

# PRESENTATION ABSTRACTS:

## MONDAY, 7 OCTOBER

The Greater Etosha Carnivore Programme: A large-scale collaborative approach

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Presenter: Stephanie Périquet-Pearce, [sp@orc.eco](mailto:sp@orc.eco)

**Abstract:** There is growing evidence from around the globe about the crucial role of predators in ecosystem functioning at many trophic levels. Due to the expansion of anthropogenic activities, these species are becoming increasingly dependent on protected areas for their persistence. As carnivores move beyond protected area boundaries, they often interfere with human interests, frequently resulting in conflict and persecution. The Greater Etosha Landscape (GEL) in northern-central Namibia exemplifies global conservation challenges. The GEL comprises one of the world's most renowned protected areas, the Etosha National Park (ENP), which is surrounded by a diverse matrix of land tenures and land uses, which translate into different management approaches and predator tolerances. While large carnivore research has a long history in the Etosha landscape, changing land use and climatic conditions require a new detailed understanding of the drivers of carnivore fitness and persistence. In close partnership, the Etosha Ecological Institute (EEI), as part of the Ministry of Environment, Forestry and Tourism (MEFT), and the Ongava Research Centre (ORC) have developed the long-term and large-scale Greater Etosha Carnivore Programme involving national and international collaborators. This collaborative programme aims to identify, understand and quantify the drivers of carnivore fitness and, thus, distribution and abundance. This talk will provide general information about our programme's aim and partners and serve as an introduction to the more in-depth presentations on specific research and conservation projects falling under its umbrella.



Stephanie Périquet-Pearce

## Distinctive spatial patterns of large herbivore movements at home range scales

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Presenter: Norman Owen-Smith, [norman.owen-smith@wits.ac.za](mailto:norman.owen-smith@wits.ac.za)

**Abstract:** Animals move at various scales: between feeding locations, among food-concentrated sites and between areas offering favourable nutrition at different stages of the year. Optimal foraging principles have been applied to movements at the finest scale represented by sequences of bites and steps. GPS tracking technology opens opportunities to shift the focus upscale to settlement periods within foraging sites alternating with relocation movements between them. Aggregations of foraging sites coupled with locations providing benefits besides food generate home ranges occupied seasonally or year-round. I will address spatial patterns emerging at home range scales, focusing specifically on large grazing mammals. Although species overlap considerably in the vegetation components they consume, they go about exploiting them in different patterns, generating behavioural niche separation. From this perspective one can distinguish contingently mobile wildebeest in the Kalahari from migratory wildebeest in Serengeti, opportunistic zebra groups, systematic buffalo herds and patchily localised sable. Protection afforded needs to be sufficiently expansive to accommodate such mobility. Achieving this requires that human-occupied lands adjoining parks and wildlife reserves be managed collaboratively as a fully integrated socio-economic system.

## **Effects of land use and fence structure on wildlife crossing behaviour between a protected area and human dominated landscape**

**Madeline H. Melton<sup>1,2</sup>, Stephanie Periquet<sup>3</sup>, J. Werner Kilian<sup>4</sup>, Claudine Cloete<sup>4</sup> & James C. Beasley<sup>1,2</sup>**

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Presenter: Madeline Melton, [madeline.melton@uga.edu](mailto:madeline.melton@uga.edu)

**Abstract:** Many protected areas have implemented conservation fences to decrease human-wildlife conflicts at the interface with human-dominated landscapes. However, conservation fences and their role in management are still poorly understood. In northern Namibia, Etosha National Park is surrounded by an 820km two-meter-high fence, in addition to a veterinary cordon fence along the southern border, and elephant-proof fencing dispersed throughout high-conflict areas, yet wildlife frequently move through breaks. Using motion-activated cameras from September 2022-May 2024 deployed on the fence, we monitored 84 crossing points between Etosha and three anthropogenic land-use types outside Etosha to 1) determine the likelihood and frequency of crossings among species of different body sizes across three taxa groups (carnivores, ungulates, and burrowing species), and 2) determine the effects of environmental attributes and fence structural elements on fence crossing behaviour. Carnivores predominantly crossed in the wet season, in habitats with increased cover, and along the fence adjacent to game reserves. Break type, mesh wire, and electrification did not affect crossing likelihood. Ungulates crossed most frequently during the hot dry season, and into game reserves. Large and medium ungulates crossed only at large breaks without mesh, while fence structure had no effect on small ungulates. Structural elements had no effect on crossings by burrowing species, which crossed more frequently into farms during the cold dry season. These results provide park officials and land managers a better understanding of the behavioural, anthropogenic, and environmental drivers of fence crossings by wildlife, which is critical for developing context-specific management strategies for target species.

## **Fences And Surrounding Landscapes Effects on Mammal Habitat Utilisation in South African Protected Areas**

**Gert S. Botha<sup>1,2</sup>, Herve Fritz<sup>1,2</sup>, Lain E. Pardo<sup>1,2</sup> & Jan A. Venter<sup>1,2</sup>**

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Presenter: Gert Stephanus Botha, s213223791@mandela.ac.za

**Abstract:** Fences play a critical role in wildlife management strategies in South Africa, serving as essential tools for mitigating human-wildlife conflicts and conserving biodiversity. However, their ecological implications have sparked considerable debate due to their potential to disrupt wildlife movement and migrations. In this study, we investigated the impacts of fences on wildlife habitat use within protected areas and assessed how the surrounding human footprint influences these patterns. Utilizing 201 camera traps deployed across diverse biomes within nine fenced protected areas across South Africa, we conducted occupancy analysis to examine the habitat preferences of six functional groups categorized based on body size and diet. Model averaging techniques were employed to quantify the effects of protected area fences and surrounding human footprint on functional group habitat use. Our findings reveal that herbivore groups exhibit avoidance behavior towards areas closer to fences and sites experiencing heightened human disturbance. Conversely, carnivore groups did not show significant changes in habitat use in response to fence proximity, potentially leading to an increase in predation pressures close to fences. Our results demonstrate how fence and surrounding human footprint alter wildlife habitat use inside fenced protected areas.

## Fencing affects movement patterns of two large carnivores in Southern Africa

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Presenter: Dipanjan Naha, [dip.sundarbans@gmail.com](mailto:dip.sundarbans@gmail.com)

**Abstract:** The erection of peripheral fences around protected areas has been shown to adversely affect the movement behaviour, genetic connectivity, and long-term viability of animal populations. However, fencing is also used extensively to reduce human encroachment, limit poaching activities, and mitigate human-wildlife conflicts. Limited information on the movement behaviour of carnivores is available along the periphery of protected areas, particularly in semi-arid environments. To quantify the potential effects of the 824 km perimeter fence surrounding the Etosha National Park on the movement and space use of carnivores, we collected GPS movement data from 36 lions (*Panthera leo*) and seven spotted hyenas (*Crocuta Crocuta*) over a 14-year period. Our results indicated that lions and hyenas moved faster when closer to the fence. Lions showed no variation in path straightness with respect to the fence but hyenas had straighter movement paths when closer to the fence. When moving within the vicinity of the fence, lions had a 9% likelihood of crossing the fence, while hyenas were much more likely (18%) to do so, which suggests that the Etosha fence was more permeable for hyenas than for lions. Fence crossings predominantly occurred at night for both species. Lions were more likely to cross the fence during the cold dry season (May-August) whereas hyenas crossed more often during the warm wet season (December-April). These findings could be useful in the development of appropriate strategies to mitigate human-carnivore conflicts and thus promote the conservation of carnivores in multiple-use areas along the periphery of the park.



