status for our mammals, to complement their Red List status, will provide a holistic measure of conservation success rather than simply reporting risk of extinction.

### **Fallow deer in southern Africa: a potential meat source or is it just an invasive species?**

*LC Hoffman*

Where Fallow deer (*Dama* spp.) were once almost extinct, they have now become one of the most widespread wild ungulate species in the world. In South Africa, this species has also been introduced and is now abundant in the country and could contribute to food security within Africa. However, conservation authorities tend to view this ungulate species as an invasive species whilst game farmers see it as a valuable contributor to farm income: as a hunted trophy or as a source of quality and nutritious meat. Surprisingly, very little is known about its production potential and meat quality in South Africa.

Fallow deer have been farmed successfully in numerous countries with the industry in New Zealand being the most prominent. All indication are that this species has adapted well to South African conditions and are highly productive. The meat yield and quality of this species is of the

highest standard when adequate harvesting procedures are followed. The fatty acid profile of this species is also beneficial for human consumption. However, antidotal information has it that the meat from stags during the rut has a taint to it: the cause of this has not yet been quantified.

Initial results (to be discussed) indicate that the meat quality of this species is of the highest standard typical of wild game animals. However, the distribution of this species needs to be quantified so that strategies can be developed to develop its potential as a sustainable protein source fit for human consumption. The ecological impact of this species also needs to be quantified so that, if required, adequate legislation can be developed to either curb or grow the potential deer farming industry.

### **Back to basics: "HUNT FOR FOOD" – Wildlife Industry to regulate game meat**

*Maretha van der Merwe, Gert Dry & Peter Oberem*

The 2014-2016 Montreal - Sustainable Wildlife Management Progress Report (Canada, 25-30 April 2016) listed two of the four integral thematic areas as: wildlife and food security and animal and human health. This sentiment echoed from WRSA 15 years ago when vast proportions of financial investment, resources and expertise were applied to finalizing the legal framework for game meat in South Africa. Following the failure of these efforts, further work was initiated to investigate the alternative of an international guideline for the safe production of game meat in SA. Self-regulation was considered the only option left for the game industry in SA with WRSA acknowledging the future small but tangible role of government in the process.

The recent "Wildlife Lab" (April - May 2016) initiative, driven by relevant and involved SA Ministers in the wildlife realm, was tasked to bring innovation but practical executable solutions to the challenges in the game industry. The main objective being a totally deracialised game meat industry with safe, legal production of a quality and nutritious protein food which will help address food security in SA and secondly, to empower local communities, BBE's and SMME's through wealth development thereby increasing the industry's contribution to GDP. This R490 million investment proposal provides for inter alia the current game numbers projected growth to 2021 and 2030 with the build-on concurred initiatives. This model will be explained and rolled out based on the 72% financial contribution from the private sector, 22% new entrepreneur funding and 6% institutional support from the SA government. Furthermore, the model highlighted the need for legal guidelines for game meat production and spurred the long overdue publication of the Game Regulations for public comments.

In addition, this model and its foreseen successes for game meat production as proposed by the Wildlife Lab could be carbon copied for and may be the only solution to re-instating the safe and sustainable utilization of bush meat. Correlations between wildlife hunting and bush meat hunting are: both are part of the customary sustainable use of biodiversity to fulfil nutritional protein needs, both are done for economic gain with meat sold in markets, irrespective of being legal or not. However, the difference lies in that: bush meat hunting is the result of an unmanaged common resource being unsustainably harvested due to weak governance, inadequate policy frameworks, and limited data and knowledge. Wildlife hunting on the other hand takes place generally on privately owned land where the land owner also

has ownership of the animals, manages these knowledgeable and harvests the resources sustainably resulting in a huge growth in game numbers.

In view of its ecological, social and economic value, wildlife is an important renewable natural resource, with significance for areas such as rural development, land-use planning, food supply, tourism, scientific research and cultural heritage. If sustainably managed, wildlife can provide economic- and food security and contribute considerably to the alleviation of poverty as well as to safeguard human and environmental health.

### **Game meat production on private land in South Africa: current scale and potential for the future**

*Andrew Taylor, Matthew Child, Peter Lindsey & Harriet Davies-Mostert*

Game meat production is considered one of the four pillars of wildlife ranching in South Africa, with the potential to generate large revenues and contribute positively to food security and job creation. It is very far from meeting its potential, however, with the main reason for this being a lack of an enabling legislation to allow for large scale game meat production. This situation is changing, and as the opportunities for game meat production open up, the wildlife ranching industry is planning the way forward. Based on background information on the sector from available literature, interviews with expert stakeholders, as well as data collected during a survey of 250 wildlife ranchers across South Africa, we examine the current and potential scales of the sector and assess the potential future contribution game meat production could make to food security and job creation. Although there are no accurate estimates of current domestic game meat production for South Africa, anecdotal estimates suggest that 10-

20% of meat consumed during the hunting season is game meat, which equates to 45 000-118 000 tonnes. By comparison, our study estimated ~40 000 tonnes of game meat were produced during 2014. With the possibility of a new game meat scheme, domestic production could be increased considerably. Producing sustainable sources of protein in social-ecological systems is also touted as a key intervention to possibly reduce bushmeat poaching and biodiversity loss. Generating game meat sustainably may thus be win-win for ecologists and the economy.

