IUCN SSC Species Survival Commission
GOSG
GIRAFFE & OKAPI SPECIALIST GROUP

Giraffid

Newsletter of the Giraffe & Okapi Specialist Group

Volume 7(2), December 2013

Note from the Co-Chairs

Wow – what a bumper issue and, of course, only befitting for the renamed **Giraffid** newsletter of the IUCN SSC Giraffe and Okapi Specialist Group (GOSG)!

It has been an exciting last six months and this issue brings you lots of stories and tall tales from across the African continent and beyond. From species conservation strategies and Red List updates, interesting wild and captive behaviours to translocations, hooves and DNA, this is truly a fully loaded newsletter. An inspiring read to keep us all going over the imminent festive season and a relaxing winter or summer break.

GOSG together with the Zoological Society of London (ZSL), the *Institut Congolais pour la Conservation de la Nature* (ICCN) and the Provincial Governor hosted a multi-stakeholder workshop in Kisangani, central Democratic Republic of Congo, where the participants reviewed the okapi's status, carried out an okapi Red List assessment and drafted the first-ever okapi conservation strategy. This resulted last month in the okapi being officially announced by IUCN as Endangered, based on an observed population size reduction of ≥50% over the last three generations. This and an update on other okapi activities are highlighted within this issue.

GOSG together with the Giraffe Conservation Foundation (GCF) and the Government of Kenya, supported by A.F.E.W, co-hosted the second Giraffe Indaba in Nairobi, Kenya in August. The Indaba provided a platform for researchers, managers, government officials and students from thirteen nations to present and discuss giraffe and okapi conservation and management issues, whilst planning for future opportunities over the coming years. All the abstracts are presented in this issue of **Giraffid** for those unfortunate enough not to attend – maybe next time!

The first two GOSG members meetings were held in Kisangani (for okapi) and Nairobi (for giraffe) respectively. The opportunity to bring together many of the new members in person to discuss various operational aspects as well as the process of Red Listing and updates on the species conservation status was invaluable.

After this exciting year, let's hope together we can sustain efforts and increase the awareness of giraffe and okapi throughout the world in 2014! Have a great festive season and see you all safe and sound in the New Year.

Julian Fennessy & Noëlle Kümpel
Co-Chairs GOSG

Inside this issue:

Objective of the IUCN SSC Giraffe & Okapi Specialist Group (GOSG):
The IUCN SSC Giraffe & Okapi Specialist Group (GOSG) is one of over 120 IUCN-SSC specialist groups, Red List Authorities and task forces working towards achieving the SSC's vision of *"a world that values and conserves present levels of biodiversity"*. Made up of experts from around the world, our group leads efforts to study giraffe, okapi and the threats they face, as well as leading and supporting conservation actions designed to ensure the survival of the two species into the future.

GOSG is jointly hosted by the Giraffe Conservation Foundation and the Zoological Society of London.
Please send any questions, comments or articles for the next issue of **Giraffid** to the Editor:
steph@giraffeconservation.org

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Okapi officially classified as 'Endangered' on the IUCN Red List

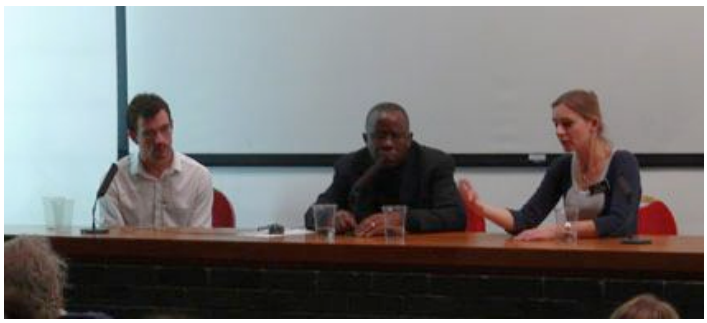
Noelle Kümpel & Alex Quinn, ZSL & David Stanton, Cardiff University

Following a reassessment led by the Zoological Society of London (ZSL) and the *Institut Congolais pour la Conservation de la Nature* (Congolese Nature Conservation Authority) (ICCN), the okapi has been reclassified as 'Endangered' on the IUCN Red List of Threatened Species. To coincide with the announcement of the okapi's new Red List status, the okapi chapter of the IUCN SSC Giraffe and Okapi Specialist Group (GOSG) held an awareness-raising event at ZSL in London on 27 November 2013. Over 100 people attended the event, including representatives from IUCN, funding bodies, the UK zoo community, conservationists, scientists, the private sector and members of the public.

Okapi caught on camera trap in Virunga National Park, DRC © ZSL

Dr Noëlle Kümpel, manager of ZSL's range-wide okapi conservation project and okapi co-chair for the GOSG, gave a talk providing an update on the range-wide okapi project, the reasoning behind the Red List assessment and an overview of the okapi conservation strategy being developed as part of the project. Cardiff University/ZSL PhD student David Stanton then gave a presentation on his project, which aims to develop a better understanding of okapi genetics and how this knowledge can be applied to conservation. A summary of the points presented in these talks may be seen later in the article.

The final talk was given by Jean-Joseph Mapilanga, Director of Protected Areas for ICCN. Director Mapilanga was previously Site Director of the Okapi Wildlife Reserve, and has over 20 years of experience working on-the-ground in the Democratic Republic of Congo (DRC). He gave an overview of the work ICCN does and spoke about the unique challenges of conservation in DRC, notably the presence of heavily armed rebel groups occupying a number of protected areas, and their impacts on wildlife.



The panellists David Stanton, Jean-Joseph Mapilanga & Noëlle Kümpel (from left to right).

A question and answer session followed the presentations. Topics discussed included how conservationists should respond as DRC develops its infrastructure and economy, how best to ensure local communities feel involved in conservation work, and how increasing stability within the okapi range may begin to form a basis for using ecotourism as a significant source of funding for conservation.

Update on the collaborative range-wide okapi conservation project

The okapi is a national icon for the DRC, but as a result of its elusive nature and the challenges of fieldwork in DRC, it remains poorly known and has received little conservation attention. The plight of the okapi reflects the state of conservation in DRC more widely. Following decades of civil conflict and under-resourcing, capacity to manage and protect the forests okapi inhabit has been substantially reduced, with increasing human population densities and poverty, compounded by resettlement of displaced peoples and movement of rebels, exerting immense pressure on forest resources through deforestation, forest degradation and hunting. In the face of these challenges the ZSL, in collaboration with the ICCN and partners across the okapi range, launched a major collaborative project in 2010 to conserve okapi and the biodiverse forests it inhabits. Following initial field surveys at the start of the project, the fieldwork component of the project unfortunately had to be abandoned due to the presence of rebel groups across much of the range, in particular in the east of DRC, and then a lethal attack on the Okapi Wildlife Reserve in June 2012, where ZSL staff were establishing a methodology comparison study.

The abandonment of fieldwork did however mean that we were subsequently able to focus on a number of other key aspects of the project. Based on a comprehensive literature review, an okapi status review was written, detailing the biology, ecology, historic and current distribution, relevant research, threats and current

conservation efforts related to okapi across its range. In May 2013, a multi-stakeholder workshop to develop the first-ever species-wide conservation strategy for the okapi was held in Kisangani, in the centre of the okapi's range. The workshop was hosted by the Governor of DRC's Orientale Province and organised by ZSL and the GOSG in partnership with ICCN. Around 40 government representatives (including site directors and key rangers from every protected area in the range), community chiefs, NGO workers and scientists from across the range attended this collaborative, participatory workshop, some journeying by river or road for up to three days each way. The continued buy-in of all these stakeholders will be critical in ensuring implementation of the strategy. Workshop participants first reviewed and updated the okapi status review prepared by ZSL, and then agreed a vision, goal, objectives and activities necessary to ensure the long-term survival of the species. The workshop highlighted that the okapi is faring worse than previously thought, being threatened throughout its range by the presence of dangerous rebels, elephant poachers and illegal miners. The participants of the workshop also reassessed the okapi as 'Endangered' on the IUCN Red List of Threatened Species, based on "an observed population size reduction of ≥50% over the last three generations" (estimated as 24 years, where generation length = 8-10 years in captivity).

Next steps for the project include a number of associated outputs, such as the establishment of a centralised okapi database and the drafting of a paper evaluating previous okapi population surveys with a view to making recommendations for monitoring. The okapi conservation strategy is being finalised and prepared for publication and the GOSG will play a vital role in supporting ICCN and partners to raise awareness and funds to implement this strategy and halt the decline of this unique, evolutionarily distinct, flagship species.

A brief update on David Stanton's PhD project: Phylogeography, population genetics and conservation of okapi (*Okapia johnstoni*)

A necessary prerequisite to conservation efforts is a basic understanding of the species in question. Broadly speaking, this translates to answering the following questions: what are they (taxonomically, evolutionarily and ecologically), where are they (current and historic distribution), and how many of them are there (census sizes and effective population sizes)? Without this information, conservation efforts could be unnecessary, and/or totally ineffective. To a large extent, this information is lacking for okapi. The okapi is a particularly challenging animal to study. They occur at low density across their range, and appear to only be present in dense forest, away from human presence. Genetics can be a useful tool for answering, or helping to answer these questions. This project is a UK NERC-CASE studentship between ZSL's Institute of Zoology and Cardiff University, and forms the genetic component of ZSL's okapi conservation project.

A combination of wild (faecal, confiscated skin and museum samples), captive (blood and preserved tissue) and founder (museum bone, tooth and tissue) samples were used. 13 polymorphic microsatellite loci, 12 'EPIC' nuclear loci and five mitochondrial primers were identified that could be amplified in low quality samples. These primers were used to amplify okapi DNA from the 'TL2 region' in the southwest of the okapi range, confirming okapi presence there. Microsatellite genotypes were constructed, which were able to show a high proportion of correct species identification from putative okapi dung in the Okapi Wildlife Reserve (RFO), although it was lower elsewhere in the range. These genotypes were also used to elucidate multiple aspects of okapi ecology in the RFO. Mitochondrial DNA and 'EPIC' loci indicate a complex evolutionary history of okapi, which may provide information on historic climatic fluctuation in Central Africa. Genetic diversities of the captive and founder okapi populations were also investigated. Captive genetic diversity was high, however, there was clear evidence of genetic drift. Also, mitochondrial genetic diversity was substantially reduced in the captive population, and simulations indicate further rapid decrease in future generations. This project provides valuable information for the conservation of this enigmatic and emblematic species. A more detailed summary of the project's finding will follow in a later issue once analysis is complete.