## Roaring Success: Lion managed metapopulation and lessons for conservation in fragmented landscapes

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Presenter: Susan Miller, [susan.miller@uct.ac.za](mailto:susan.miller@uct.ac.za)

**Abstract:** In the past three decades, the South African landscape has been transformed through the establishment of many small, fenced reserves. Fencing reduces human-wildlife conflict but disrupts natural processes. Wildlife managers use translocation between properties to mimic immigration and emigration of many species, thus reducing the negative impact of fencing. For some species, such as the lion (*Panthera leo*), a “managed metapopulation” approach is applied. Over the past three decades, lions were reintroduced into over 50 fenced reserves, resulting in a current managed metapopulation of over 800 lions. Previous studies have highlighted the successes and challenges of many aspects of lion conservation in these small, fenced reserves, but none have evaluated if the managed metapopulation approach adheres to metapopulation principles.

We demonstrate that these small reserves successfully function as a metapopulation through *ad hoc* translocation events. The Lion Management Forum (LiMF) has provided a platform for communication between role players that has contributed to this success. Ongoing efforts are underway to develop comprehensive lion translocation guidelines based on the collective experiences of lion managers and veterinarians within LiMF as well as guidelines to ensure the continued success of the managed metapopulation. The managed metapopulation approach, with or without fencing, holds promise for establishing landscape linkages at both national and international scales, thereby offering potential for conserving additional lion populations and other species.

**Connecting spots in a fragmented landscape: Identifying, prioritising, and investigating potential corridors for leopards in the Western Cape within a socio-ecological context**

**Jamie-Lee Carle<sup>1</sup>, Kathryn S. Williams<sup>2</sup>, Anita Wilkinson<sup>2</sup>, Alison J. Leslie<sup>1</sup>**

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Presenter: Jamie-Lee Carle, jamieleecarle14@gmail.com

**Abstract:** Globally, large carnivores are declining due to anthropogenic pressures such as habitat loss, reduced prey bases, and persecution. The increase of these pressures is concerning for leopards (*Panthera pardus*) in the Western Cape which have larger territories than their savanna counterparts and occur at low densities. Wildlife corridors have potential to connect sub-populations of fauna, ensuring genetic integrity. Identifying and protecting wildlife corridors is vital to conserve leopards, their prey species, and ensure ecosystem integrity. This study utilised a habitat suitability model built for leopards in the Western Cape to define, identify, prioritise, and investigate potential wildlife corridors using a socio-ecological approach. The following criteria were applied to identify core areas for leopards: habitat suitability equal to and above a 60% threshold, protected areas, and area size greater than 34.8 km<sup>2</sup>. The habitat suitability model, exponentially inversed and reinforced with road network layers, was used in Linkage Mapper software to predict least-cost linkages between core areas. Using Linkage Priority tool, linkages were ranked by predicted conservation priority using built-in criteria. Additional biodiversity and predictive modelling layers shortlisted areas for investigation. Camera trap surveys and land-owner interviews were conducted within two priority corridors, revealing leopard activity and potential threats to leopards. Broad-scale modelling outputs and fieldwork results from within priority corridors are the first of their kind to inform long-term leopard conservation management within the Western Cape. Lessons from this holistic approach can be applied to other corridors within the province, offering a replicable tested framework for use in other landscapes.



Jamie-Lee Carle

## Movement-Based Connectivity Modelling for Leopards In Sub-Saharan Africa

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Presenter: Julien Fattebert, [julien.fattebert@gmail.com](mailto:julien.fattebert@gmail.com)

**Abstract:** Quantifying habitat use and dispersal is vital for understanding connectivity, but direct methods face challenges due to rare long-distance events. This has led to the development of indirect landscape-centric methods to model connectivity that rely heavily on oversimplistic assumptions regarding animal movement, such as e.g., i) full knowledge of landscape, ii) ability to optimize best routes, or iii) random motion. Moreover, most methods require to define *a priori* animals' end points that are unrealistic in the context of dispersal to new habitat patches unknown to the individuals.

We developed a habitat suitability model for leopards over sub-Saharan Africa. To circumvent limited data on leopard dispersal, we then simulated movement trajectories of individuals dispersing on this landscape using a reverse step-selection function, allowing us to relax the need for known destinations. We removed individuals based on habitat- and sex-specific mortality probabilities at each generation.

Our movement- and demography-explicit connectivity model offers insights into corridor identification and, importantly, the temporal aspects of population linkage. Linkage between some populations could take several decades and management might demand facilitated dispersal in the form of translocation of individuals, especially females. Recolonisation of suitable habitats outside the extant range of the species might not happen without reintroductions.



## Tails through time: Leopard population dynamics in the Little Karoo

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Presenter: Lawrence Steyn, lawrencesteyn118@gmail.com

**Abstract:** Knowledge of leopard persistence over time in mixed-use landscapes is limited, especially in the semi-arid regions of southern Africa. This study aimed to estimate leopard population changes over time and to investigate the possible drivers affecting density, using three camera trap surveys (2012, 2017, 2022), in the mixed-use landscape of the Little Karoo in the Western Cape, South Africa. To the best of our knowledge, this is the only multi-session maximum likelihood spatial capture-recapture (SCR) analysis to have been conducted in a semi-arid environment outside of an exclusively protected area in southern Africa. The best-performing density model indicated an increasing population trend over the study period which included a density trend term ( $D \sim \text{year}$ ) and an interaction term (individual session\*sex) affecting  $\lambda_0$  (capture rate) and  $\sigma$  (spatial decay). Density estimates ( $\pm$  standard error) for leopard populations for the three surveys, were 0.52 ( $\pm$  0.11), 0.70 ( $\pm$  0.08), and 0.95 ( $\pm$  0.16) leopards per 100 km<sup>2</sup>, respectively. Terrain ruggedness, elevation, vegetation type and distance from major rivers were all important drivers of leopard density in the Little Karoo, indicating that high-lying areas provide suitable refuge for leopards and are key areas for movement-corridor planning. These results indicate that leopards have persisted in the Little Karoo, which is encouraging for leopard conservation in the region.