### **Game meat as alternative food source for Africa: A distributor perspective**

*Prof E Slabbert, Prof M Saayman & Prof P van der Merwe*

The issue of food (in) security is critical in many parts of the world including Africa. Citizens have the right to sufficient food, water and social security which means sufficient provision of food on a day-to-day basis. South Africa has the largest privately owned wildlife industry in the world where game farmers utilise more or less 16.8% of South Africa's agricultural land (semi-arid which is best for wildlife farming) for wildlife related activities. This holds enormous potential for Africa in terms of food security. The effective and safe provision of game meat in South Africa and the export thereof can play an important role in contributing to food security. Qualitative research will be done through interviews with major distributors of game meat in South Africa to determine the magnitude of this industry from a supply perspective. Specific attention is given to distributors' perspective of consumer preferences in terms of species, the amount and types of game meat sold and the general consumption patterns of this market. The fact that the wildlife industry lacks data on the consumption of game meat in

South Africa hampers the growth of this industry. This information will therefore contribute to growth but also inform stakeholders on the current status of this industry from a supply perspective.

### **Does age influence biltong hunters' behaviour?**

*Prof Peet van der Merwe*

When looking at market segmentation, age is often used to segment tourism markets. This was also the case with this study, where age was used to perform a market segmentation of South African biltong hunters. The aim was to determine how age affects hunters' behaviour. Data were obtained during the 2015 national hunters' survey. During this time, 492 completed questionnaires were obtained. The results showed that age does affect hunters' behaviour. Firstly, the results revealed that the main motive for hunters to hunt is to escape, to be in nature and to obtain meat; and secondly, age affects hunters' spending and motives to hunt. This research will help product owners to develop different products for hunters based on their age.

### **Sustainable versus unsustainable trends in wildlife ranching in Africa**

*Dr Wilhelm J Schack*

Wildlife Ranching was born at the time when passionate individuals thought it was possible to conserve the dwindling wildlife resources of Africa by commercialising the utilization of animals and other natural resources. These pioneering individuals started to perceive realistic outcomes for wildlife management in Africa at a stage when most natural resources were becoming, or were already, under immense pressure from the ever expanding human population but also from the ever increasing sophistication of ruthless exploiters

as personalised by poaching syndicates and money grabbers.

The initial successes in this regard of pioneers like Ian Player, Norman Atherstone, Zacharias Young, Alec Rough and Jan Oelofse are today legendary, but greatly obscured by the tremendous tide of commercialisation that got a very strong foothold in a venture these days often referred to as an 'industry'.

In terms of the long view regarding planetary health, commitment to social responsibility, participation by the less privileged, poverty alleviation and food security, it will be to the advantage of every individual on earth to contemplate the wise and sustainable management and utilization of our natural resources and through that the ultimate wellbeing of humankind.

This presentation deals with topics like rhino horn trade, breeding of colour variant antelopes and methods to engage African communities in wildlife ranching to ultimately ensure positive outcomes for human advancement, food security, conservation ethics, and a heritable and healthy earth for posterity from an African perspective.

### **The Local Meat Hunter: Backbone or bane of the game rancher's business**

*Stephen Palos*

Making the most of the "bread & milk shopper" requires appreciating their importance, providing for their needs, keeping them "low maintenance", maximising the "basket" and ensuring they select animals which meet management objectives of the ranch.

This presentation aims to explore the value of the most basic "customer" of the Wildlife Rancher. Coming from a "Greek South African" up-bringing

the presentation will be in "Café Speak" and aims to take a light hearted and amusing view of an incredibly important aspect of the business, encouraging fresh thoughts on the subject and perhaps some specific initiatives by representative organisations to further develop the relationship between the rancher and the meat hunter.

Studies in South Africa indicate that the local meat hunter brings in excess of 70% of the revenue to the Wildlife Rancher's gate. But average take per animal is far lower than what international trophy hunters bring. Different too is the expected hunting method or style, and the expectations in relation to services and accommodation. Extreme contrast exists from the most ethical, humble traditionalist (with a tiny "bag" in mind) to big groups of well heeled "corporate hunters" who aim to "whack em & stack em" in between raucous partying, and everything possible in between; each bringing pros & cons!