Contact:
Noëlle Kümpel
noelle.kumpel@zsl.org

Unusual sightings of wild giraffe behaviour

Anne Innis Dagg & Lisa Clifton-Bumpass

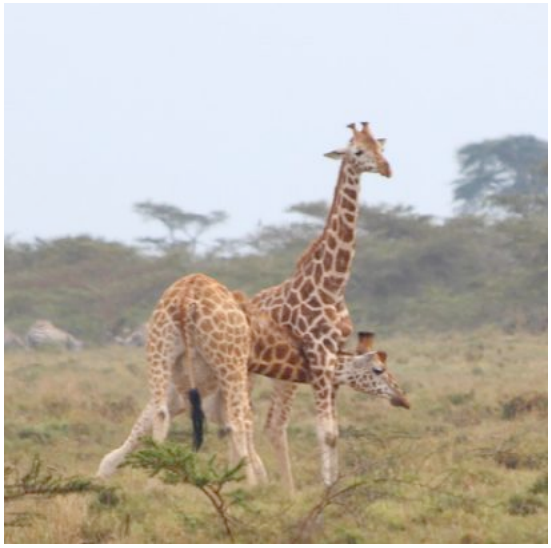
Sometimes it is useful not to have an agenda when observing the behavior of giraffe, but simply to sit back while watching them to see what they do over prolonged periods of time. On a sunny August 31, 2013, in Soysambu Conservancy, Kenya, seven of us were fortunate to observe behaviors apparently not reported before for wild giraffe. In our group were two local naturalists, Tony Cruize and Ishmael Lentula, two British zookeepers specializing in giraffe, Gareth Chamberlain and Sarah Roffe, an American giraffe behaviorist Lisa Clifton-Bumpass and her partner Lorril Fong-Jean and Canadian zoologist Anne Innis Dagg.

At mid-morning our guide Ishmael and driver Tony parked the safari van on a selected open grassy plain scattered with acacia trees. About 200 meters away we saw 13 Rothschild's giraffe spread along a line of about half a kilometer. The group members were feeding, lying down, standing, walking about and interacting with one another. We watched and photographed them over a period of an hour and a half until the members, as a loose group, moved out of our sight.

Leg Lift Behavior

Strangely, the first account of this behavior during a sparring or fighting match of two male giraffe seems to have been as recently as 2010, when Karl Ammann photographed it for both Masai and reticulated males for Dale Peterson's new book, *Giraffe Reflections*. The leg lift sparring behavior was also documented by Dana Allen at South Luangwa National Park in Zambia in Thornicroft's giraffe in 2013.

Our combatants were a medium-sized young male and a larger young male about 10 and 11 feet tall respectively. This pair stayed in the same area for about 45 minutes as they interacted in a manner that appeared to be practice

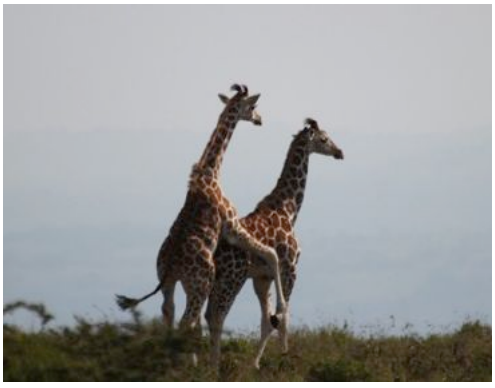


sparring and leg lifting behaviors. These consisted of ossicone strikes in various positions, hitting different body parts and in various action patterns punctuated with pushing matches and repeated leg lifts. Before the sparring started in earnest, the smaller male (S) was seen pressing himself against the body of his cohort (L) as they stood side by side facing the same direction. From then on they stood together between the bouts of hitting, always within five feet of each other.

The hits were not hard enough to unbalance or drive one away, because S was keen to continue the match although he was the usual recipient of blows. Various times L put his head under S's leg and raised his head so that the leg, either front or hind, was lifted sometimes to S's rump height. S tended to turn his body as his leg was lifted to maintain a stable stance. It seemed as if L might have been practising this leg lift behavior with a view toward using it in future matches. If done with full force, it could easily force the opponent to the ground, as Ammann documented. An interesting additional note is that approx. four minutes after the cohorts stopped sparring they were resting next to each other in the sleeping pose.

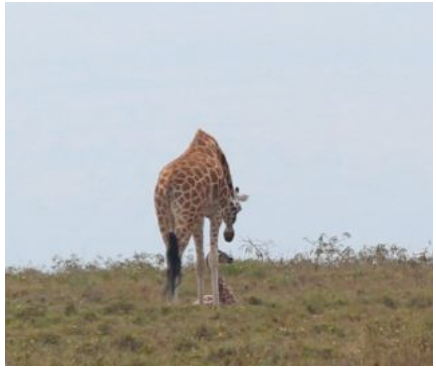
Female Mounting a Male

A female giraffe about eight feet tall mounted a male of similar size. The young animals had not sparred much in the past, judging from the amount of hair growing around their horns. (We reviewed our field notes and 8 photos of these two animals to be certain the mounter was a female.) In zoos mounting is not necessarily male-to-male giraffe or even to conspecifics; many giraffe zookeepers report young female giraffe mounting other giraffe and other animals they share their exhibits with, such as male eland at the Oakland Zoo in California.



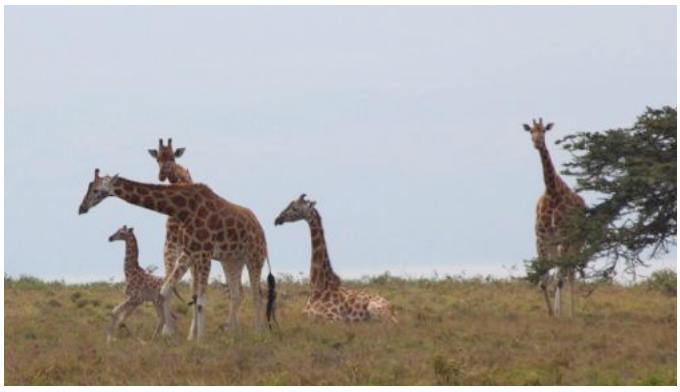
Teasing Infant Giraffe

To the right, farther from the van, was a resting female lying near a tree. An infant giraffe that had been lying nearby, but alone, suddenly raised its head catching our attention for the first time. It seemed to be less than six months old so we assumed this was a related pair. Within moments, however, another adult female approached it and we thought, ahh, *that's* its mother. The two were in close proximity for a few minutes, the female standing over the female infant nosing and smelling it. When the female nudged the calf with her left foreleg, it cantered off by itself. The female followed closely, rejoining the infant as she smelled it until the infant walked away; this reoccurred 6 times in a 5 minute span covering a distance of roughly 200 feet. Within a short period of time, a second female walked up to it and joined the first cow who was once again smelling the head, neck, and back of the calf. We thought, ahh *this* must be the mother. But again the youngster cantered off at which time a third possible mother joined them. All the while, the original lying female giraffe did not stir from her resting place.



For the next 6 minutes, we watched the three cows follow the infant as it walked, pranced and galloped away from the slow pursuit-chase-catch-chase patterns of behavior. One female loping after the calf caught up and nudged it with her right foreleg. After 19 minutes of this "chase", the group moved out of sight. Of note, during our 30 minutes observing these giraffe and the chase, no males showed interest in or were involved with this youngster.

The same type of slow pursuit of the infant giraffe is well documented in captive herds, usually occurring when infants are introduced to the adults of the herd for the first time. It continues for a number of days until the youngster is no longer a novelty. Perhaps we witnessed the first day of introduction of the calf to the herd group, which would mirror what is seen in zoos and normal captive animal social interactions.



Large Male Perhaps Making Infrasound

In zoos, giraffe have been observed throwing their heads up to make an infrasound. This seems to us to be what a large male was doing (von Muggenthaler *et al.* 1999).

Although giraffe have been observed by zoologists in the field for many years, it is still possible and important to document observed behaviors never before reported, as the recent documentation of the sparring leg lift found in the reticulated, Thornicroft's, Masai and Rothschild's giraffe populations within the past three years demonstrates.

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Contact:
Anne Innis Dagg
adagg@uwaterloo.ca
or
Lisa Clifton-Bumpass
pawsitivedogs@comcast.net

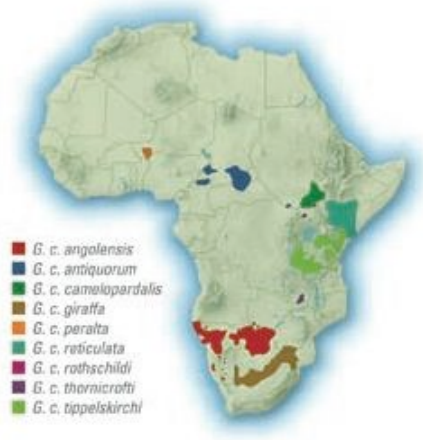
Standing tall for giraffe – Research and conservation of an overlooked African icon

Derek E. Lee, Julian T. Fennessy & Monica L. Bond, Wild Nature Institute & Giraffe Conservation Foundation

From the shade beneath a flat-topped acacia tree, a tall and elegant Maasai giraffe (*Giraffa camelopardalis tippelskirchi)* serenely chews a wad of cud as she watches our Land Cruiser bump slowly toward her across the savanna. We swing the vehicle around to her right side and stop about 80 meters away to photograph her, record her exact distance with a laser rangefinder, and mark her GPS location. As we drive off, she stares after us, chewing intermittently, but otherwise completely unfazed as we depart with another data point in our growing set of thousands of photographic giraffe "captures" that we are using to investigate the species' demography in the Tarangire Ecosystem of northern Tanzania.

Despite being iconically African, the giraffe remains largely understudied in the wild—unlike most of the continent's other large megafauna. In part, this is because giraffe were not heavily hunted until recently: they don't produce tusks or horns that are coveted as trophies or medicine and they are not an aggressive species. Sadly, the Giraffe Conservation Foundation (GCF) now estimates that giraffe numbers have plummeted across Africa by 40 percent in the last decade to less than 80,000 individuals due to increasing habitat fragmentation and a surge in bushmeat poaching driven by human population growth, economics, and war. Despite this precipitous decline, giraffe are not high on the conservation agenda of most countries, research groups, or NGOs.

The shortage of demographic and taxonomic information on the giraffe is now an impediment to its conservation. Most of what we know about giraffe ecology and demography comes from research conducted entirely within protected areas such as national parks. Meanwhile, most of the giraffe's historical range—which once encompassed all savanna habitat south of the Sahara Desert—is unprotected and increasingly fragmented due to the conversion of savanna ecosystems into farms and permanent settlements to support growing human populations and booming economies. Disconnected giraffe populations are now sprinkled across the African continent, from Niger in the west, through the northern savannas of Central Africa, east into Ethiopia, Kenya, and Tanzania, and down throughout Southern Africa (see map on below). Nearly all of these populations are in decline.

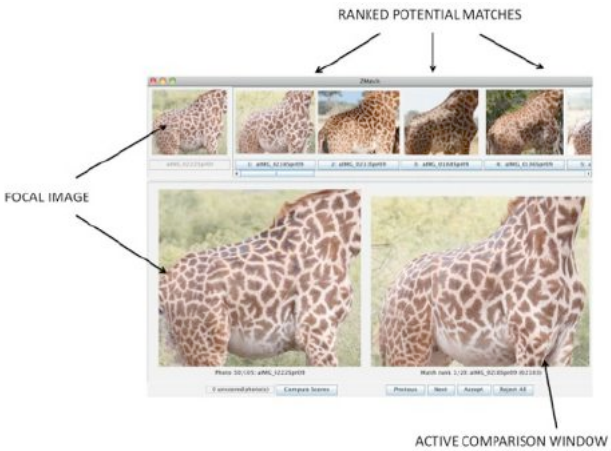


On the Trail of Giants

After decades of almost no research on the wild giraffe, wildlife biologists are showing renewed interest in these gentle giants because of recently declining numbers. Representing Dartmouth College and the Wild Nature Institute—a science and education NGO that advocates for wildlife conservation—we began employing photographic mark-recapture methods in 2011 to build an extensive database of demographic data on giraffe populations across the vast and heterogeneous Tarangire

Ecosystem. This region is known for its extraordinary diversity and abundance of large mammals but is threatened by habitat fragmentation and severe poaching. The Tarangire Ecosystem is second only to the Serengeti in giraffe density, but unlike the Serengeti, land in the Tarangire Ecosystem is largely unprotected. Hopefully, the new demographic data will allow wildlife managers to pinpoint areas that support high giraffe survival and reproduction, and enable Tanzanian wildlife agencies and lawmakers to protect and connect them.