Lawrence Steyn

## Assessing leopard density in the Sarah Baartman District of the Eastern Cape Province, South Africa

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Presenter: Silindokuhle Tokota, silindokuhletokota@gmail.com

**Abstract:** Leopard (*Panthera pardus*) populations and distribution range are considered in decline in southern Africa, yet some regions still lack robust data to inform conservation management. The elusive and solitary nature of leopards, coupled with low density occurrence in many parts amplify species-specific research challenges. The Eastern Cape province of South Africa is a region with comparatively few leopard studies. We used camera traps to survey five game reserves (Kwandwe, Amakhala, Lalibela, Tanglewood, Kuzuko) and Addo Elephant National Park. The areas were grouped into three surveys based on geographical proximity and each survey, which lasted between 60 - 74 days, aimed to estimate leopard density. No leopards were detected across most survey areas, except Kwandwe (94 detections) and Tanglewood (1 detection) area. We combined data from a 2017 survey conducted in Kwandwe with data from 2023 (current study) and used multi-session spatial capture recapture models to estimate population density. Density was estimated at 1.62 leopards/100 km<sup>2</sup> (95 % CI = 0.69 – 3.85) in 2017 and 1.86 leopards/100 km<sup>2</sup> (95 % CI = 0.92 – 3.58) in 2023. Although there was a difference in the number of individuals photographed between the 2017 and 2023 surveys, 8 and 11 respectively, density remained relatively constant. Our results indicate low leopard densities in Kwandwe and low detection that varies across other fenced protected areas. Identifying key threats and priority areas for species specific conservation is recommended as essential next step especially considering the planned development of the Albany Biodiversity Ecological Corridor in the region.



Silindokuhle Tokota

## **Carnivore connectivity in Western GLTFCA: Investigating persistence and movement of lions and African wild dogs under increasing anthropogenic pressures**

**Alison Govaerts<sup>1</sup>, Sam Ferreira<sup>2</sup>, Lizanne Roxburgh<sup>3</sup>, Cornelio Ntumi<sup>4</sup> & Katharina von Dürckheim<sup>5</sup>**

*<sup>1,5</sup> Stellenbosch University*

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Presenter: Alison Govaerts, [alison.govaerts@hotmail.com](mailto:alison.govaerts@hotmail.com)

**Abstract:** Kruger National Park (KNP) and Limpopo National park (LNP) are both crucial elements within the Great Limpopo Transfrontier Conservation Area (GLTFCA), with KNP being a stronghold for lion and African wild dogs, and LNP being a stepping stone for dispersal towards the other national parks in the conservation area. However, Northern KNP and LNP are subjected to an increasing pressure on carnivore populations due to human-wildlife conflict, creating barriers hindering dispersal and jeopardizing their persistence in the landscape. To inform effective conservation strategies, it is essential to investigate crucial processes underlying the population dynamics of both species in the area, such as distribution, habitat preferences and, importantly, connectivity. For this purpose, an extensive dataset on lion and wild dog has been gathered, including collar data, call-up data, camera trap data, environmental data and human-wildlife conflict data from previous and recent years. Using this data, we will investigate (1) lion and wild dog population numbers and distribution in the area, (2) human-wildlife conflict hotspots (3) the impact of human activity on movement and ranging behavior of both species in Limpopo National Park and Kruger National Park, (4) identify potential corridors and explore the implications for predator connectivity in the GLTFCA. Preliminary results and future steps will be presented.



Alison Govaerts

## Controlling population growth: Insights from Addo's elephants

Robert Guldemond<sup>1</sup> & Ryan Huang<sup>1</sup>

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Presenter: Robert Guldemond, robert.guldemond@up.ac.za

**Abstract:** Addo contains one of the 78 fenced elephant populations in South Africa. Fences prevent dispersal as a means to regulate numbers. From 2003 onwards, management in Addo implemented range expansion and translocations of elephants to reduce numbers, densities, and growth. In 2019, adult female elephants in the Main Camp and Colchester sections were vaccinated with porcine zona pellucida (pZP), a reversible treatment, to control births. We used a Rapid Elephant Population Assessment (REPA) to determine their standing age distribution at the time of applying the vaccine. We repeated the survey four years later, typically the calving interval for elephants, and modelled the consequences of applying contraception to control population growth. Our dose-response scenario-sketching simulation considered all the known reproductive (and lack thereof) and survival parameters, vaccine efficiency, and the (median) reversibility time. The dosage aspect deals with the effective percentages of females vaccinated in the primer phase (followed by two annual booster cycles) and the standing age structures for 4, 12, 24 and 48 years of continued vaccination as the response. Our simulation and the models based on observed age structures demonstrated the shift in the age structure over time, indicating when an ageing population may become locally extinct, at which vaccination rate a zero-growth rate is obtained, and the consequences of halting the vaccination program. The outcomes of this study stand to inform decision-makers of the other 43 elephant populations currently using contraceptives as an ethical and non-lethal method of suppressing growth.



Robert Guldemond

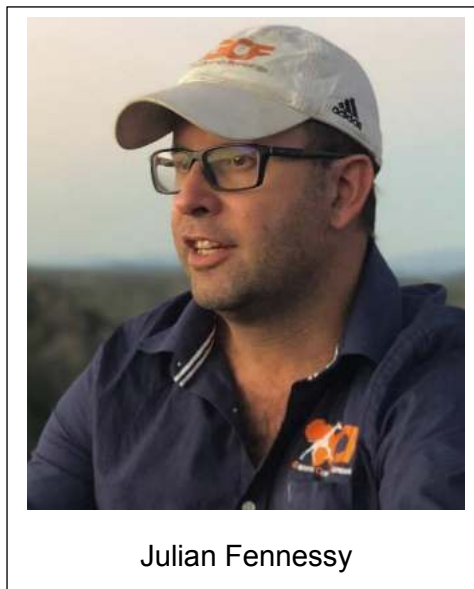
## **Saving Africa's giraffe – An emerging conservation success story**

**Julian Fennessy<sup>1</sup>, Naemi Antonius<sup>1</sup>, Michael Brown<sup>1</sup>, Sara Ferguson<sup>1</sup>, Martha Haukongo<sup>1</sup>, Rigardt Hoffman<sup>1</sup>, Adams Kimpchumba<sup>1</sup>, Martina Kusters<sup>1</sup>, Nicky McNamara<sup>1</sup>, Arthur Muneza<sup>1</sup>, Timo Mvula<sup>1</sup>, Audi Shaanika<sup>1</sup> & Stephanie Fennessy<sup>1</sup>**  
*<sup>1</sup>Giraffe Conservation Foundation*

Presenter: Julian Fennessy, [julian@giraffeconservation.org](mailto:julian@giraffeconservation.org)

**Abstract:** The tallest and one of the most iconic animals in the world is undergoing a silent extinction. Giraffe are Africa's forgotten giants, but not all is lost yet. Already extinct in at least seven African countries, giraffe numbers have declined significantly throughout their range in the last century. They have lost almost 90% of their habitat in the last 300 years. To curb these trends, the Giraffe Conservation Foundation (GCF) has created conservation partnerships with governments, NGOs, conservationists, academia, zoos, and African communities to implement successful conservation actions throughout the African continent and to bring giraffe on relevant conservation agendas.

Giraffe can only be saved through strong partnerships and collaborative actions. Together with our partners, we currently support conservation efforts in over 100 million acres of giraffe habitat in Africa and we have reclaimed over 10 million acres of quality habitat through re-introductions and augmentations. By providing a science-based approach to our work, GCF has been integral in deciphering the giraffe taxonomy, implementing the largest GPS satellite tracking programme on the continent, enhancing community conservation and environmental education, and much more. With all this in mind, I will outline how a small conservation NGO can have a big impact and provide a conservation model to help the plight of giraffe. Giraffe might just turn into a truly African conservation success story.