### **Guideline booklet for game harvesting and processing**

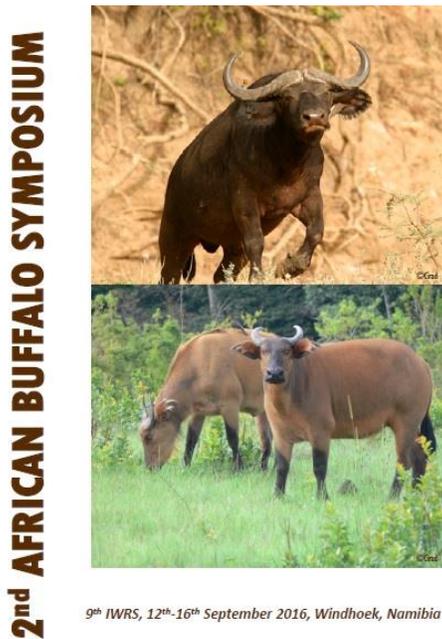
*Dr Diana van Schalkwyk*

The wildlife industry in Namibia has shown tremendous growth over the past decades and is currently the only extensive animal production system within the country that is expanding. Several factors are responsible for the dramatic increase in wildlife in range and numbers across Namibia, with the most important being the devolution of rights over wildlife by the state to freehold landowners and communal conservancies. Tourism, live sales and trophy hunting have significantly contributed to the tremendous growth, however they cannot alone sustain further growth. Harvesting wildlife for the purpose of meat production is a viable option, since there is a demand for healthy and high quality meat proteins to feed the ever-increasing

world population. It is also predicted that Namibia will experience climate changes in the near future which will further necessitate the optimal management of wildlife herds. The need to hygienically harvest and process game spearheaded the writing of a guideline booklet

with the intention of it being used by Namibian game farmers and game harvesting teams. The authors are proud having the opportunity to launch the second edition of this booklet at this symposium.

### 3. 2<sup>nd</sup> African Buffalo Symposium



**A Framework for Evaluating the Impacts of the Realignment or Removal of Veterinary Cordon Fences on Wildlife Movement and Habitat Use**  
*Robin Naidoo, Piet Beytell, Pierre du Preez, Ortwin Aschenboorn, Greg Stuart-Hill, and Russell Taylor*

Re-alignment or decommissioning of veterinary cordon fences (VCF) in southern Africa, in particular the Kavango-Zambezi Transfrontier Conservation Area (KAZA TFCA) is likely to provoke

important changes in how wildlife use and move through the central part of this conservation and development landscape. These possible changes are evaluated using best available data and at scales that are relevant for wildlife space use, migrations, and fine-scale movements for multiple species of interest. A tiered approach is used to evaluate possible changes associated with the removal of fences. The methodology is flexible and applicable to a variety of places, species, and data types and we illustrate it empirically with data from GPS tracking collars deployed on African buffalo collared on the Namibian side of the Namibia-Botswana border where a robust VCF has been in place over the past 20 years. Using resource selection modelling, we analyse habitat suitability of newly accessible regions following fence removal that can be used to simulate how changes in any of the environmental features affect probability of occurrence across a new landscape. Against hard barriers to movement, we might expect the size and shape of home ranges adjacent to a fence to be different than those further away. To test this in a preliminary way, we calculated the home ranges of all buffalo, and compared their size and shape in relation to proximity to fences. At the finest scale we assessed

how fences affect movement trajectories of individual buffalo by examining step lengths and relative turn angles along a gradient of fence proximity.

### **Analyzing herbivore movements in relation to resource availability in the Savuti-Mababe-Linyanti Ecosystem (SMLE) in Northern Botswana**

*Keoikantse, S. & Fynn, R.*

The size and stability of large herbivore populations is dependent upon the ability to adapt to strong inter-annual and inter-seasonal variation in forage quantity and quality, while minimizing the risk of predation. Thus, understanding seasonal variations in habitat suitability in relation to a species' requirements at different stages in its reproductional cycle is essential to develop strategies for large, trans-national conservation areas and to mitigate conflicts between conservation and human land use.

The Savuti-Mababe-Linyanti region has been selected as an area to study seasonal resource utilization by buffalo. GPS collars were deployed to 3 buffalo herds between 2011 and 2013 and allowed to track animal movements with ~ 6 occurrence points per day. Based on these, an interpretation of field- and laboratory analysis of the movement of buffalo in relation to forage quality and quantity was conducted.

Buffalo, moved into thicker woodland habitats where taller leafy grasses were common during the wet season which varied in forage quality and quantity. Buffalo herds used woodlands where visibility was low probably because they can defend themselves against their predators. Both species relied on ephemeral water in the pans during the wet season. When pans dried out during the dry season, buffalo moved to their dry

season ranges around permanent water. During the early dry season, the buffalo used a range of woodland habitats and floodplain grasslands around the Selinda Spillway, Linyanti Swamps and Savuti Marsh.