Demographic studies of species using the photographic mark-recapture method have grown in popularity as digital cameras and pattern-recognition software have improved. Photographic mark-recapture is a non-invasive survey technique that allows scientists to easily identify individuals by differences in their coat patterns, which in giraffe are as unique as human fingerprints. Giraffe population estimates generated from photographic mark-recapture are twice as precise as aerial survey estimates and individual animals can be tracked over time. Such longitudinal information is immensely valuable to population biologists seeking to understand spatial and temporal factors affecting a species' survival, reproduction, and movements. The method is also much less expensive than physical captures for marking large mammals, so it allows much bigger sample sizes across a much larger area.



Every giraffe has a coat pattern as unique as a human fingerprint. Photos of Masai giraffe from the Tarangire ecosystem (above) are fed into Wild-ID, a pattern-matching software program that identifies individuals so they can be tracked without physical capture. The program enables much larger demographic studies than if patterns had be matched by eye.

The photographic mark-recapture method is now being employed in a large-scale study of Tarangire giraffe. To date, Wild Nature Institute has conducted seven surveys using the method, and four more are planned through the end of 2014. We conduct one-month-long fixed-route transect surveys at the end of the three annual precipitation seasons (short rains, long rains, and dry season). Each survey covers more than 1,700 square kilometers including parts of the Tarangire and Lake Manyara National Parks, Manyara Ranch (a private ranch conservancy), and two game-controlled areas containing village wildlife management areas and hunting blocks. During the surveys, we collect thousands of photographs of more than 1,500 known individual giraffe (approximately 65 percent of the total Tarangire Ecosystem population), photographically capturing each individual several times throughout the year in order to monitor their seasonal survival and reproduction as well as their movements throughout the study area.

Derek Lee photographs Masai giraffe at Lake Manyara National Park, Tanzania.

The data are used to test hypotheses about how factors including sex, age, location, vegetation phenology, predators, and density of giraffe and other ungulate populations affect survival, reproduction, and movement rates. We use a free, pattern-recognition software program called Wild-ID developed at Dartmouth College to match our photographs with those from previous surveys. The program has the lowest pattern identification error rate (less than or equal to 0.007) of any photo-identification system currently available. The photographic mark-recapture system easily processes large sample sizes across large geographical areas, making it possible to conduct complex statistical analyses for metapopulation studies that include multiple sites and covariates.

Using these techniques, our research has uncovered evidence for interesting spatial variation in birth rates, death rates, and movement rates of individuals, which may indicate source-sink dynamics in the Tarangire Ecosystem. For example, we found that mean survival rates were positively correlated with giraffe density, but movements tended to be from high survival areas (sources) toward areas of lower survival, where populations may not be self-sustaining (sinks). Preliminary data also show higher calving rates outside of the national parks, but higher adult survival within the parks. These findings emphasize the importance of maintaining and improving connective corridors among all areas that giraffe use. Additional data will help us identify possible

reasons for the dynamics we've observed, as well as identify important calving grounds outside parks that may require protection.

The Taxonomic Puzzle

In addition to demographic research, scientists from GCF and the LOEWE Biodiversity and Climate Research Centre in Germany are working to unravel giraffe taxonomy as a way to inform conservation, management, and policy decisions for giraffe conservation. Giraffe taxonomy has been confusing and sometimes contradictory for more than 100 years as debate has raged over whether populations were members of the same subspecies or hybrids of different subspecies. Historically, nine subspecies within the species *G. camelopardalis* were recognized, but today some researchers have proposed that as many as eight of these should be recognized as distinct species. Recent efforts using molecular genetics techniques are providing valuable insight into the evolutionary history of the species and may soon settle the debate.

If giraffe subspecies become recognized as separate species, the most at-risk among them could enjoy stronger protections. Currently, the giraffe is designated a species of "least concern" on the International Union for the Conservation of Nature's (IUCN) Red List. Several subspecies are at greater risk than the species as a whole, but it is unusual for subspecies to achieve a higher conservation status than the species itself. In 2008 and 2010, the GCF and the IUCN's Species Survival Commission's (SSC) Antelope Specialist Group's International Giraffe Working Group (now the IUCN SSC Giraffe and Okapi Specialist Group) overcame the odds by getting two giraffe subspecies listed as "endangered"—the West African (*G. c. peralta)* and Rothschild's (*G. c. rothschildi).* It was the end result of enormous effort to gather and analyze demographic data, conduct baseline taxonomic research, and hold discussions with all stakeholders. The government of Niger, home to the West African subspecies, has now produced the first-ever national giraffe conservation strategy for the country. A conservation strategy for Kenya, which is home to some Rothschild's giraffe populations, is in process. Other countries will hopefully follow suit as more results and findings come to the fore.

If taxonomic research concludes that giraffe are indeed one species, the challenges facing different subspecies may continue to be masked. However, even as a single species, giraffe are obviously in trouble. In comparison with another charismatic mega-herbivore, the 450,000 remaining African elephant vastly outnumber the 80,000 remaining giraffe. And yet, the elephant's Red List designation as "vulnerable" garners it massive global attention while giraffe research and conservation remain underfunded and unknown.

Much remains to be done to safeguard a future for wild giraffe in Africa. Our limited knowledge regarding the current status of the species and its various subspecies poses a threat to their longterm sustainability. To strengthen efforts towards fundamental research, the IUCN SSC formed the Giraffe and Okapi Specialist Group in March 2013, which is co-chaired by Drs. Julian Fennessy of the GCF and Noëlle Kümpel with the Zoological Society of London. The group aims to attract international support for the giraffe and okapi by improving knowledge of the species' distribution, abundance, ecology, habitats, and the threat posed by hunting and human conflict, and by assessing connectivity and relatedness of populations and the importance of habitat fragmentation. Another goal is to provide an official forum to support implementation of much-needed conservation strategies across the African continent by providing advice on conservation issues of giraffe and okapi to interested parties, including international bodies such as CITES, African governments, and management authorities.

At the continental level, GCF's Africa-wide assessment project works to evaluate the status of all giraffe populations and subspecies throughout Africa in order to inform giraffe conservation and management. The GCF collaborates with African governments, NGOs, universities, and researchers to gather demographic data across the species' range. The project's end goal is to publish a comprehensive analysis of census and anecdotal data on the giraffe including individual country profiles, conservation recommendations, and recommendations for future research. It is time to stand tall for giraffe conservation—as we have for elephant—and save a symbol of wild Africa.

Contact:
Derek Lee
1dereklee@gmail.com
or
Julian Fennessy
julian@giraffeconservation.org

Tall Tales – Giraffe evolution and ecology

Monica L. Bond, Wild Nature Institute

Around eight million years ago, more than 10 genera of the giraffid family roamed throughout eurasia, and some of these eventually spread into Africa. Fossil records indicate that long-necked species characteristic of the modern giraffe arose five to seven million years ago. Climate and other changes caused the extinction of the eurasian giraffids, but several African genera survived. About one million years ago, the modern long-necked giraffe (*Giraffa camelopardalis)* arose. Today, it and the much smaller and short-necked okapi (*Okapi johnstoni)* are the only two giraffid species that remain (Mitchell and Skinner 2003).

There is no mistaking a giraffe for any other species. Towering more than five meters high, it is the tallest animal in the world. Their incredible height and a host of other curious physical traits have enabled giraffe to exploit a nearly inaccessible niche. With long legs and a nearly two-meter-long neck, giraffe can feed from the upper canopy of acacia trees, avoiding competition with all other browsers except elephant (Estes 1991).

Possibly as a result of competition with other browsing species, the giraffe evolved cervical (neck) vertebrae that are each more than 28 centimeters long (Cameron and du Toit 2007). These seven vertebrae now make up more than half of the entire length of the spine, in contrast to other large ungulates in which these vertebrae make up one-third of their length (Badlangana *et al.* 2009).

Height as a Defense

Adult giraffe enjoy relatively little threat from predators because of their size and height. They can also fend off attackers with their dinner-plate-sized hooves (Dagg 1971). Young calves, on the other hand, are more vulnerable to attack by lion and hyena. Even though giraffe measure 1.8 meters tall at birth and double in height during their first year of life, only an estimated 27 to 42 percent survive that first year (Pellew 1983, Dagg and Foster 1976). Hiding in the undergrowth for the first few weeks of life and growing as quickly as possible are the young giraffe's main strategies to survive. Speed also helps: giraffe can run up to 60 kilometers per hour, and juveniles can run even faster than adults.

In an evolutionary arms race, as acacia trees evolved spines, hooks, and galls to protect their leaves from browsers, giraffe co-evolved the means to get around these defenses (Estes 1991, Kingdon 1997). The giraffe's 50-centimeter-long tongue and upper lip are both prehensile and can grasp and strip leaves off branches or select individual leaflets between sharp thorns. To protect against the thorns, the giraffe's lips, tongue, and inside of the mouth are covered in thick papillae and saliva (Dagg 1971).

The giraffe's distinctive brown-and-white coat pattern helps scientists identify individuals in demography studies. One study suggests that the patterns may also provide some camouflage in the dappled sunlight of savanna woodlands (du Toit 2001). Individuals of a subspecies share certain coat pattern characteristics. For example, the Rothschild's giraffe (*G. c. rothschildi)* has the fewest spots (usually none) below its knees, while the dark spots of the reticulated giraffe (*G. c. reticulata)* are separated by the narrowest white stripes.

The unique, elongated neck and limbs of a giraffe come with certain physiological difficulties, for which the animal has evolved some remarkable adaptations. A giraffe's blood pressure, for example, is twice that of a typical large mammal, an adaptation that maintains blood flow to the brain against gravity. When the giraffe lowers its head to drink, a complex net-like pressure-regulation system in the upper neck called the "rete mirabile" regulates blood flow to the brain and prevents loss of consciousness (Dagg 1971, du Toit 2001). In order to prevent edema in the long legs, a tight sheath of thick skin covers their lower limbs like a sock.

The giraffe has long fascinated humans around the world, but its future is threatened. Hopefully, through research and targeted conservation efforts, our grandchildren will have the opportunity to witness the magnificence of a wild giraffe.

Contact:
Monica Bond
monicabond@hotmail.com

CSI Namibia

Peter Fraser, Auckland Zoo

Auckland Zoo recently joined an expedition to help collect genetic samples from giraffe in Bwabwata National Park, northeast Namibia. The tissue sampling is part of a Giraffe Conservation Foundation (GCF) project funded by the Auckland Zoo Conservation Fund. Results could help reveal the 'missing link' to understanding giraffe genetics and in turn, assist in the conservation management of these majestic animals.