Julian Fennessy

## The impact of species hybridization and subsequent guidelines for conservation programmes

Laura Tensen<sup>1,2</sup>

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Presenter: Laura Tensen, [tensen.laura@gmail.com](mailto:tensen.laura@gmail.com)

**Abstract:** Hybridization is an important evolutionary force with a principal role in the origin of new species, known as hybrid speciation. However, ongoing hybridization can create hybrid swamping, in which parental genomes are completely lost. This can become a biodiversity threat if it involves species that have adapted to certain environmental conditions and occur nowhere else. Because conservation scientists commonly have a negative attitude towards hybridization, whether involving species or populations, it is important to improve understanding of its influence. We reviewed the literature on species hybridization to build a list of all known cases in the wild in the order Carnivora. To evaluate the conservation implications of hybrids, we developed a decision-making tree for status assessments. We further discuss three cases for which we generated empirical genomic data: African wild dogs *Lycaon pictus* (population level), leopards *Panthera pardus* (subspecies level), and Ethiopian wolves *Canis simensis* (species level). We found no evidence of genomic extinction in the order Carnivora, whereas positive outcomes of hybridization were common, such as novel genetic diversity, adaptation to extreme environments, and increased reproductive fitness. This may be particularly valuable in translocation programmes for counterbalancing the negative effects of genetic drift and enabling adaptation to human-dominated landscapes. The hybrid assessment showed that only the Ethiopian wolf faces immediate risk of genomic extinction, through hybridization with domestic dogs. Due to its small population size and narrow ecological niche, reduced fitness of hybrids seems inevitable and active elimination or restriction of domestic dogs is recommended as a conservation strategy.



Laura Tensen

## **Does the chain Of Eastern Arc Mountains impede gene flow? Genetic evidence from the African savanna elephant and the Masai giraffe in Tanzania**

**George Lohay<sup>1,2</sup>, David Pearce<sup>3</sup>, Monica Bond<sup>4</sup>, Alex Lobora<sup>5</sup>, Derek Lee<sup>1,4</sup> & Douglas Cavener<sup>1</sup>**

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Presenter: George Lohay, [georgel@grumetifund.org](mailto:georgel@grumetifund.org)

**Abstract:** An increase in human population in recent years poses threats to the conservation of wildlife species. Expansion of human settlement and agricultural activities lead to loss of wildlife corridors making wildlife species isolated. Apart from the influence of humans on gene flow of species between protected areas, natural features such as mountains, rivers and hills can act as a barrier for gene flow. The African savanna elephant and the Masai Giraffe are widely distributed in Tanzania. However, the Eastern Arc Mountains (EAM) and the Gregory Rift Valley (GRV) systems influence gene flow for some species. We conducted a study in South-Eastern Tanzania covering three major ecosystems: Ruaha-Rungwa, Katavi-Rukwa and Selous-Mikumi to determine whether there is genetic differentiation between these ecosystems for giraffes and elephants. We analyzed the mitochondrial DNA of 250 elephants and 74 giraffes. Our results show that (1) there is high genetic differentiation between populations found east and west of the EAM for both elephants and giraffes (2) there is no female-mediated gene flow between these populations (3) Populations found west of the EAM show high genetic connectivity suggesting historical gene flow between them (4) Elephant population from Ruaha share haplotypes with both Tarangire and Serengeti ecosystems suggesting historical connectivity between them. Our study reveals that the EAM plays a significant role in the gene flow of these species. However, the recent loss of miombo forests between Ruaha and Katavi may reduce gene flow in the long run.

**Exploring the genetic diversity and population dynamics of wild *Oreochromis mossambicus* (Peters, 1852) In South Africa: Advancing effective species conservation strategies**

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Presenter: Mahlatse Mashaphu, [fortunate.mashaphu@gmail.com](mailto:fortunate.mashaphu@gmail.com)

**Abstract:** Increased anthropogenic activities and poor management have led to the deterioration of South African freshwater habitats, affecting populations of aquatic organisms. The impact of water management regimes, in particular, on the genetic diversity of freshwater fishes in the region is poorly studied. *Oreochromis mossambicus* is one of the most important freshwater fish species used in the South African aquaculture industry. They occur naturally in many major river catchments in South Africa, especially in the country's warmer regions. Despite this, little is known regarding the genetic diversity and structure of wild populations. Furthermore, the species is threatened by hybridisation with the introduced *O. niloticus*, and so it has been listed as Vulnerable on the IUCN Red List. Using 14 microsatellite loci we investigated whether existing water management regimes support or undermine the genetic structure of *O. mossambicus* populations, focusing on the genetic diversity and fine-scale population structure of fish from major river catchments in three South African provinces (KwaZulu-Natal, Mpumalanga, and Limpopo). Analyses revealed low genetic diversity within populations, but significant differentiation among them. STRUCTURE analyses suggested 16 geographically distinct clusters, in particular one population in KwaZulu-Natal (Mtamvuna), three populations in Mpumalanga (Olifants, Loskop Dam, and Pieter Vosloo Dam) and four populations in Limpopo (Mapungubjwe, Shingwedzi, Sand River, and Letaba) were highly genetically distinct. We recommend that any water management approaches used must contribute to maintaining the existing genetic variety, as this will contribute to the long-term survival of this vulnerable species in South Africa.



Mahlatse Mashaphu



**Genetic diversity and optimal composition of founder populations in an intensely managed southern white rhino population.**

**Zuan Grobler<sup>1</sup>, Paul Grobler<sup>1</sup>, Karen Ehlers<sup>1</sup> and Charli Pretorius<sup>2</sup>**

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Presenter: Zuan Grobler, zuanagrobler@gmail.com

**Abstract:** The white rhino population on the 29,866 ha Munywana Conservancy (KwaZulu-Natal) has expanded significantly since its establishment in 1991 and has also been used as source population to establish new populations in other African countries. The genetic diversity of the current Munywana population, as well as the founder populations formed for previous translocation projects were assessed. We also screened for genetic structure in the population, and its genetic position relative to other white rhino populations. Analysis was based on 12 polymorphic microsatellite loci and the mitochondrial DNA (mtDNA) D-loop region. The aim is to genotype 75% of the current population. Initial results, based on around 55% of the targeted sample size, showed comparatively high levels of diversity in the current population and founder populations formed from it. Expected heterozygosity values were in the range of  $H_e=0.508-0.519$ , compared to values of  $0.440-0.602$  previously reported for eight other populations. The number of alleles per locus ranged from 3.0-3.3, compared to 2.1-4.5 in the previous studies. No genetic structuring was present in the population based on the microsatellite data and Principal Coordinates Analysis (PCoA). In phylogenetic analysis from the mtDNA data, animals from different areas of Munywana, as well as reference sequences from previous studies, were intermingled in a Maximum Likelihood tree. This lack of structure agrees with the historic bottleneck experienced by white rhino, re-stocking from a limited number of founder populations, and extensive translocations across South Africa. For the future, we aim to screen the remainder of the Munywana population to strengthen the current results and conduct pedigree analysis from the microsatellite data to identify bulls that contribute disproportionately to reproduction in the population, lowering the effective population size.