### **Effects of divergent migratory strategies on access to resources for Cape buffalo (*Syncerus caffer caffer*)**

*Emily Bennitt, Mphaphi C. Bonyongo, and Stephen Harris*

Populations of large herbivores frequently display divergent migratory strategies, a likely consequence of the trade-off between the costs and benefits of migration. Globally, physical and environmental barriers disrupt migrations, leading to increased residency, which can have detrimental consequences. In the Okavango Delta, Botswana, veterinary cordon fences erected in 1982 may have caused enforced residency in some subpopulations of Cape buffalo (*Syncerus caffer caffer*). We used data from GPS enabled collars fitted to females in 1 resident and 1 migratory subpopulation of buffalo to test the hypotheses that (i) residents have access to less productive forage than migrants, (ii) residents occupy smaller home ranges and live in smaller herds than migrants, (iii) reproductive productivity is lower in resident herds, and (iv) residents have poorer body condition than migrants. Forage characteristics varied between resident and migrant ranges, both between and within seasons. Reproductive productivity and body condition did not differ between subpopulations, but residents occupied smaller home ranges during the rainy season and lived in smaller herds than migrants. The area that residents occupied was located in a more central region of the Okavango Delta than that of migrants; therefore, this area would receive higher levels of nutrients from the annual flood, which

would have increased heterogeneity in resident ranges, thereby potentially compensating for effects of disrupted migrations. These results highlight the importance of conserving landscapes with spatially and temporally heterogeneous resources to buffer effects of anthropogenic activities such as artificial barriers on migrations.

### **Surface water availability and cattle herding practices shape the human-wildlife interface at the edge of a protected area**

*Hugo Valls Fox, Simon Chamaillé-Jammes, Michel de Garine-Wichatitsky, Arthur Perrotton, Nicolas Courbin, Eve Miguel, Chloé Guerbois, Alexandre Caron, Andrew Loveridge, Brent Stapelkamp, Martin Muzamba & Hervé Fritz*

Spatial and temporal partitioning of key resources promotes species coexistence. On the edge of unfenced protected areas, livestock and wild herbivores share foraging and watering resources. We investigated whether effective resource partitioning was maintained in African savannas as surface water availability declined during the dry season.

We quantified avoidance between African elephant (*Loxodonta africana*), African buffalo (*Syncerus caffer*) and cattle (*Bos taurus & indicus*) at multiple scales using habitat selection models with GPS relocation data according to seasonal changes in surface water distribution on the eastern fringe of Hwange National Park, Zimbabwe.

The range and duration of cattle incursions into the protected area varied seasonally by shifting from consistent selection of open habitats close to water pans during the rainy season to the less predictable selection of areas far away from the now dried up water pans at the end of the dry season.

During the rainy and cold dry season, buffalo successfully avoid cattle at large (overlap < 3%) and fine spatial scales. By the end of the dry season, buffalo herds, which are restricted to the vicinity of water, still avoid the boundary of the protected area but tolerate higher overlap with cattle (10%) and do not avoid them as strongly at fine scales.

Elephant home-ranges overlap extensively with cattle (15-68%) throughout the year but elephant avoid cattle by staying away from the boundary during the day and getting closer to it at night. As the dry season advances, elephant bulls range closer to the boundary especially at night and may even make excursions into the communal land in their search of forage.

Synthesis: Wild herbivores strongly avoid livestock and people at the boundary of a protected area as long as their foraging and drinking resources allow. In the advent of a drought, artificial water provisioning and cattle husbandry determine the level of avoidance and may be used to mitigate disease transmission and crop-raiding.

### **Comparative Analysis of Forest Buffalo Grouping Patterns In Central Africa**

*Mario Melletti, Milou Groenenberg, Thomas Breuer, Andrea Turkalo, Forrest Hogg, Davy Ekouoth, Lisa Korte*

Understanding the social organization of elusive forest-dwelling ungulates may have important conservation and management implications. We present a comparison of grouping patterns in forest buffalo across different sites and through time in Central African rainforest. We examined five sites: Mbeli Bai and Bonye Bai (Nouabalé-Ndoki National Park, Republic of Congo), Dzanga Bai and Bai-Hokou (Dzanga-Ndoki National Park, C.A.R.) and Lopé-Okanda National Park (Gabon). Buffalo showed high site fidelity to open areas,

including forest clearings. Forest buffalo herds (mean 12 ind.  $\pm$  SD; range 3-24) were much smaller than records of savanna buffalo herds (mean 350 ind.  $\pm$  SD; range 12-1500>), but also showed frequently fission-fusion patterns. Data from Mbeli Bai collected from 2012 to 2016 confirm a stable presence of two buffalo herds (range 9-10 ind.) with occasional visits by lone individuals. Observations from Dzanga Bai over a period of 10 years (2006-2016) confirm the occurrence of only one buffalo herd (range 8-10 ind.). In Bai-Hokou site, a single buffalo herd increased from 16 to 24 individuals during a three-year period (2001-2004). Finally in Lopé National Park (a mosaic of savanna and forest fragments), the mean group size for 18 herds monitored from 2002 to 2004 was  $12 \pm 2$  ind. (range of means=3–24). We analysed if herd size and herd stability are affected by clearing size, clearing type (e.g. marsh or land) and grass coverage across different sites and through time.