Auckland Zoo Conservation Fund programmes coordinator Peter Fraser was happy to cope with intense heat, drive thousands of kilometres, clock up 12-hour days and come face to face with some of Africa's most spectacular wildlife, to help get the job done. This is his story…

The journey

Windhoek, Namibia is the starting point of my adventure. I meet up with Dr Julian Fennessy, the world's foremost giraffe researcher, and his wife Stephanie. Stephanie is a member of the GCF board, and responsible for the logistics of our expedition. Others in our core team are GCF board member Andy Tutchings, and GCF researcher Andri Marais.

We load up two four-wheel drive vehicles with supplies for our two-week expedition and drive 1,000km north to the Zambezi Region (formerly Caprivi Region) on roads that lead to the Angolan border and along the mighty Kavango River.

It's here we reach the small strip of Namibia bordering Angola, Botswana, Zambia and Zimbabwe. This is the Zambezi Region, which is part of a five-country agreement called KAZA (Kavanga-Zambezi Transfrontier Conservation Area) that aims to protect and allow movement of migratory wildlife freely across borders.

It takes two days to reach our destination, and it's only at sunrise the next morning that I get to see the full beauty of our campsite on the banks of the Kwando River. This explains the sound of hippos browsing right next to my tent during the night!

Getting the job done

Our mission is to collect tissue samples from as many giraffe as we can. To do this, we're equipped with modified guns that shoot out darts. A dart fired at a giraffe takes a small bite of tissue, does no long-term harm and is probably no more painful than an insect bite.

After being fired, the dart falls out. It's then our job to retrieve the small tissue sample from the dart, transfer it to a vial, label it, and record all relevant data.

All 12 days of our expedition begin at 6am and finish at 6pm (dusk). I discover giraffe are surprisingly hard to spot in the African bush, and at times on seeing us they scarper – even when we're up to 300m away.

Illegal hunting

It is unusual behaviour say our giraffe experts, but this is an isolated area that also sees illegal hunting take place, which could explain why these giraffe so quickly take fright and flight.

Our excitement builds whenever we sight a giraffe. We get as close as possible in our vehicles, but more often than not, we need to go cross-country to get within the required 50m range of the dart gun. I'm aware we're on foot in lion country, but I take solace in knowing I'm not the slowest runner in our team. When successful, the bang of the dart gun is followed by the thwack of the dart hitting the giraffe's rump.

Then we must find the dart – designed to fall out immediately after impact. Sometimes it's straight forward, other times we have to search through thorny bushes and deep sandy soil. Fortunately, we recover all our darts, and most importantly, the accompanying tissue samples. In all, we come across just 35 giraffe, many of which exhibit extreme flight behaviour. But through a mix of luck and skill, we manage to get close enough to nine giraffe to obtain samples, and this is a good number for the study.

Road rules and wildlife

To avoid the hazard of encountering elephant at night, we aim to be at our campsite by dusk. Large numbers of elephant migrate through this five-country KAZA area, and this year's particularly dry summer has seen many stay near the perennial waters of the Kwando River.

If there's one rule in Africa to know, it's that elephant have right-of-way. One night, we had to remain in our vehicles while an elephant herd wandered through our camp. They brushed against our tents, and I held my breath as one of these giant creatures knocked the side

mirror of the vehicle I was driving - scary, but totally exhilarating!

Nightly around an open fire eating dinner, we'd recount our day; the number of times we'd had to dig our vehicles out of sandy tracks or fix flat tyres, the extraordinary and beautiful wildlife we'd encountered. I was lucky enough to report leopard, wild dog, honey badger, hippo, fish eagle, zebra, sable, springbok, impala, wildebeest, vervet monkeys, mongoose, hyena, and several more besides.

Finding the missing link

In all, I travelled over 2,500km within Namibia, worked alongside incredibly committed and passionate conservationists, and got up close to some of the world's most amazing and diminishing wildlife. The idea that any of these species could disappear in our lifetime, be it from poaching or other human-related pressures, is something we need to actively acknowledge and do everything in our power to prevent.

The tissue samples successfully collected are now being analysed in Germany. Following analysis, results will be compared between each sample, and then against datasets from other giraffe from across Africa.

The Giraffe Conservation Foundation (GCF) is working to secure a future for all giraffe populations and (sub)species in the wild. It is currently the only organisation in the world putting the spotlight on giraffe. To learn more, visit www.giraffeconservation.org.

Africa's forgotten megafauna

In 1998, giraffe numbers in Africa exceeded 140,000 individuals. Incredibly, today there are now fewer than 80,000 wild giraffe remaining.

That's less than a third of the current estimate of Africa elephant, which are classified as 'Endangered' on the IUCN Red List, yet the conservation status and profile of the world's tallest animal is very different.

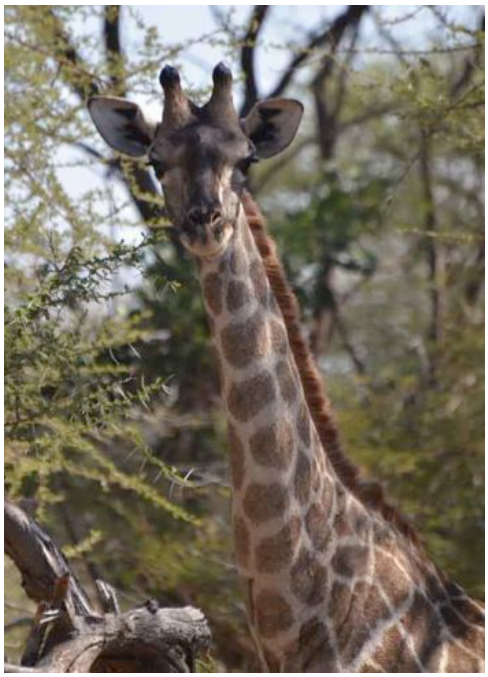
It's why our friends at the GCF are so committed to researching and conserving this megafauna species they describe as "one of Africa's most charismatic and ecologically and economically important species".

Early research has hinted that Namibian giraffe, never before studied, may be quite distinct from their Botswana counterparts, which are more closely related to South African giraffe. It is thought they may be the missing link to understanding southern Africa giraffe and their population genetics.

Results from the genetic sampling I assisted with may help prove that Namibian giraffe are distinct enough to be assessed and proposed as a 'Vulnerable' subspecies of giraffe on the ICUN Red List. That is tremendously important for their future conservation.

FAST FACTS

- Since 1998, habitat loss and poaching have seen giraffe populations plummet from 140,000 to less than 80,000 individuals today.
- The Rothschild's giraffe (Uganda) has an estimated wild population of less than 1,100 animals. An additional 450 are in zoos worldwide – a valuable insurance population.
- Research efforts by GCF have led to two giraffe sub-species (Rothschild's and West African giraffe) being formally classified as 'Endangered' on the IUCN Red List.
- The IUCN Red List of Threatened Species is widely recognized as the most comprehensive, objective global approach for evaluating the conservation status of plant and animal species.
- Auckland Zoo's giraffe herd is part of an Australasian regional breeding programme. Male Zabulu is a Rothschild's and female Rukiya is part-Rothschild's.



Contact:
Peter Fraser
peter.fraser@aucklandcouncil.govt.nz

Africa's giraffe: A conservation guide

Andy Tutchings, Stephanie Fennessy, Andri Marais, Julian Fennessy, Giraffe Conservation Foundation

The Giraffe Conservation Foundation (GCF), in collaboration with Black Eagle Media (former publisher of *Africa Geographic*), has produced an easy to read 32-page booklet that gives up-to-date information about the distribution, statistics and conservation status of the nine giraffe (sub)species currently recognised, as well as the threats facing them.

Released in conjunction with a series of educational posters (under development), the easy-to-read guide was launched at the in Nairobi at Giraffe Indaba II, 25-30 August 2013 (see other stories in **Giraffid**). The purpose of these materials is to:

- Raise awareness of the current status of Africa's wild giraffe populations to as wide an audience as possible.
- Promote and distribute the most up to date information on giraffe status, while at the same time updating existing, outdated and often misleading or false information currently in circulation.
- Provide an easy to read guide suitable for readers of all ages and backgrounds. The booklet includes historical and factual information, summarises current status of (sub)species and among other things outlines the giraffe's conservation significance and the threats they face.

GCF is providing an exciting opportunity for organisations, institutions and companies to partner with GCF in producing personalised special editions of the Conservation Guide and/or the posters.

The copyright for all materials will remain with GCF, but partner organisations are invited to include their logo and the following text* on the back cover:

This special edition of the Conservation Guide has been produced in collaboration with XXXXX and the Giraffe Conservation Foundation. Any proceeds and profit from the sale of this booklet will go directly to conservation of Africa's wild giraffe populations.

[* Exact details of the text, including additional information from the partner organisation e.g. mission, can be added and/or amended, as agreed between GCF and the partner organisation.]

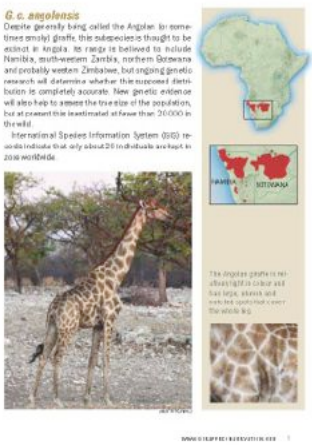
Partner organisations will not be able to amend or alter any of the Conservation Guide or posters' content without the express permission of GCF so as we can keep consistency – one of the real issues we have had with getting the right message out there!

Both the Conservation Guide and the posters will remain 'living documents' i.e. GCF will update the contents of these materials as new research and data collection reveals updated information. GCF guarantees to liaise closely with partner organisations and inform them at the earliest opportunity of any amendments, which are to be included in subsequent print-runs of the material.

The original versions of the Conservation Guide and posters will be available in PDF format as a free download from the GCF website at: *www.giraffeconservation.org*

For further information about this collaboration and how to obtain a tailored version of the material for your organisation, institution or company, please contact: *info@giraffeconservation.org*

Contact:
GCF
info@giraffeconservation.org



Giraffe back in the Fish River Canyon area of Southern Namibia after 160 years of local extinction

Chris Brown, Manni Goldbeck, Tryg & Sue Cooper, Gondwana Collection

When Hendrik Hop crossed the Orange / Senqu River from the Cape into present day Namibia and ventured along the lower Löwen River near its junction with the Fish River Canyon on 22 December 1761 he crossed a plain covered in "large herds of wild animals, viz rhinoceri, giraffe, buffaloes, kudus, gemsboks, stags and aurorochs".

This arid area (mean annual rainfall of about 90mm) is now part of the Gondwana Canyon Park, a private protected landscape of about 130,000ha with an open common border of about 70km with the 310,000ha |Ai-|Ais National Park. In the intervening years since Hendrik Hop travelled across those plains there have been major changes in land use and in the diversity and abundance of wildlife in the area.

The southern part of Namibia was the gateway for many early European explorers, traders and hunters from the Cape moving northwards into south-western Africa. They traded firearms with local Nama people and had an exploitative and wasteful attitude to wildlife. As a result, the first recorded local wildlife extinctions in Namibia took place in the far south of the country: white rhinoceros by 1800, elephant by about 1810, black rhinoceros by about 1830 and giraffe by about 1860. Giraffe were much sought after for their hides, from which long reins could be cut for the ox wagons. Similarly the pelt of the klipspringer was valued as an under-blanket for saddles to prevent chafing of the backs of horses.