## Unravelling the conservation status of giraffe in South Africa

**Rigardt Hoffman**<sup>1,2</sup>

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Presenter: Rigardt Hoffman, [rig@giraffeconservation.org](mailto:rig@giraffeconservation.org)/[righoff@gmail.com](mailto:righoff@gmail.com)

**Abstract:** Giraffe (*Giraffa giraffa* spp) in southern Africa are widely distributed across a range of land-use types, including National Parks, private reserves, game ranches, and personal farms. These diverse approaches to giraffe management offer unique opportunities and challenges for their conservation. The South African population of the Southern giraffe (*G. giraffa*) comprises both South African (*G. g. giraffa*) and Angolan (*G. g. angolensis*) subspecies, however, the specifics of their numbers, distribution, and degree of hybridisation are unknown, especially in the western and central areas. With an estimated 20 million hectares of private wildlife ranching, population estimates for most wildlife in South Africa are outdated and, as such, limit effective conservation efforts. Despite their ecological and commercial value, giraffe are often not prioritised by landowners. To fill these knowledge gaps, I have been undertaking a detailed assessment of the genetic, distribution and abundance of South Africa's giraffe population. To date, I have collected over 600 full population records and 450 genetic samples from across the country. The results of which indicate distribution and population sizes outside of National and Provincial Parks. I anticipate that this project's findings will help to protect the long-term genetic (biological) integrity of both South African and Angolan giraffe across South Africa's diverse land-use types, as well as identify threats that can be mitigated through targeted conservation and management actions.



Rigardt Hoffman

## Climate change risks for conservation connectivity in socio-ecological systems: The MAZALA Transfrontier Conservation Area

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Presenter: Yolandi Ernst, yolandi.ernst@wits.ac.za

**Abstract:** Regional climate models forecast rising temperatures and increased variability in rainfall across southern Africa. The MAZALA TFCA is likely to experience increased frequencies and intensities of extreme events such as droughts, and floods. A TFCA incentive aims to connect protected areas, but, at the same time places humans and wildlife in shared landscapes. This stands to increase pressure on ecological processes and biodiversity, as a growing human population may intensify land use activities in areas with water and arable land for food production. Wildlife moving across the connected landscapes will also have to adapt to changing resource patterns induced by a changing climate. Maintaining and optimising connectivity between protected areas are crucial to ensure adaptation and resilience to changing conditions for both humans and wildlife. However, sharing land in the matrix landscape may exacerbate human-wildlife conflict, especially for elephants that need large areas to roam. Understanding the potential impacts of climate change on the resources that drive land use for both humans and elephants are essential if we want to manage these socio-ecological systems sustainably and effectively. This study will characterise the climate risk landscape and model the impact on both human land use and elephant space use and population dynamics. Using the MAZALA TFCA as the first case study, we present our initial findings on climate risks to the socio-ecological resources that drive land use by people and elephants.



Yolandi Ernst

**Landscape connectivity along Balinsky's (1962) drought corridor between Eastern and Southern Africa (Kalahari – Rift Valley Trans Frontier Conservation Landscapes):  
An option for climate change adaptation by African wildlife**

**Tsaone Goikantswemang<sup>1</sup>, Jeremy S. Perkins<sup>1</sup>, Jason Riggio<sup>2</sup> & Samuel Cushman<sup>3,4</sup>**

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<sup>4</sup> *US Forest Service, Rocky Mountain Research Station, Flagstaff, Arizona, USA*

Presenter: Tsaone Goikantswemang, goikantswemangt@gmail.com

**Abstract:** Landscape connectivity is increasingly promoted as a conservation tool combat the negative effects of climate change towards wildlife populations through fostering their movement between habitats and increasing their ability to access resources as well as areas with suitable climatic conditions. Connectivity therefore needs to be investigated and understood at local and global levels. Southern and Eastern Africa have been predicted to have contrasting climate scenarios which is likely to implicate wildlife populations in the regions. The purpose of this study is to investigate the impacts of climate change on landscape connectivity between Eastern (Rift valley) and Southern (Kalahari) Africa for adaptation of wildlife populations in the face of present and future scenarios of climate change. This study proposes to predict landscape connectivity and quantify possible impacts of climate change on landscape connectivity within the two landscapes in the study area. A coupled Resistant Kernel with Least-cost-path model will be employed to investigate landscape connectivity using movement data for African elephant *Loxodonta Africana* and Giraffe *Giraffa camelopardalis* from both regions will be used to model connectivity. Impacts of climate change on landscape connectivity will be investigated using climate data from CMIP6 (CODEX CORE) under RCP 2.6 and RCP 8.5. The timeline for this project spans from 1970 to 2100 to allow for historical, present, and future climate projections. The findings of this study will contribute to global biodiversity targets, and towards Sustainable Development Goals.



Tsaone Goikantswemang

## **The Automated Elephant Land Expansion and Migration Route.**

**Sean Hensman, Marc Sherratt, Emma Carter<sup>3</sup> & Franco Shoeman<sup>4</sup>**

<sup>1</sup> *Adventure with Elephants and RHCRU*

<sup>2</sup> *Marc Sherratt Sustainability Architects*

<sup>3</sup> *Rory Hensman Conservation Research Unit (RHCRU)*

<sup>4</sup> *Elephant acoustics expert*

Presenter: Tippie Degré, [okanti.films@outlook.com](mailto:okanti.films@outlook.com)

South Africa has an overpopulation of the IUCN classified, Endangered, African Savanna Elephant (*Loxodonta Africana*) within its large, fenced conservation areas. This leads to unnatural population control, including culling (as seen in Kruger National Park) and contraception (as seen in Addo Elephant National Park) of an endangered species. However, these areas are usually surrounded by smaller reserves that can accommodate temporary elephant movement, if managed correctly.

RESEARCH QUESTION/ TOPIC OF FOCUS: How do we manage the access of elephants to these smaller reserves?

The Goal of this project is to open up smaller reserves to elephant populations through automated gates in order to relieve feeding pressure on the host properties and to allow elephants to migrate between properties which have historically had elephants. The spaces will only be open to elephants, thus will not allow other wildlife to migrate through and will keep other high value game on a landowner's property.

This is an Applied Research project (solving a practical problem) to ascertain whether wild elephants can be taught to utilize automatic gates in order to access other land to feed or migrate, thus expanding elephant ranges. There are many instances where elephants break fences in order to access other land for food or search for mates unrelated to themselves. Further wild elephants are confined to only large reserves of 5000 (8000) hectare or more, which severely limits the amount of land that they can occupy. Very few game farms within a country are this size and they are often overpopulated already. This project proposes three target aims to resolve this conflict;

1. Open areas of land that are normally inaccessible to elephants (due to size restrictions) and as such increase overall the ranging areas for elephants.
2. Create migratory corridors for elephants to utilize so that 'elephant properties' can be linked by smaller managed properties.
3. Utilize the cameras on the gates to monitor the demographics of elephant migration routes and body score in terms of health.