### **Social dynamics in the African buffalo (*Syncerus caffer*): socio-ecologic drivers and eco-epidemiological implications**

*Cornelis D, de Garine-Wichatitsky M, Michaux J, Chamailles S, Caron A*

This is a PhD proposal that will be implemented beginning of 2017. The project aims at understanding the social organisation of the African buffalo and its eco-epidemiological implications. Approaches from several scientific disciplines will be used to build a comprehensive study: the patterns of association between individuals will be studied using concepts and tools from behavioral and movement ecology: it will be based on a large GPS-tracking database and will relate inter-individual interactions to environmental factors (e.g. distribution of key resources, human disturbances, predation risk); the

epidemiological processes and the influence of association patterns on pathogens transmission will be studied using a generic modelling approach which could be parameterized for various diseases. Here, we will present the preliminary research questions addressed by this project.

### **Evolutionary history of the African buffalo (*Syncerus caffer*) at continental scale based on mitochondrial and nuclear molecular markers**

*Nathalie Smitz, Rasmus Heller, Pim Van Hooft, Daniel Cornélis, Philippe Chardonnet, Alexandre Caron, Michel de Garine-Wichatitsky, Johan Michaux*

The African buffalo (*Syncerus caffer*) exhibits extreme morphological variability at the continental scale. Today, four subspecies are recognized based on morphological characteristics, with three subspecies distributed in the West-Central African region and the last one covering the Southern and the Eastern African regions. Based on the mtDNA D-Loop region and on more than 42,000 SNP genetic markers (Single-Nucleotide-Polymorphism), the present study aimed to investigate the evolutionary history of the species by inferring the pan-African spatial distribution of its genetic diversity. All analyses converged on the existence of two distinct lineages, corresponding to a group encompassing West and Central African populations and a group encompassing East and Southern African populations. The former is currently assigned to two to three subspecies (*S. c. nanus*, *S. c. brachyceros*, *S. c. aequinoctialis*) and the latter to a separate subspecies (*S. c. caffer*). 42% of the total amount of genetic diversity is explained by the between-lineage component, with one to seventeen female migrants per generation inferred as consistent with the isolation-with-migration model. The divergence time was estimated to have

occurred during the late to middle Pleistocene, followed by a population expansion in both lineages, adapting morphologically to colonize new habitats, hence developing the variety of ecophenotypes observed today. At the regional scale, 8 populations distributed within these two lineages could be identified, resulting from more recent fragmentation processes. The two main lineages is a structuration that reflects common evolutionary responses to environmental changes within savanna mammals and can be observed within almost all species with a large distribution pattern as for example the waterbuck (*Kobus ellipsiprymnus*), the hartebeest (*Alcelaphus buselaphus*), or the roan (*Hippotragus equinus*).

### **Genetic variability of Cape buffalo populations in South Africa**

*Lené van der Westhuizen, Frederick WC Naser & Roan Louw*

Genetic diversity is essential to ensure viability of species and for them to respond to selection pressures. Climate change is predicted to cause extreme environmental conditions in South Africa with the potential for adverse impacts on livestock and wildlife that may not be as readily mitigated by selection, if genetic variance has been reduced by inbreeding. Estimating the genetic variability on both a herd and breed level include unbiased heterozygosity (Hz), mean number of alleles (MNA), genetic structure and inbreeding. The study describes preliminary results regarding genetic diversity estimates of Cape buffalo populations in South Africa. A total of 2601 animals from 27 buffalo populations from different geographical areas of South Africa with the use of 14 microsatellite markers. Multiple-locus assignment, performed using the Bayesian clustering algorithm of STRUCTURE, revealed two underlying genotypic groups. Across herds, Hz

ranged from 0.48 to 0.73, averaging 0.65; MNA ranged from 3.5 to 8.9, averaging 6.7. Therefore, a reasonably high level of genetic diversity is present with buffalo populations. The average level of inbreeding (FIT) for the populations was estimated to be 1.2 %, which also demonstrates low inbreeding. It is important to use these estimates as a conservation tool to ensure that inbreeding does not become a major concern in both private and state wildlife populations.