This phase of exploration and trading was followed by early European settlement and extensive livestock farming. While the farms were large and mainly unfenced, the farming practices were more sedentary than the highly nomadic and well-adapted animal husbandry practiced by the Nama people. Wildlife species seen as conflicting with farming were actively removed such as the larger predators – lion, wild dog and spotted hyaena, as well as grazers such as buffalo and eland. As the land was largely unfenced wildlife could move over large areas.

The next phase of land transformation involved intensification of livestock farming through reduction in farm sizes, fencing and the development of artificial water points. This led to the most important adaptation of wildlife to arid areas, namely the ability to move in response to changing climatic, grazing and water conditions, being removed for most species. There were also active eradication programmes for species such as blue wildebeest (misconceived veterinary perceptions) and zebras (breaking fences). At the same time, vigorous campaigns were mounted to destroy all predators, using highly unselective methods such as poisons (mainly strychnine) and gin traps. These campaigns essentially eliminated all the scavenging species in the region, both birds and mammals. It has taken some 15 years of protection to start seeing the slow return of aardvark, aardwolf, Cape fox, bat-eared fox, African black-footed cat, brown hyaena and vultures.

Another consequence of the intensification of farming was that livestock numbers increased and became more sedentary. Water supply was no longer a limiting factor, food supply now determined how many animals could survive. Farmers managed for maximum livestock numbers and took little care over the condition of the rangeland.

With the international decline in the karakul pelt trade, livestock production became ever more marginal. This was compounded by long droughts that forced many farmers off their land. In a desperate attempt to survive under these harsh climatic and economic conditions farmers placed increasing pressure on the environment. Overstocking of small-stock led to damaged rangelands with the loss of perennial grasses and soil erosion, the remaining wildlife was hunted to the verge of extinction for food (e.g. springbok and oryx) and for their hides for sale (mountain zebra) and the campaign against predators was escalated to unprecedented levels in an attempt to eradicate the last remaining jackals, caracals and leopards. The value of farmland had collapsed and people began to realize that this land was simply too arid for sustainable farming.

In 1995 a group of conservation-oriented entrepreneurial Namibians started to see the value of wild landscapes linked to biodiversity conservation and tourism. They bought up land in the Fish River Canyon area and built a small lodge. Over the next ten years they bought more land, expanded the lodge and built two additional lodges. At the same time they started re-wilding the land and turning it into a private protected area – removing internal fences and old farming infrastructure, setting up monitoring and research programmes and rebuilding wildlife populations and reintroducing many of the wildlife species that historically occurred there. As can be seen from the graph in Figure 1, the recovery has been remarkable. This initiative evolved into the Gondwana Canyon Park and the Gondwana Collection, with another

three private protected areas and another nine lodges in other parts of Namibia.

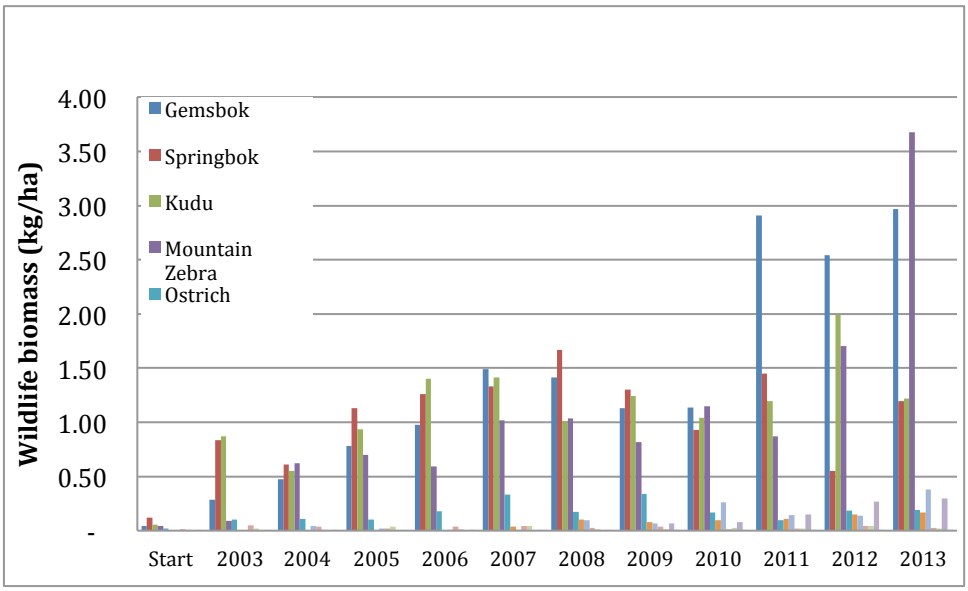


Figure 1: Change in wildlife biomass per species in the Gondwana Canyon Park from mid-1990s to 2013.

In about 2006 the Gondwana Canyon Park started reaching out to its neighbours, both the state managed |Ai-|Ais National Park and private landowners, with an expanded vision of "landscape co-management" for improved conservation and socio-economic development. This involves neighbours with similar land uses and long-term objectives coming together and asking one simple question: "what can we do better for conservation and socio-economic development in our area by working together?" The issues thus identified were prioritized, turned into a strategic plan and systematically implemented. One unforeseen benefit of the approach has been the increase in overall capacity and momentum in achieving results. So successful has the approach been that the Namibian government has now adopted it as a national strategy, with the assistance of GEF funding through UNDP. It is now being implemented in five pilot sites across Namibia.

One aspect prioritized in the Landscape Plan was to remove property boundary fences between like-minded land owners and custodians. Most internal fencing on areas managed for wildlife and tourism had already been removed. To date this has resulted in the opening up of over 500,000ha in the Fish River Canyon area. While not matching historic landscapes, it nonetheless allows wildlife to move far more freely in response to changing climatic events. These movements can be seen in the wildlife biomass graph above. A critical fence between the Gondwana Canyon Park and the |Ai-|Ais National Park was removed in late 2008 and early 2009. A decline in springbok and oryx number can be seen in the Gondwana Park in 2009 and 2010. Animals moved west into the |Ai-|Ais National Park where good rains had fallen. The converse can be seen in 2011 to 2013, with large numbers of oryx and mountain zebra moving east onto Gondwana land in response to poor rainfall in the west. These changing biomass numbers reflect population movements and ecosystems functioning more efficiently at a landscape level. They reflect a re-wilding of not just small parcels of land, but of an entire landscape through successful collaboration between neighbours.

In 2006, as part of Gondwana's wildlife reintroduction programme, four giraffe were captured and translocated from a farm in the Maltahöhe district some 250km to the north and released in the ephemeral !Gab (Holoog) River on the northern side of the Gondwana Canyon Park. It was a "hard" release – no boma, just off-loaded from the truck and allowed to canter away. The giraffe remained in the general area for a few days, then two headed west across the Fish River, one went north and one went east, the last returning from time to time but favouring the neighbour's farm. All four giraffe were seen from time to time and remained in good condition. After about a year the male giraffe that had moved east onto the neighbour's cattle farm started to take an unhealthy interest in his cows. It would herd the cows which disrupted their grazing and caused them to lose condition. The farmer was no longer so pleased to have this giraffe on his property. The giraffe was herded back onto Gondwana land three times, but always returned to the cows. The situation came to a head when the giraffe tried to mount a cow and broke its back. Further attempts to herd the giraffe back resulted in it becoming aggressive. The giraffe was then given to the farmer. After further attempts to separate it from the cows failed, the farmer shot the giraffe. The other three giraffe continued to prosper.

In 2012 plans were made to carry out another re-introduction of giraffe, this time of 13 animals by means of a "soft" release using a boma to settle the animals. The boma was constructed on the northern side of the Gondwana Canyon Park adjacent to the ephemeral !Gab River which supports a gallery of *Acacia*, *Zizyphus*, *Boscia* and other trees favoured by giraffe (Figure 2).

Figure 2: Giraffe boma constructed near to the ephemeral !Gab River (a small part of which can be seen on the right of the photo) on the northern side of the Gondwana.

In 2013, two consignments of young giraffe were captured on the farm Nomtsas north of Maltahöhe by African Wildlife Services, transported for eight hours and then off-loaded into the new boma – six giraffe on Thursday 30 May and seven on Saturday 1 June. They comprised five males and eight females between one and three years old. Though a little thin, all were in reasonable condition, and soon took to the browse cut and provided for them each day and, after a few days, also stared feeding on Lucerne (Figure 3).

Figure 3: Thirteen giraffe in the boma, where they were held for five days.

The giraffe settled down quickly in the boma. After five days they were released and headed down the !Gab River to explore their new home (Figure 4). They stayed together as a group for another five days. Then two animals left the group and headed north onto neighbouring property. After monitoring their movements for a week, they were chased back on foot and by vehicle into the Gondwana Park by our staff and with the help of neighbours. Then for a few months, only twelve animals were accounted for, and it was assumed that the thirteenth had either died or moved well away from the area. The remaining twelve giraffe split up occasionally, but came together again. Then suddenly after four months the animal that had gone missing returned to the group and so all thirteen giraffe were back together once more.

The introduced giraffe were monitored daily for the first month, then once a week for the next three months; they are still checked on from time to time, about every second week, and are all accounted for and in better condition after five months than when they were released, probably on account of the good browse along the !Gab River. They have remained in the same general area, and cover a home range of around 12km up and down the !Gab valley.

As the giraffe become established, get to know their new home. it is expected that they will started to breed and to gradually expand their population and range to other parts of the Gondwana Canyon Park and beyond, into the Greater Fish River Canyon Landscape. The intention of the Gondwana Collection is not just to re-wild and re-sock the Gondwana Park, but to have an impact at a landscape level: to increase collaboration between neighbouring owners and custodians of land, to open up the landscape to reinstate it ecological functioning and resilience – particularly as we go into uncertain times because of climate change – and, based on the sustainable management of indigenous biodiversity ecosystems, to create jobs and wealth from this arid land which was so badly degraded under conventional livestock farming.

Figure 4: Giraffe in the !Gab River exploring their new home after their release from the boma.

As an iconic element of the Fish River Canyon ecosystem, the giraffe is a powerful flagship species depicting the re-wilding of this dramatic landscape after 160 years of over-hunting, overgrazing and inappropriate land use in this arid area.

Contact:
Chris Brown
chrisbrown.namibia@gmail.com

Rearing a giraffe in Zoo Lyon – Kissa's case

Benoit Gaudiller, Pierre Maccagnan, Guillaume Douay DVM & Xavier Vaillant, Zoo Lyon

Zoo Lyon has a long history of breeding giraffe. Since 1973, no less than nineteen giraffe have been born at the zoo. In 2006, a new group was established with the development of The African Plain, a new enclosure concept for the zoo. This new group consists of 1.2 *Giraffa camelopardalis antiquorum* (Bachir 6 y.o. from Bioparc Doué la Fontaine, Rihanne and Uélé 7 y.o. from Paris Zoo) and one old (25 y.o.) hybrid female under PZP contraception.

The two primiparous females were introduced to the male during heat and after several attempts from the inexperienced male, the females finally stopped to show any signs of interest. Fortunately for Zoo Lyon one of the females was confirmed pregnant after a hormone assessments in Chester Zoo's Reproduction & Welfare Research Unit.