Our goal is to scale this out to other reserves or interested landowners. The long-term vision for this project would be to connect both private and public land with wildlife corridors that could allow elephant movement in a fully connected, provincially scaled, adequately protected migration route.

## The first GPS-tracking of African spoonbills reveals connectivity between major Southern African wetlands.

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<sup>2</sup> Centre for Ecosystem Science, University of New South Wales, Australia

Presenter: Jonah Gula, jonah.gula@yahoo.com

**Abstract:** The dynamics of southern Africa's wetlands are driven by seasonal rainfall with high interannual variability, especially with climate change. As a consequence, piscivorous wading birds likely track optimal foraging conditions, which are related to an interaction between hydrology and prey densities. African Spoonbills (*Platalea alba*) are tactile foragers and therefore require high prey densities, which are most often found during water recession in flood-pulse systems. In western Zambia, we deployed the first telemetry transmitters on two African Spoonbills to understand movement ecology over a two-year period (2022-2024). We also used satellite-imagery-derived inundation measures from across their movement area to characterise how spoonbills tracked receding floodwaters on a landscape scale. Both spoonbills moved down the Barotse Floodplain of the Zambezi River before moving to the Linyanti Swamp and Chobe River Floodplain in Namibia's Zambezi Region. The fastest movement was c. 460 km flown overnight in 12 hours from Zambia to the Okavango. Subsequently, one spoonbill moved between the Okavango Delta and the Chobe River Floodplain, tracking floodwater recession. This novel telemetry study revealed significant movements of spoonbills across major southern African wetlands, and demonstrates the importance of considering connectivity of not just terrestrial habitats but also wetlands in conservation planning.



Jonah Gula

## Success of transboundary giraffe translocations

Courtney Marneweck<sup>1,2</sup>, Michael Brown<sup>1</sup>, Steph Fennessy<sup>1</sup>, Sara Ferguson<sup>1</sup>, Arthur Muneza<sup>1</sup> & Julian Fennessy<sup>1,3</sup>

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Presenter: Courtney Marneweck, [courtney@giraffeconservation.org](mailto:courtney@giraffeconservation.org)

**Abstract:** Transboundary species translocations are a vital conservation tool for ensuring the viability of species and their populations. Over the past decade, the Giraffe Conservation Foundation collaboratively with several partners have implemented 21 transboundary giraffe translocations, four of those across country borders. This initiative aligns with the overarching conservation goal of establishing sustainable source populations within former giraffe range across Africa. After appropriate translocation assessments were conducted, participating countries in these translocations span Angola, Malawi, Mozambique, Namibia, Niger, South Africa, and Uganda, and include two species and four subspecies. Post-translocation population surveys reveal an average population growth rate of 0.22 per year for known populations, suggestive of both (1) survival of release generation and (2) breeding by release generation (the short-term criteria for evaluating reintroduction success). This translocation strategy has been responsible for establishing four new founder populations in sites where giraffe were previously extirpated, in addition to augmenting 17 populations. These findings underscore the effectiveness of these efforts in boosting giraffe populations where these translocations have not only revitalised isolated populations but also contributed to the broader genetic diversity and resilience of giraffe subspecies. To improve the impact of this translocation strategy, more effort is required to understand breeding and survival of release generations (not only population growth) to link to the persistence of the population which would indicate long term success. Through detailed case studies, we highlight the significance and tangible benefits of transboundary translocations in safeguarding vulnerable populations and promoting species conservation.



Courtney Marneweck

## Role of local medium to large mammalian species in seed dispersal of fleshy-fruited invasive alien plants in the montane grassland biome of South Africa

Lehlohonolo Adams<sup>1,2</sup>, Grant Martin<sup>3,4</sup>, Sandy-Lynn Steenhuisen<sup>3</sup> & Colleen Downs<sup>1,5</sup>

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Presenter: Lehlohonolo Adams, adams20165@gmail.com

**Abstract:** Fleshy-fruited invasive alien shrubs are an increasing problem in the grasslands of South Africa, where they impact vegetation structure and threaten biodiversity. Their spread in grassland ecosystems remains understudied, including their dispersal by mammals. Mammals facilitate seed movement and promote seed dispersal, all contributing to the increase in invasion. This study aimed to determine the role of various mammals in the seed dispersal. The faeces of eland (*Taurotragus oryx*), chacma baboon (*Papio ursinus*), domestic goat (*Capra hircus*), and black-backed jackal (*Lupulella mesomelas*) were collected in the grasslands of the eastern Free State Province, South Africa. Seeds were removed from the faeces, identified, and planted in a greenhouse. Seeds of the invasive fleshy-fruited species silver-leaf cotoneaster *Cotoneaster pannosus*, yellow firethorn *Pyracantha angustifolia* and eglantine *Rosa rubiginosa* (all Rosaceae) were identified from the faeces together with the seeds of the indigenous star-apple *Diospyros austro-africana*. Seed composition of faeces samples differed between animal species. Seedling emergence experiments showed no differences in seedling emergence between ingested *P. angustifolia* seed and manually de-pulped controls, while there were differences in *C. pannosus* seed seedling emergence compared with manually de-pulped controls. Overall seedling emergence of *R. rubiginosa* seeds from faeces was very low (<2%), similar to controls. *Diospyros austro-africana* had the highest seedling emergence percentage for seeds from jackal and eland faeces. The locally found medium to large terrestrial mammals were shown to be potential dispersers of invasive fleshy fruiting plants in the grasslands of eastern Free State Province, facilitating the spread of these alien plant species.



**Above and beyond the helicopter; Using remote sensed imagery and machine learning to improve the accuracy and precision of aerial census in the savanna biome**

**Paul Allin<sup>1,2</sup>, Alison Leslie<sup>1</sup>, Frans Radloff<sup>3</sup> & Andrew Davies<sup>4</sup>**

<sup>1</sup> Stellenbosch University

<sup>2</sup> Transfrontier Africa NPC

<sup>3</sup> Cape Peninsula University of Technology

<sup>4</sup> Harvard University

Presenter: Paul Allin, allinpaul@gmail.com

**Abstract:** Reliable animal censuses are key to making informed conservation decisions. The methods for censuses have remained largely unchanged since the 1970's and are not only time consuming and costly, but also fraught with error. The advances in machine learning have been shown to outperform humans in numerous instances, especially in detection and counting of objects in imagery. The combination of machine learning applied to remote sensed imagery paves the way to automate the process of animal censuses, increasing the accuracy and precision of these censuses. For this study we conducted a comparative analysis between helicopter censuses and remote sensed imagery over 23 breeding camps with known populations of 7 different ungulate species across three canopy cover densities.