### **Population genomics of the Cape buffalo subspecies (*Syncerus caffer caffer*) of the Southern African region based on SNP markers**

*Nathalie Smitz, Charles Christian Riis Hansen, Benoît Durieu, Rasmus Heller, Carl Vangestel, Virginie Winant, Pim Van Hooft, Daniel Cornélis, Philippe Chardonnet, Robert Kraus, Alexandre Caron, Michel de Garine-Wichatitsky, Johan Michaux*

Recent phylogeographical and population genetic studies on the African buffalo (*Syncerus caffer*) have revealed a complex population structure both at continental and regional scales. These studies were mainly focused on the analysis of the genetic variations of mtDNA amplicons and microsatellites molecular markers. With the advent of Next-Generation Sequencing technologies, large-scale sequencing and identification of large sets of single nucleotide polymorphism from library-construction became possible. In the present study, the 'Genotyping-by-Sequencing' (GBS) technology was applied on 450 samples of African buffaloes spread all over its distribution range (sub-Saharan), including a more intensive sampling in Southern African regions (Mozambique, South Africa, Zimbabwe, Zambia and Botswana). The African buffalo being a non-model organism, the use of a closely related species genome (*Bos taurus*) to map the reads (64bp) and identify

nucleotide variations was the most reliable approach. Population structure analyses and demographic parameters estimations were based on 42,643 identified SNPs. Clustering analyses revealed a structuring into 8 populations at the continental scale, with low levels of genetic differentiation, indicative of high historical gene flow. Population fragmentation impact in the Southern African region was evaluated using different indices. The confinement within protected areas, obstructing natural migrations, was shown to have impacted some of these populations. Those results are particularly of conservation concern, as the management of genetically distinct populations can increase species-wide resilience. The resolution of the results obtained with SNPs and microsatellites will be also discussed, based on datasets obtained from the same set of samples.

**Feeding buffalo: Improving production, reproduction and health in intensive, semi intensive and extensive game farming systems in southern Africa**

*Craig Shepstone*

Food can be used to enhance the genetic potential of a buffalo herd by feeding buffalo for improved production, reproduction and health. This discussion will provide a basic overview of nutrient requirements, practical supply of supplements or feed, and risks to be aware of.

Different management systems need different approaches. Buffalo kept in large open areas only need to be supplied supplements that supply the nutrients nature cannot supply. Buffalo kept in smaller camps with limited available forage, and or boma's, need to be supplied semi adlib or full feeds. Drought and how drought affects the decisions on feeding in the different systems.

**Sustainably Managing Buffalo Trophy Quality**

*Dr Kevin Robertson*

To be successful, wildlife utilization needs to be financially, ecologically and genetically sustainable. Regarding buffalo, trophy hunters invariably target the highest scoring, largest-horned bulls with little regard to their age or breeding status. This is a situation compounded by ill-conceived trophy scoring methods which actively encourage the hunting of pre-breeding or active breeding bulls. Over time the 'best' trophy genetics have consequently been lost and as a result trophy quality is dropping.

This presentation will in detail explain the Taylor first molar teeth buffalo aging process and demonstrate how it is possible to age live buffalo bulls accurately. It will also help participants to identify breeding age bulls and those considered to be of post breeding age. The presentation will also demonstrate how to trophy score live buffalo accurately. Suggestions will also be made as to how to change public opinion as to what should constitute a 'real' buffalo trophy.

**Health and demographics of African buffalo (*Syncerus caffer*) in Ruaha National Park, Tanzania**

*Annette Roug, Daniel Mathayo, Goodluck Paul, Deana Clifford, Woutrina Smith, Rudovick Kazwala, Jonna Mazet, Epaphras A. Muse*

The African buffalo (*Syncerus caffer*) population of Ruaha National Park may be in decline. Seasonal drying of the park's water source due to upstream irrigation may have caused loss of dry season habitat, increased pressure on remaining water sources, and possibly increased contact between wildlife and livestock at the park borders. The Health for Animals and Livelihood Improvement (HALI) project and Ruaha National Park are

collaborating to investigate the health and population status of the African buffaloes. Between 2011 and 2015, this partnership resulted in testing 30 young and 25 adult African buffaloes for bovine tuberculosis (2011, 2014-15), conducting 4 dry season demographic surveys and herd level parasite screenings (2011, 2013-15), and conducting one aerial population survey in collaboration with the Tanzania Wildlife Research Institute (2013). In 2014-15, 12 adult female buffaloes were collared with satellite GPS collars to learn more about the seasonal movements, habitat preferences, and herd dynamics of Ruaha's buffalo herds. The research has shown that bovine tuberculosis and brucellosis is present in the buffalo population, that the population number appear to be reduced since the last total count in 2004, that the herd composition and seasonal movements may be influenced by rainfall, and the herd level gastrointestinal parasite counts generally are low. The data generated in this study will be used to inform management and conservation of Ruaha National Park's buffaloes.