Birth and other complications

After weeks of imminent birth signs, a small hoof appeared in the evening of 25 June. The parturition lasted less than one and a half hours and a healthy calf was born in the presence of the zoo team.

We decided to leave the mother within the group to reduce any potential stress. Despite her initial interest in the calf, it appeared to scare her after a short while. Moreover, the hybrid female giraffe showed aggressive behaviour towards the mother and made attempts to take over the care of the young calf herself. We tried several isolation schemes but this had no effect on the mother's apparent fear of her own calf.

When no suckling had been observed after 48 hours, we decided, after consultation with Paris Zoo, to sedate the mother in order to allow the calf to approach her and start suckling. Unfortunately, despite three attempts in as many consecutives days, the mother still rejected its calf and appeared scared even under sedation.

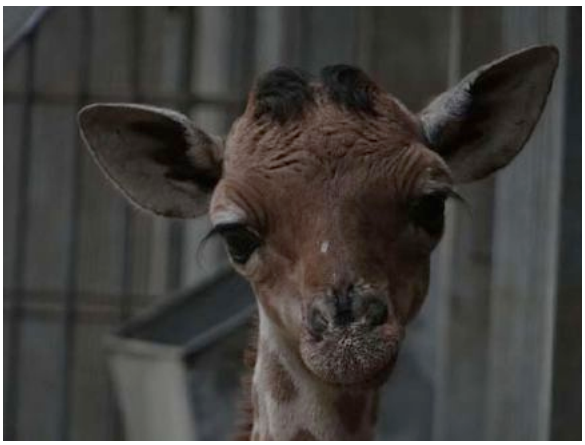
Despite this stressful situation, both for the zoo staff and the giraffe, the calf, which we had named 'Kissa', maintained good health and high spirits. Kissa quickly learned to drink dairy milk from a feed trough and with a lot of patience, also using our basic experience in medical training, we slowly taught her to come to the feeding trough, which was filled with lucerne grass. We monitored her feeding with the help of a video camera and soon could observe her exploring various adult food times.

Becoming part of the group

Our other concern was the future of Kissa within the group. All the females were kept inside for two months in order to allow them to accept Kissa. The old multiparous female was a great help as she had regular contact with the calf, allowing her to suckle on her chest whenever the calf felt stressed. This behaviour also helped the two others giraffe to calm down.

Today, things are going well for our twentieth giraffe calf born in Zoo Lyon. But it is important to keep in mind that each case is different and we must adapt. Maternal neglect in primiparous giraffe is an important issue in captivity. We have faced the same problem with the other primiparous giraffe and we applied the same protocol. Unfortunately, this calf died because of an abomasal impaction.

Thanks to Kissa's enormous will to live, the experience of our old hybrid female, as well as the determination of our staff we were able to rear the animal without altering its behaviour. This is a great result and important outcome for our work.



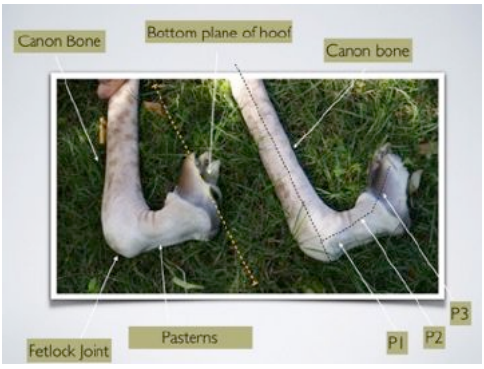
Contact:
Guillaume Douay
guillaume.douay@mairie-lyon.fr

Treatment of congenital bilateral severe hyperextension of the fetlock joint in a giraffe with extended heel shoes

Joseph P. Kamer, Veterinary Medical & Surgical Hospital of Topeka

Introduction

A female giraffe was born at the Topeka Zoological Park in Topeka, Kansas on July 11, 2010 with a severe form of congenital fetlock hyperextension of both rear legs. This particular baby giraffe's full male sibling was born with virtually the same condition five years prior and was euthanized after seven months of failed treatment. Similar foot deformities are said to occur in newborn giraffe with significant frequency in captivity (R. Ball and L. Bingaman Lackey pers. comm.). A similar condition has been seen in a new born giraffe in the wild eventually succumbing to predators (G. Clarke pers. comm.). Congenital and acquired flexor tendon laxity or hyperextension of the fetlock is well documented in the equine, bovine, and camelid (Baxter 2011, Bahr *et al.* 2005, Fowler 2012). Genetics, ingested toxins during gestation, nutrition during gestation, uterine positioning, and injury are implicated causes in the various species (Trotter 2012). Treatment of this deformity in new born foals when they are still able to walk on their heels or pasterns are conservatively treated with some form of hoof heel extensions and often successfully outgrow this condition; however, those born with the level of severity seen in this giraffe case are generally euthanized (E. Gaughan pers. comm.).



This calf was born full term with an uneventful and fairly rapid front feet and head delivery. The calf was standing within 45 minutes of birth in tall grass so the feet were not openly visible, however, it appeared to be standing incorrectly. Initial exam of the female calf revealed severe hyperextension of both rear fetlocks with anterior subluxation of P1 and severe contracture of the digital extensor tendons. The suspensory ligament and digital flexor tendons were totally lax with redundant stretched skin over the caudal aspect of the fetlock joints. Flexing the fetlock to a normal standing angle required moderate to heavy force to oppose the extensor tendon contracture. A palpable and audible pop was produced with this manipulation and is believed to be the relocation of the subluxated P1's. The giraffe appeared normal in all other aspects. It was obvious that this giraffe would need aggressive and immediate treatment or euthanasia would be required.

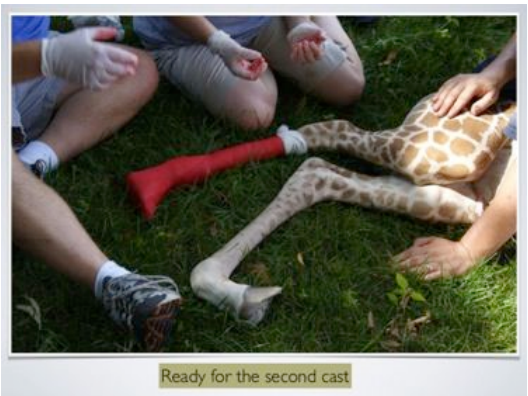
The course of treatment applied to this patient would span three months and could be divided into three separate phases. Phase one took three weeks and entailed the use of fiberglass casts and physical therapy to stretch the digital extensor tendons. Phase two took six weeks and involved the attachment of specially designed extended heel wooden shoes and the construction of an external suspensory ligament system to keep the feet flat on the ground and to support the extremely lax suspensory ligaments and digital flexor tendons. The final three weeks of treatment was referred to as, phase three, and included gradual reduction in supportive coaptation, a decrease in the heel length of the shoes, and ended with removal of the shoes.

Several complications were also addressed during the treatment process. A severe wound infection that occurred secondary to a cast saw laceration during a routine cast removal was aggressively treated with antibiotics and eventually treated with A-cell® porcine bladder epithelium to finally get it to heal. Also, an acquired varus deformity of the right fetlock was treated with several corrective shoeing modifications.

CASE REPORT

Phase One: Application of fiberglass casts and stretching of digital extensor tendons

With the severity of this limb deformity, time was of the essence in initiating treatment. Prolonged ambulation of a calf with this particular defect would lead to rapid pressure sore formation and open ulceration to the caudal fetlock soft tissues structures striking the ground.


Ready for the second cast

This would lead to further damage to the already stretched, flaccid and compromised suspensory ligament, flexor tendons, inter-phalangeal ligaments and joint capsules.

The primary objectives in phase one were to align the fetlock joints in a normal standing angle, counteract the extreme forces of the digital extensor tendon contracture, and provide both protection along with support to the caudal aspects of the fetlock and pasterns. This could best be achieved by providing rigid stabilization to both fetlock joints while still allowing the giraffe to walk on the bottom of the hooves and to walk in as normal a fashion as possible. Fiberglass casting was elected due to the ease of application and to its ability to conform uniquely to the patient's leg anatomy. This fixation would eliminate motion and pressure sores as opposed to other more temporary rigid splinting options. Soft Robert-Jones type bandage coaptation applied at this point was considered ineffective in counteracting the excessive extensor tendon contracture.

The leg was thoroughly dried with towels, the hoof caps were trimmed away and some slight filing of the bottom of the hoof was done. An overlapping layer of 6 inch cast padding was applied and shaped around the hoof up to the proximal canon bone 10cm below the hock. Three rolls of standard fiberglass casting were used per leg while wrapping extra thickness around the entire hoof and fetlock region for maximum support. During casting, the fetlocks were flexed and held in a standing angle during cast application and curing. After the casts hardened, the calf was lifted and allowed to stand and walk immediately on the casts. The calf was put back with her mother and she began to nurse soon after. Over the next 48 hours the calf began to exhibit a stiff abnormal gait of the rear legs and signs of pain. The cast bound limbs were observed for odor, pain, or sensitivity. None was found. Further orthopedic examination revealed pain in the cranial tibial region and stifle. The tension on the digital extensor tendons, caused by forcing the fetlock to a normal standing angle, was radiating proximal in the limb to the level of the stifle causing pain and stiffness. Twice daily physical therapy was implemented which included forced extension of the hip, stifle, and hock with deep fascial stripping and massage of the cranial tibial region. Pain was managed with Metacam® (0.1mg/kg SID) injectable and oral formulations. A more normal gait was achieved over the next two weeks.

The first cast change was done in five days. The casts were removed by using a cast cutting saw making the cuts medial and lateral as to prevent damage to the extensor and suspensory tendons. The digital extensor tendons had stretched about 30%. No sign of pressure sores were noted on the limb. The hooves were trimmed and filed and treated with Wonder Dust TM before reapplying the casts in the same procedure as before. If lengthening the extensor tendons was unobtainable by casting, an extensor tendon desmotomy was recommended at the mid cannon bone region to release the contracture (E. Gaughan and T. Parks pers. comm.). After four castings and physical therapy over a span of 21 days, the extensor contraction was gradually relieved allowing the feet to rest in a neutral position. Surgical extensor release would not be necessary (T. Parks pers comm.). The casts were kept dry by wrapping with plastic wrap and duct tape whenever a wet environment was encountered.

Phase Two: Application of extended heel shoes with external suspensory ligament system and external flexible cooptation

The second phase of this treatment would last 44 days and involved the use of specially crafted wooden shoes with extended heels designed to fit a giraffe's cloven hoof. It would also incorporate a constructed external suspensory ligament system and external elastic bandage type coaptation. The design would fasten securely to the hoof, force the hooves to strike flat on the ground, provide support to the extremely lax and weakened fetlock joint, allow sufficient weight load to all of the tendons, ligaments, and other structures of the foot, and would not impede range of motion or restrict growth.

The shoes design was based from clay moldings of the bottom of the hooves and tracings of the circumference of the left and right rear hooves. The shoes were cut from 3/4 inch plywood using a scroll saw. The shoe was a single pieced "spoon shaped design" that was sized to fit on both claws of the hoof with close tolerances to the outer hoof circumference. The overall length of the shoe was calculated by doubling the length of the foot. This extended heel length provided a sufficient lever arm that struck the ground first, forcing the bottom of hoof to always rest flat on the ground and prevented the toe from rocking up during weight bearing. The extended heel was designed to be slightly more narrow than the main portion of the shoe with a slight taper and rounded corners.