All camps were flown 3 times within a 5 day period at the end of the dry season, for each method and compared to the known population. Average accuracy and precision for the helicopter count were 75.3% and 77.2% respectively, but both displayed large variance depending on the species and canopy cover. Generally a greater body mass and more open vegetation yielded higher results. The remote sensed imagery were recorded using a drone with an RGB and thermal infrared cameras. The imagery were pre-processed and initial data labelling was through a YOLOv8 detection algorithm. The labelled imagery was then used to train 3 identification algorithms which identified the animals to species level. Results show comparable results and thus great potential, specifically as repeatability of the data capture is much greater.



Paul Allin

## Exploring the mutualistic relationship between giraffes and red-billed oxpeckers

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Presenter: Anton Baotic, anton.baotic@oeaw.ac.at

**Abstract:** Vigilance serves as a crucial adaptive strategy for giraffes (*Giraffa camelopardalis*), particularly during feeding activities and browsing. Giraffes rely on a combination of visual surveillance and eavesdropping on other species for risk assessment, by using their height advantage and acute hearing to detect threat in their environment. By employing these vigilance strategies, giraffes optimize foraging efficiency while remaining vigilant against predators. Within heterospecific relationships, vigilance gains added significance as species interact within shared ecosystems. Oxpeckers (*Buphagus* sp.) exemplify such associations, known for their symbiotic ties with large African mammals. Emerging research indicates a potential extension of oxpecker behavior beyond mutualism, with suggestions that their alarm calls may evoke vigilance responses in host species. However, experimental bio-acoustical investigations into oxpecker alarm calls in interspecies contexts are lacking. This research centers on giraffe vigilance by exploring their response to red-billed oxpecker (*B. erythrorynchus*) alarm calls and the potential implications for survival success. Through playback experiments, the study delineates the mechanisms underlying giraffe recognition and responsiveness to these heterospecies-specific acoustic cues. This study represents a pioneering endeavour, as it bridges the gap in existing knowledge by offering the first deterministic approach into the functional significance of oxpecker alarm calls in interspecies contexts. The findings not only advance our understanding of interspecies communication and cooperation but also underscore the pivotal role of mutualistic relationships in shaping animal behaviour and survival strategies. Recognizing and safeguarding such symbiotic associations may be relevant for effective wildlife management and conservation amid anthropogenic pressures and habitat fragmentation.

## Geophagy, a remedy for internal parasite infestations?

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Presenter: Hennie Butler, butlerhj@ufs.ac.za

**Abstract:** Areas of conservation can be described as island parks which limit migration of animals over large areas. An increase in the density of wild herbivores around areas of congregation, increases the risk of potential faecal-oral parasite transmissions. The supplementation role of geophagy, the deliberate ingestion of soils by animals, at least for some chemical elements, was clearly illustrated. Geophagic soil can also be protective by binding directly to toxins rendering such toxins unabsorbable by the gut. Geophagic earth might furthermore assist in eradication of larger pathogens such as geohelminths. Soil, high in element concentrations, might inhibit parasite respiration or even change the osmotic pressure and therefore desiccate parasite eggs in the digestive tracks of animals. Fresh argillaceous dung pellets were examined for prevalence of parasite eggs by means of a standard egg-floatation method. A strong negative relationship between faecal egg count and percentage of soil in the elementary canal of large mammalian herbivores seems to eradicate at least parasite eggs. This resulted in a lower burden of internal parasites to the animal that practice geophagy and ultimately lower the risk of dispersal of parasite eggs not only at geophagy sites, but elsewhere as well.



Hennie Butler

## Exploring wildlife crossing effectiveness on the N4 Toll Route (TRAC N4), Gauteng Province, South Africa

T.I Hlatshwayo<sup>1,2</sup>; M.M Zungu<sup>1</sup>; W.J Collinson-Jonker<sup>3</sup> & C.T. Downs<sup>1</sup>

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<sup>2</sup> Endangered Wildlife Trust, Johannesburg, South Africa

<sup>3</sup> Global Conservation Corps, Hoedspruit, South Africa

Presenter: Thabo Hlatshwayo, 221121589@stu.ukzn.ac.za

**Abstract:** In this study, we explored the effectiveness of seven existing road underpass-crossing-structures along the TRAC N4 highway, Gauteng Province, South Africa, for wildlife crossings, with a special focus on vertebrates. The underpasses comprised of; three circular, two rectangular, and one box culverts as well as one large bridge. These were monitored continuously using mounted camera traps from April 2023 until April 2024. Two camera traps were deployed in each of the underpass crossings to capture vertebrate animals that enter and exit the structure at both ends, with the larger bridge being monitored by four camera traps. The preliminary camera trap results showed increasing animal activity and use of the monitored underpasses, with twelve different mammalian, three reptilian and six aves species recorded using them for crossing beneath the highway. Although the majority of the animals travelled through the entire length of the crossing structure (complete crossing), animal use of the underpass structures for crossing was greatly influenced by the characteristics of the crossing structures (size, shape, and adjacent roadside habitat type). Underpass crossings with a waterbody underneath were less preferred by terrestrial animals, only Cape clawless otter (*Aonyx capensis*), water mongoose (*Atilax paludinosus*) and several water birds used them for crossing. This shows that gathering baseline data on wildlife roadkill, animal movement, and behaviour patterns across roadways could help improve planning for ecological connectivity. We recommend that exploring wildlife use of crossing-structures should consider monitoring existing road-crossing structures (culverts, bridges, and tunnels) as this provides a less costly method of restoring landscape connectivity in road fragmented ecosystems.



## Fine scale monitoring and tracking of reintegrated pangolin using SPOT devices

Petrus J. (Hanno) Kilian, Gary Schneider<sup>2</sup> & Edyta Wozna<sup>2</sup>

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<sup>2</sup>Working With Wildlife. !Khamab Kalahari Reserve, Tosca, Northwest Province, South Africa

Presenter: Hanno Kilian, [ecologist@khamab.co.za](mailto:ecologist@khamab.co.za)

**Abstract:** The illegal trade in Temminck's pangolin (*Smutsia temminckii*) in southern Africa has increased significantly over the last decade, along with the number of pangolins recovered from the illegal trade. Many of these animals require treatment and rehabilitation before being reintegrated into the wild through a soft release process. !Khamab Kalahari Reserve has assisted with the reintegration of two such rehabilitated pangolins. Part of the reintegration process involves intensive monitoring of the animals post-release to determine their survival and movements. Pangolins are generally fitted with both VHF and satellite devices. Typical satellite devices are expensive, have limited battery life, and are usually set to provide four location points per day. We have fitted SPOT Trace tracking devices to these pangolins, which allowed us to record 10-minute location intervals and fine-scale movement data because batteries can easily be replaced during standard release and monitoring protocols. This allowed us to gather detailed information on their movements (location and speed) as well as activity patterns that would otherwise be difficult to determine without visual observation. We observed that pangolins have variable foraging times, sometimes foraging both in the morning and afternoon, and they increase their speed of movement through areas they do not prefer. We also mapped and compared movements at typical four-hour intervals of traditional devices with ten-minute intervals using the SPOT devices. It also allowed us to monitor and intervene when needed when pangolin were foraging close to electrical fences.