### **Primary production drives eco-physiological cascades in African buffalo**

*Hendrik J Combrink, Brianna Beechler, Vanessa Azenwa and Anna E Jolles*

In savannah ecosystems, annual photosynthetic cycles are conspicuous from leaf to landscape level, introducing substantial temporal variability in the quality and quantity of forage plants. As such, the life histories and health of herbivores should be tightly coupled to seasonal phenological patterns; and occurrence patterns of infectious diseases may be driven by the resulting fluctuations in animal immune status. However, few longitudinal datasets including measures of forage quality, along with physiological, immunological and disease outcomes for ungulate

consumers have yet been available to test this idea. In this work we used a novel dietary metric, faecal chlorophyll, to show that African buffalo (*Syncerus caffer caffer*) are highly sensitive to variation in primary production. We demonstrate that faecal chlorophyll correlates tightly with faecal nitrogen, which is often used to evaluate nutritional condition in ungulates; however, faecal chlorophyll assays are far more economical to run. We employ time lagged cross-correlation functions to explore its relationship with various environmental, physiological and immunological parameters and their outcomes for buffalo physiological condition and susceptibility to disease. Our results suggest that primary production is an overwhelming explanatory variable driving broad population level patterns of physiological condition, susceptibility to parasites, disease prevalence and the synergistic outcomes of these on buffalo health. Such strong links to environmental variability have cascading implications for disease dynamics and how we model the spread and maintenance of diseases in ungulate populations. We discuss the implications of this work for evaluating the vulnerability of buffalo to changes in climate, land use or management.

### **Elands under intensive husbandry: fattening and meat quality in comparison to cattle**

*Radim Kotrba, Petr Kolbábek, Daniel Bureš, Luděk Bartoň*

Domestication attempts to breed elands as cattle have been documented since the first half of last century. Based on mild temperament and similarities to cattle elands were recommended for intensive husbandry. Our aim was to investigate fattening performance, physical, chemical and sensory characteristics of elands (*Taurotragus oryx*) bulls and Fleckvieh (*Bos taurus*, a Simmental type

dual-purpose breed) bulls. Both species were finished at comparable slaughter weight under controlled conditions of feeding (mixed diets based on maize, Lucerne silages and cereal straw) and management in the Czech Republic. Elands were slaughtered at a live weight of 414.2 kg (s.d. 47.5 kg) and age at slaughter 1112 days (s.d. 138 days) and cattle at average live weight of 573.0 kg (s.d. 17.0 kg) and an average slaughter age 458 days (s.d. 39 days). *Musculus longissimus lumborum* from eland was darker and less yellow in colour, with a higher pH and lower contents of intramuscular fat and total collagen, compared to cattle. Contents (mg/100 g muscle tissue) and proportions (g/100 g of FA determined) of SFA and MUFA were higher in cattle. Although the proportion of total PUFA was higher in eland, contents of PUFA were similar between species. Grilled beef steaks (until an internal temperature of 70°C was reached) were consistently scored higher for sensory texture characteristics, juiciness, flavour, and overall acceptance. We concluded that bulls of eland provided low-fat meat with a beneficial fatty acid composition from a human nutrition perspective, but with lower sensory scores, compared to bull beef. It can be influenced also by higher slaughter age of elands or by relatively high final internal temperature after grilling. Therefore, eland production potential under intensive husbandry can be reasonable recently only when customers will accept higher price of eland meat or in longer perspective will be possible to improve fattening performance by improvement of diet and selection of breeding stock for higher weight gain.

### **Escherichia coli populations sharing and antibioresistance gradient at a buffalo/cattle interface in Southern Africa**

*Mercat M, Ruppe E, Clermont O, de Garine-Wichatitsky M, Miguel E, Valls Fox H, Cornelis D, Andremont A, Denamur E, Caron A*

Human/livestock/wildlife interfaces create favorable conditions for microorganisms spillover between hosts. In landscapes where human expansion encroaches into natural ecosystems, the resulting epidemics are a major cause of human/wildlife conflicts that challenge the sustainable coexistence between Mankind and Nature. *Escherichia coli* is a well-known bacteria, ubiquitous and harboring antibiotic resistance. It provides a good model to understand the diffusion of antibiotic resistance between hosts and the environment. This is also a good candidate to explore the mechanisms of microorganism transmission between hosts and could be used to track pathogen transmission. We used phenotypic and molecular characterization techniques to describe antibiotic resistance and the diversity of *E. coli* populations found in sympatric African buffalo (*Syncerus caffer caffer*) and cattle populations at the Hwange National Park interface, Zimbabwe. Although the structure of *E. coli* populations was similar between cattle and buffalo populations, we found a gradient of antibiotic resistance, highest in cattle, intermediate in buffalo that were in contact with cattle, and lowest in isolated buffalo. The types and molecular characterization of antibiotic resistance further confirm the observed gradient and suggest that antibiotic resistance is spreading from human to animal populations.

We demonstrate that there is a risk of antibiotic resistance diffusion between wildlife, livestock and human populations, with unknown consequences on the health of host populations. These results also confirm that *E. coli* could be used as a tool to identify transmission pathways in multi-host systems, in an attempt to characterize pathogen spread and risks of emergence.