Using a radial arm saw, 3/32" wide saw kerfs were cut at a 1/8" depth, 5/16" apart and perpendicular to the long axis of the shoe in the toe portion of the shoe to increase cement bonding between the hoof and shoe. These pre-fabricated shoes were test fitted to the bottom of the hoof, the outer edges scribed with a marker and final contouring was done with a stationary sander to provide a shoe that fit with an edge 1/16" larger than the actual hoof circumference. Two 1/4" holes were drilled into the shoes 5 mm caudal and centered to each heel bulb. On the bottom of the shoe, a 1/4" wide by 3/16" deep groove was created with a Dremel TM tool and burr. This groove connected the two holes on the bottom side of the shoe to allow a 1/4 inch nylon rope, (external suspensory ligament), to fit flush with the bottom of the shoe.

Application of the wooden shoes to the hooves was a two step process. First the giraffe was laid in lateral recumbency on an air mattress and manually restrained by zoo keepers as the fourth cast was removed with a cast cutter. The hoof soles were both filed flat in an even plane and the toe length was trimmed and filed to correct length. The entire hoof was sanded with a medium grit sanding block and the interdigital region thoroughly cleaned with gauze and the entire hoof cleaned and prepared with acetone. Plastic cling wrap was placed temporarily between the caudal interdigital space between the heel bulbs to keep cement out of this region. (The giraffe was sedated with Xylazine (0.1mg/kg IM) prior to cementing on shoe due to excess motion.) A 1.5 ounce batch of Equilox® methylmethacrylate cement was mixed and applied to the bottom of the hoof and to the dorsal side of the shoe. The shoe was pressed to the sole of the hoof and tightly wrapped and secured to the hoof with plastic cling wrap until the methlymethacrylate (MMA) was cured which took about 10 minutes. Then the plastic wrap was removed. The same procedure was performed on the opposite foot.

During step two, an Ultra-High-Molecular-Weight Polyethylene (UHMWPE) fabric (Spectra® fabric), was cemented and applied on the hoof and wrapped around and underneath the shoe. A 4 inch x 8 inch sheet of Spectra® polyethylene fabric was divided into two 2 inch x 4 inch pieces and four 1 inch x 4 inch pieces. A two ounce batch of Equilox® was mixed and applied to the Spectra® fabric and saturated into the fabric pieces. Equilox® was applied to the dorsal aspects of both hoof claws and between the claws. The larger strips of cloth were applied to the mid hoof and wrapped around to the bottom of the shoe (Vetwrap® was temporarily wrapped around the pasterns above the hoof to prevent cement from getting on the skin.). The smaller strips were placed around the front of the toes covering additional exposed hoof and wrapped around the bottom of the shoe. Plastic cling wrap was again tightly wrapped around the hoof and shoe to mold the MMA and UHMWPE to the hoof wall and shoe until it cured in about ten minutes. The plastic was removed. The resulting wrap-around shell of MMA and UHMWPE provided a very solid and strong fixation of the shoe to the hoof that held on well until actual removal of the shoe was performed. A similar type of shoe adhesion procedure was utilized by a farrier on my personal horse to cement on plastic and wooden shoes for chronic laminitis treatment (C. Macy pers. comm.).

Close up of finished shoe application

After both shoes were cemented to the hooves, a suspensory system for each fetlock was built. Each suspensory system was comprised of a pair of external suspensory ligaments including their attachments near the caudal hoof and proximal-caudal canon bone. This external suspensory ligament (ESL) was comprised of 1/4" nylon braided rope that was threaded through two 12 inch lengths of 1/2" plastic tubing. The ESL insertion point was located on the shoe directly behind the heel bulbs of the hoof. Two 1/4 inch holes were drilled into the shoe at a point centered to each heel bulb and placed 5 mm caudal to each heel bulb. The 1/4" nylon rope was threaded into one hole, passed within the groove between the two holes, and then out of the other hole. The preformed groove's purpose was to allow the rope to fit flush with the bottom surface of the shoe.

Next, Elastikon® 4" stretch adhesive bandage was applied directly to the haired skin and wrapped around the limb extending from the bottom of the shoe and around the hoof up to the hock with a 1.5cm thick buildup of bandage material around the fetlock joint providing flexible external coaptation. The two artificial rope tendons, each inside of their 1/2" plastic tubing tendon sheath, were stretched proximal from the caudal aspect of the bulbs of the heel, over the caudal fetlock, along the caudal aspect of the canon bone, towards the tarsus, and they were secured to the caudal aspect of the fetlock and canon bone with a layer of Elastikon®. The distal end of the two lengths of plastic tubing was slid several inches away from the wooden shoe prior to taping down with Elastikon® to allow for later adjustment of the ESL.

A fiberglass cast tube was applied over the ESL around the canon bone extending from just 2 inches proximal to the distal cannon bone to 6 inches distal to the tarsus and allowed to cure. The ESL was drawn up tight and then wrapped back distal where it was covered by another 4 inch wide fiberglass cast tube applied around the distal cast and over this ESL. The fiberglass was allowed to cure and then the taught ESL was again wrapped back proximal and secured at the proximal cast tube with medical tape. This back and forth wrapping of the two ropes created a pulley like system preventing slippage of the ESL and allowing for tension adjustment. The caudal-proximal edge of the first tube of fiberglass casting essentially provided an origin site for the two nylon ropes of the ESL. The strong pulling forces exerted at this origin point was effectively displaced over the entire surface area beneath this cast tube, bonding to the underneath Elastikon® that was adhered to the skin. In addition, the distal portion of this cast tube rode on top of a flared thickened portion (1.5cm) of Elastikon® around the fetlock also preventing distal slippage of the tube. This external suspensory ligament provided support to the fetlock preventing hyperextension of the fetlock. The giraffe was able to walk immediately after the procedure.

The tube casts and all of the wraps were removed in 10 days. (During this ten-day period, several tightening adjustments were made to the ESL). While the giraffe stood unaided on the shoed feet with no bandaging, the fetlock angle was measured at 105 degrees. The back of the fetlock also did not drop to the level of the extended heel shoe. At this point, the first evidence of increased tension of the giraffe's suspensory ligaments was seen. The ESL were tightened and reattached to the backs of the cannon bones with multiple wraps of Elastikon®, instead of cast tubes, in a similar fashion as previously done with the cast tubes. This method of attaching the ESL to the cannon bone was not as secure, so additional coaptation and support was provided to the fetlocks by wrapping them with gauze and Elastikon® and by applying thick and tightly wrapped Robert-Jones bandages extending to the upper cannon bone.

Full Shoe Revision

Full shoe revision involved the removal of the old shoe from the hoof, cleaning, filing and trimming the hoof, and reattachment of the shoe.

Earlier procedures were done with the aid of Xylazine sedation, however these later procedures were done without the aid of sedation on the standing giraffe in the giraffe chute. A mini chute was made inside of this larger chute by stacking hay bales in such a fashion that the

giraffe fit tightly in the chute preventing injury.


Shoe after removal

A halter was always used so that a zoo keeper could control the head. A belly sling, designed to fit the young giraffe (S. Gamerl pers. comm.) was made from old fire water hose attached to quick release adjustable straps and hooked to the side walls of the giraffe chute. It was used to hoist and support the body of giraffe preventing her from falling down during the procedure. Several hay bales were placed behind the giraffe. A single hind leg was extended over these hay bales while a zoo keeper secured the limb keeping it in extension as the foot was worked on.


Succession of shoes

Removal of each shoe was a tedious chore and involved loosening the edges of the MMA/UHMWPE shell from the hoof with a hoof file and grasping the edges with hoof trimmers and peeling the shell away from the hoof. A narrow heavy blade putty knife was inserted between the wooden shoe and the bottom of the hoof to pry the shoe from the hoof. Removing the shoe was a relatively slow process but was safely done on four separate occasions. After removal, the bottom of the hoof was found to be covered in a grey thick odorous debris. The entire hoof was cleaned with particular attention cleaning between the claws using gauze in flossing type motion. The hoof was trimmed, filed and sanded. The overall health of the hoof appeared normal. After shoe removal, the giraffe was allowed to temporarily stand on the foot for evaluation. The fetlock dropped to the ground, the foot rocked back on the pasterns and heel, and the toes tipped up. There was, however, some obvious increased tension in the suspensory ligament upon palpation. Reapplication of the shoes was done as previously described. (During routine examinations, Kopertox® was infiltrated under the heel bulb and between the toes.)

Phase Three: Decreased coaptation, shoe modification, and shoe removal

Approximately three weeks after the second set of shoes were applied, it was noticeable that the fetlock angles were slowly increasing. This was visually apparent and was verified with goniometer readings. The giraffe was increasingly more active and was frequently seen running, bucking, and galloping at full speed in the yard with the extended heel shoes. During Robert-Jones Bandage changes, the amount of bandage material reapplied was gradually decreased in amount. The external suspensory ligament was eventually discontinued.

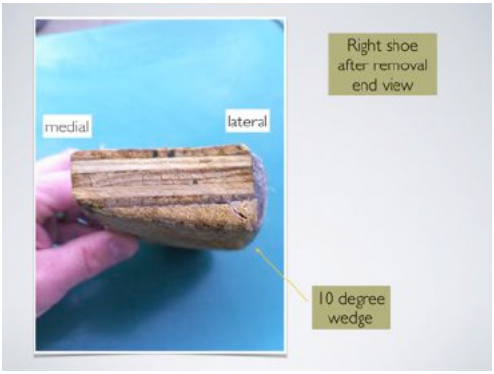
Note fetlock standing angle

The standing angle of the fetlocks continued to increase as more load was applied and as the giraffe grew. The giraffe was always very active and was frequently seen running at full gallop with the extended heel shoes. The second shoe would stay on the left foot for 35 days and 46 days for the right foot. The left shoe heel was shortened by 50% one week before its removal, and the right heel was shortened 50% two days before its removal. A third, newly designed set of shoes, would not be needed.

Complications

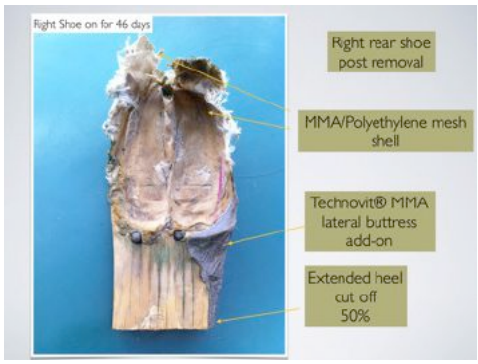
During the second cast removal with the cast cutting saw, the giraffe received two skin lacerations, one over the left fetlock on the lateral aspect and one over the right fetlock on the medial aspect. These wounds were immediately cleaned with chlorhexidine scrub and then copiously lavaged with sterile saline. A local anesthetic block of 2% Lidocaine was administered and the wounds were sutured. Enrofloxacin and Penicillin treatment was administered daily for the next four days and upon re-inspection and recasting, the wounds appeared to be healing very well with no sign of infection. Nine days later, on 4 August 2010 at the last cast removal before the first wooden shoes were applied, it appeared that the wounds were infected. The right wound had partially dehisced. The wound was cultured, remaining sutures removed, flushed with saline, packed with triple antibiotic ointment, and wrapped in sterile gauze prior to covering with Elastikon®.