Hanno Kilian

## Using landscape and habitat characteristics to delineate distribution of black-footed cats (*Felis Nigripes*) in Southern Africa

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<sup>3</sup> Kölner Zoo, Köln, Germany

Presenter: Martina Küsters, [martina@giraffeconservation.org](mailto:martina@giraffeconservation.org)

**Abstract:** Black-footed cats (bfc), are habitat specialists, occurring mostly in open low dwarf-shrub or grassland habitats, within in the Grassland, open Savannah and Nama Karoo biomes, with average rainfall of 100-500 mm, at altitudes up to 2000 m asl. Distribution and densities are difficult to estimate due to the shy, nocturnal nature of bfcs and few records. Lack of confirmed records coupled with limited knowledge of presence in some areas, results in inaccurate conservation status and population size estimations across their range. Most of their distribution range is outside protected areas and habitat degradation and high mortality rates create high local extinction risk and limited recolonisation. Habitat degradation or change, like overgrazing and bush encroachment impacts the suitable habitat available to bfcs. It is unlikely that bfcs occur continuously across the current range, thus a new approach is needed to delineate its distribution range and population connectivity more accurately. They do not occur in mountainous terrain, true desert, or habitats with dense, tall vegetation. Subpopulations are isolated and not connected due to geographical barriers (mountains, rivers), fragmented suitable habitats across its range, and limited dispersal ability, resulting in genetic isolation, low survival outside these habitats and high risk of local extinction rate if threats are high/ constant. Here we represent the distribution range for black-footed cats using landscape and vegetation structure characteristics and confirmed records of the species to describe its range in more detail.



Martina Küsters

## The reintroduction of cheetah (*Acinonyx jubatus*) into unfenced protected areas

Kelsey L. Brown<sup>1</sup>, Vincent C. van der Merwe<sup>1,2</sup>, & Donovan de Swardt<sup>1</sup>

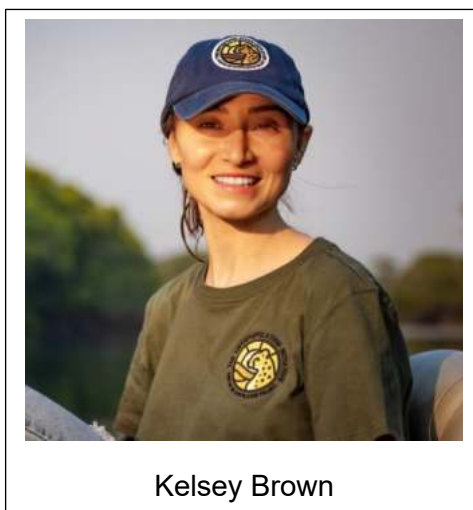
<sup>1</sup> *The Metapopulation Initiative, Haenertsburg*

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Presenter: Kelsey Brown, [kelsey@metapopulation.org](mailto:kelsey@metapopulation.org)

**Abstract:** Reintroductions have been instrumental in restoring South Africa's wild cheetah population. However, early reintroduction attempts were largely uncoordinated, opportunistic, and unsuccessful. Between 1965 and 1998, 188 'problem' cheetahs from Namibia were reintroduced into ten South African reserves. Within these, resident populations became established in only two, with most of the reintroduced cheetahs escaping from inadequately fenced reserves. Subsequent improvements in game fencing and the establishment of a managed metapopulation contributed significantly to successfully reintroducing cheetahs into 70 fenced reserves across Southern Africa. Reintroductions into unfenced systems present distinct challenges that have yet to be overcome, principally the absence of communication networks and the need for re-establishment.

Scent-marking locations play an essential role in cheetahs' communication. These scent-marking locations, termed communication hubs, are maintained by successive territory holders and visited by nonterritorial males and females for information exchange. In areas where cheetahs have been historically extirpated, their reintroduction can result in large exploratory movements in search of communication hubs that no longer exist. As founder cheetahs move beyond the protection of the reserve into which they were reintroduced, they risk exposure to poaching, conflict with humans and resident populations of other large carnivores, starvation, and immobilisation complications during recapture. The socio-spatial organisation of the cheetah and its consideration for reintroduction into unfenced systems may better confer the success of future attempts.



**No passports required: Exploring the significance of transnational boundary conservation areas and implications for multinational conservation initiatives for giraffe (*Giraffa spp.*)**

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**Abstract:** The conservation of large, highly mobile species often requires consideration of spatiotemporal dynamic resources at the landscape scale, many of which transect international political borders. Transboundary conservation initiatives offer strategic frameworks to better conserve habitat at the landscape scale through coordinated management across political boundaries. To understand the significance of transboundary conservation initiatives for giraffe, we quantified the geographical intersection of current giraffe range maps with existing and potential transboundary conservation areas. These areas highlight the extent of existing protected area coverage, potential protected area establishment, and the functional connectivity of suitable environments across national boundaries. Our results emphasise the importance of Southern African Development Community (SADC) recognised transfrontier conservation areas (TFCAs) for giraffe conservation, and also identify other potentially significant transboundary areas in eastern and central Africa. We also used a GPS telemetry dataset of over 470 unique giraffe from across 17 countries to characterise giraffe movement responses to transnational political boundaries using behavioral barrier analysis. While many national borders in giraffe ranges are associated with hard boundaries (e.g. fences or impermeable rivers and lakes), we identified multiple confirmed cases of at least three giraffe species crossing international borders. Identifying priority transnational boundary conservation areas for giraffe can enable countries to harmonize cross-border governance and management and increase the effectiveness of protected areas and other effective area-based conservation networks across political boundaries. Understanding the role of transnational boundary movements for highly mobile species is critical to ensuring appropriate management regimes for their conservation.





## Impacts of range expansion on elephant well-being: Insights from Kariega Game Reserve, South Africa

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**Abstract:** The study investigates the effects of range expansion via fence removal on elephant well-being, movement, behavior, and physiology at Kariega Game Reserve, South Africa. Utilizing African Wildlife Tracking Long Range (LoRa) Technology radio collars, spatial movements and behaviors of six elephants (three females and three males) were monitored before and after fence removal. Within months, collar twisting incidents occurred solely in males, necessitating collar removal due to irritation and resultant wounds. Browsing behavior in dense vegetation by males and collar design were identified as primary factors contributing to these incidents. GIS analysis revealed that collared elephants effectively utilized the entire fenced area, with seasonal rotation of home ranges to accommodate varying vegetation availability. A Phase 1 fence removal showed that bulls entered the new area at 10 days and cow-calf groups entered at 35 days. Other methods include behavioral observations, dung sampling, herd associations, and identification. Areas with higher elephant density and tourist visitation exhibited increased stress-related and agonistic behaviors, likely due to habitat and tourism pressure. These findings underscore the multifaceted impacts of range expansion on elephant populations, highlighting the necessity for comprehensive habitat management strategies within fenced reserves. Furthermore, the study underscores the importance of wildlife management protocols and collar design optimization to mitigate risks and ensure the well-being of collared individuals. Our research contributes valuable insights into the complexities of range expansion on elephant welfare, informing conservation efforts and management practices aimed at promoting coexistence between humans and wildlife in protected areas.



Brooke Friswold