## *Poster Presentations*

### **Ecological trends, experiences and lessons learnt of game ranching for trophy hunting in Zimbabwe**

*Thandiwe Sibanda, Juliet Johnstone, Daniel Cornelis and Peter Mundy*

The game ranching industry is one facet of Zimbabwe's effort to manage and conserve its wildlife resources. Privately owned game ranches represent different management objectives and ownership in Zimbabwe. There is also a need for local communities to have specific information to evaluate wildlife ranching as a viable land use from lessons learnt from case studies where availability of long term data sets have been captured as a critical tool in management of natural resources.

This communication is aimed at addressing practical realities learnt from a representative privately owned game ranch in Zimbabwe, Cawston Block operating under the banner Rosslyn Safaris. It provides a descriptive approach which addresses the picture produced by solid data sets and management activities administered over a 27 (1987-2014) year period. This example draws together key ecological issues of relevance, evaluating ecological outcomes (i.e., population trends, carrying capacity, offtakes and trophy hunting) and the ability to quantify data across different activities.

Furthermore, trophy hunting as promoted by the ranch, both economically and ecologically, is a tool to monitor its sustainability. Thus long term trophy quality trends are of key concern as they reflect the criteria of trophy hunting (i.e. attitude of foreign clients, social status of the animals killed, type of hunting methods). This is of importance so that changing conditions and indicators in this

sector can be tracked. For this reason, game ranching and the trophy hunting concept need explanation in more practical terms.

### **Serum chemistry panels as indicators of health: Establishing normal ranges for African Buffalo & assessing variability across season, age and sex.**

*Claire Couch, Morgan Movius, Brianna Beechler*

This study established serum biochemistry normal reference ranges for 12 biochemical parameters in African buffalo in Kruger National Park, and then compared the results between a wild and semi-wild herd to investigate whether captivity alters biochemical parameters. Several important differences were identified between the wild and semi-wild herds, reflecting different physiological stressors related to management. Biochemical parameters related to overall nutrition were higher in the wild population, perhaps because the enclosure inhibits animal migration in search of adequate resources. Enzymes released as a result of organ stress as well as indicators of inflammation were elevated in the captive population, which may be related to poor nutrition, animal crowding, or other management techniques. These findings have implications for management of this and other species, which are often maintained on smaller game parks that artificially limit the normal migration of these animals. Surprisingly, animal sex had very little influence on the parameters studied, while age related changes were consistent with previous literature on cattle and other mammals. Season was the parameter which had the largest influence on biochemical parameters, due to a combination of changing nutrient availability and shifting

disease burdens in the wet versus the dry season. Understanding the physiological changes due to these different factors and the resulting effects on animal health may have dramatic implications for management strategies and disease transmission affecting humans and domestic species.

### **South African consumers' attitudes toward game meat**

*Anjolize Wassenaar, Prof E.L. Kempen, Dr T.S. van Eeden*

The industry needs to understand consumer decision-making with regard to game meat. It is believed that the game meat sector will be crucial to the growth of the wildlife industry in the near future. However, very little is known about the South African consumer market for game meat. Attitudes have motivational qualities that are capable of propelling a consumer towards, or repelling a consumer away from a specific behaviour. Although there might not be a perfect correlation between attitudes and behaviour, marketing managers have often found that designing an effective marketing mix based on consumer attitudes are often the best tool available to sell a product. Since attitudes play a crucial role in consumer decisions, it becomes important to understand South African consumers' attitudes toward game meat if it is to be marketed effectively. The results of the study are expected to contribute to an improved understanding of South African consumers' attitudes toward game meat.

This was an exploratory study. The aim of the study was to explore South African consumers' attitudes toward game meat by focussing on the product attributes, like sensory characteristics, health benefits, game meat production ethics, animal welfare, safety of game meat for human consumption, availability, price, promotion and

preparation. It compared the attitudes of consumers and non-consumers of game meat to explore which attributes could be key in the consumption of game meat.

### **Passive capture of wild animals: latest methods and technology**

*Dr Wilhelm J Schack*

The methods to capture wild animals in Africa went through an interesting evolution since the ancient days where our forefathers drove herds of wild animals into stone built funnels and passages in which animals fell into concealed trenches where they could be hunted or killed for food.

Over the eons the capture methods evolved from the crude capture techniques whereby animals were killed in the process, to modern sophistication resulting in the careful handling, treatment and transportation of wild animals over long distances around the globe.

Today we are entering the next stage in the evolution of capture techniques with the advent of passive capture. It has been practiced for some time over the decades in various applications like for example zoologists catching small mammals in traps for population survey purposes, or farmers and scientists baiting predators for various reasons. In recent times game ranch managers have started employing passive capture techniques to round up all types of antelope and even buffalo and rhino.

High technology has now entered the arena, or should we rather say, the passive capture boma. Remote sensing through cameras, aided by satellite and cell phone technology and the internet are an enormous advance in this field with the final goal of rendering game capture safe, humane and stress free.



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