Five days later culture and sensitivity results of the wound infection revealed *Pseudomonas aeruginosa, Proteus mirabilis,* and *Enterococcus* species. This infection was not susceptiple to Enrofloxacin or Penicillin. Initial antibiotic treatment was switched to Amikacin and Ampicillin, and was then changed to Ceftazadime and Ampicillin for 16 days. Frequent bandage changes and wound lavages were done over a four-week period. A large amount of swelling was associated with this wound. Radiographs revealed no bone or joint involvement. After the infection was eliminated a large 5 cm x 3 cm open granulated wound remained. Two applications of A-cell porcine bladder epithelium sheets were applied over a ten-day period. This effectively stimulated new skin growth and wound contraction leaving a small 2.5cm x 1.5cm pigmented scar.



In less than two weeks after the first shoes were applied, there were early signs of a right fetlock varus deformity beginning to occur. It actually appeared to be more of an internal torsion of the foot at the level of the fetlock (pigeon toeing). This appeared to worsen over the next several weeks. Radiograph views did not reveal any obvious angular limb deformity. When sighting down the right leg from the hock to the foot, a 10 degree internal torsion of the toes was measured. An early attempt to counteract this internal torsion of the foot (or varus deformity of the fetlock) was done by placing the second shoe on the hoof in a more correct forward directing anatomical alignment. In doing so, the lateral heel bulb of the foot would hang slightly over the lateral side of the shoe and the shoe would create a slight lateral extension of the lateral toe. After three weeks, the internal toe deviation worsened and when measured had increased to 12.5 degrees. Additional corrections to the shoe were made as adjunctive treatment. A 10 degree wedge was cut from pine and its shape was cut to match the contour of the existing shoe. After sanding and preparing the bottom of the right shoe, this wedge was attached to the shoe bottom with Technovit® MMA cement. The wedge was applied so that its wide edge was aligned with the lateral side of the shoe and its tapered edge was aligned with the medial side of the shoe. The long axis of the wedge was actually applied obliquely. It was applied with the toe portion rotated laterally about 7-8 degrees so that its long axis orientation was parallel and in line with the frontal articulation plane of the hock as sighted down the hock and cannon bone (The shoe was already attached 3-4 degrees oblique to the foot.). This orientation caused the lateral toe portion of the wedge to hang over the leading lateral edge of the shoe by 1.75cm and the medial heel portion of the wedge to hang over the medial trailing extended heel portion of the shoe about 1cm. After the wedge was secured, shallow 1/4 inch anchor holes were drilled in the side of the shoe, and additional Technovit® MMA was mixed and molded in a doughy state and formed to the lateral side of the shoe. This created a slightly wider lateral toe shoe extension and created a buttress under the over hanging lateral heel bulb.

A slight addition of MMA was formed on to the medial caudal heel region of the shoe also. This all was wrapped in cling wrap, molded and allowed to cure in about 10 minutes. These shoe modifications exerted a lateral force on the foot during weight bearing counteracting the internal varus deviation of the foot. The concern with not treating this angular deformity was that the toe could continue to torsion inwards such that more weight would be applied to the lateral toe possibly leading to a 'rolling over effect' on the lateral foot. This corrective shoe was kept on for 21 days. It appeared to correct the internal torsion. After the shoes were removed, the medial toe was filed slightly shorter to continue the wedge effect under the foot. This was done again a final time in seven days. The fetlock varus or internal torsion was visibly correcting.



Results

This case of severe bilateral fetlock hyperextension in a new born giraffe was successfully treated with casting, physical therapy, extended heel shoes, an artificial external suspensory ligament system, and external coaptation. The giraffe cloven foot tolerated the wearing of a MMA cement attached wooden shoe for long periods of time with no obvious complications. The giraffe was also totally functional wearing these shoes and was seen frequently running and bucking. The shoes held up well to this normal daily activity. The adhesion technique worked very well and the shoes had to be physically removed in all cases. As commonly experienced in foals, fetlock

hyperextension in this giraffe was completely reversed. A mild angular limb defect of the right foot was successfully treated with corrective modification of the already attached extended heel shoe. The 10 degree lateral wedge cemented to the bottom of the shoe was well tolerated by the giraffe and it forced the varus deformity laterally. A-cell® porcine bladder epithelium was used successfully to re-epithelialize a large open wound on the foot.

Discussion

From the results of this case study, it is my conclusion that treatment of severe fetlock hyperextension in the giraffe by adapting known treatment modalities used in the equine is certainly possible. By providing the appropriate support to the hoof and fetlock joint over an early critical time period, a giraffe can 'outgrow' this condition and be normal and functional. The cloven hoof of the giraffe can tolerate being solidly bound to a wooden shoe with MMA cement for relatively long periods of time. In regards to the complication of cast saw lacerations to the skin, a veterinarian might consider incorporating Spectra fabric (UHMWPE) in with the cast padding prior to fiberglass casting of the limb. This could provide a cut resistant barrier and potentially eliminate the risk of cutting the skin when removing the cast with a cast cutting saw. Also, the veterinarian may consider the use of Minoken Honey as and adjunctive therapy to treating severe wound infections as there is a large amount of evidence of this working well in the treatment of wound infections (Stanley 2012). A-cell® porcine bladder epithelium provided an efficient means of primary wound closure.

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Contact:
Joseph Kamer
jpkamer@aol.com

Social networking for the long necks

Amy Schilz, Andrea Bryant & Diana Cartier, Cheyenne Mountain Zoo

Cheyenne Mountain Zoo is famous for their giraffe herd, but the herd's three zookeepers are becoming known in the social media world for something else – they've started a page that has launched several important conversations about captive giraffe and how to care for them.

Cheyenne Mountain Zoo is located in Colorado Springs CO and is home to the world's most prolific captive reticulated giraffe herd. The Zoo has celebrated 198 giraffe births since 1954, when giraffe were introduced to their animal collection. Currently, the Zoo has 18 reticulated giraffe, making its herd one of the largest, cohesive herds in North America. They are a mix of castrated bulls, cows, and one large breeding bull.

In the spring of 2013, the Zoo opened Encounter Africa, a new exhibit adjacent to the giraffe, and combined keeper duties of Encounter Africa's lion and African Rift Valley's giraffe. Three keepers, Amy Schilz, Andrea Bryant and Diana Cartier were hired to care for the Zoo's lion and giraffe.

The new keepers discovered they had a passion for the gentle giants and threw all of their energy into learning about how to care, and train, the Zoo's famous herd. The team quickly bonded over conversations about how to properly and effectively train cooperative husbandry behaviors and how to provide daily enrichment. While they all had general giraffe knowledge, none considered themselves experts. Lively discussions about how to progress became part of their daily routine. While they could bounce ideas off each other and their management team, a part of them wondered what the rest of the giraffe world was doing.

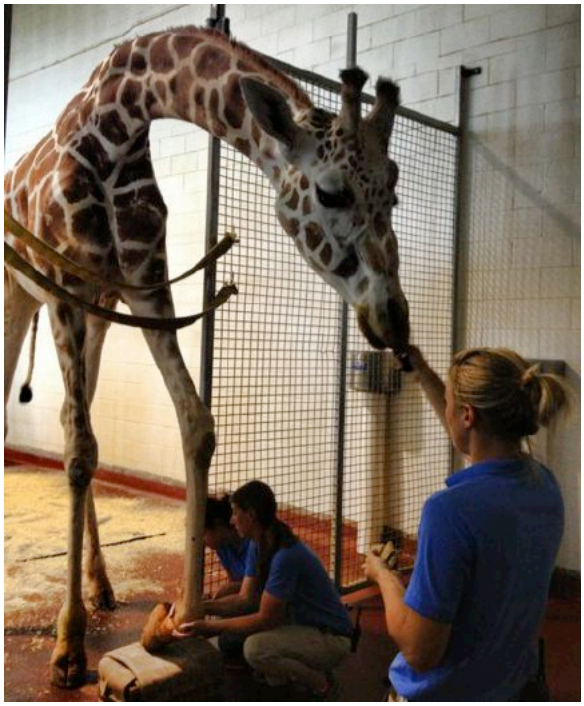
They brainstormed ways to connect with other keepers and decided to launch the *Giraffe Training and Enrichment* Facebook page. The page was created in late July 2013 and has quickly gained popularity with other zoo keepers. The page boasts members from several countries, including United States of America, Japan, Ireland and Scotland.

"One of my favorite things about the page is getting requests from keepers all over the world," Amy Schilz, Lead Animal Keeper Cheyenne Mountain Zoo, said. "We've had requests from countries as far away as the UK and New Zealand. It's a great forum for asking questions and gaining information on husbandry practices from people who have different backgrounds and expertise."

The page has sparked conversations amongst keepers who would have otherwise never been able to connect. Additionally it provides a great networking opportunity for giraffe keepers to discuss a variety of subjects related to giraffe care.

"The first thing that comes to mind when I think about the *Giraffe Training and Enrichment* is the positive attitude that other keepers maintain while they are on the site," Diana Cartier, Animal Keeper Cheyenne Mountain Zoo, said. "Whether it's posting pictures of their favorite giraffe or discussing conservation issues, all of the keepers maintain such a thoughtful and positive demeanor."

The Facebook page has generated several posts about progressive training methods for giraffe in captivity. Keepers have shared videos showing giraffe participating in voluntary hoof care procedures, blood draws, chute training and much more.



"My favorite aspect of the Facebook page is that we are able to share our training successes and talk through our training challenges with keepers at other facilities," Andrea Bryant, Animal Keeper Cheyenne Mountain Zoo, said. "Because of the popularity of training photos and videos, we had to set up a Drop Box account as a secondary way to send media."

Giraffe enrichment has been another great topic of interest on the page. There have been discoveries regarding new ways to provide old enrichment, instructions on how create new toys, how to keep items

"giraffe proof", the best materials to create durable enrichment items with and (of course) videos of giraffe having a blast with their new items.

In addition to training and enrichment, keepers have also discussed nutrition. Giraffe nutrition is still an up-and-coming topic; the forum provides a lot of ways for keepers to share some of the more progressive strategies to maintain the best overall health of their herds. Scientific papers discussing nutrition and body conditions that were shared have shaped the way giraffe nutrition is viewed at Cheyenne Mountain Zoo.

Overall, the page seems to be a great success. It is helping to keep the captive giraffe community up-to-date with giraffe news from around the world.

"We are looking forward to what the *Giraffe Training and Enrichment* Facebook page has in store for the future," Schilz said. "This is just the beginning, and we hope more people will join the conversation about care, training and wild conservation efforts for giraffe."

Contact:
Diana Cartier
dcartier@cmzoo.org

Giraffe Conservation Status Report – Country Profile: Uganda

Andri Marais, Stephanie Fennesssy & Julian Fennessy, Giraffe Conservation Foundation

Sub-region: East Africa

General statistics
Size of country: 236,040 km²

Size of protected areas / percentage protected area coverage: 8%

(Sub)species
Rothschild's giraffe *(Giraffa camelopardalis rothschildi)*

Conservation Status
IUCN Red List (IUCN 2012):
Giraffa camelopardalis (as a species) – Least Concern
Giraffa camelopardalis rothschildi – Endangered

In the Republic of Uganda:
In the Republic of Uganda (referred to as Uganda in this report), giraffe are protected under the Game (Preservation and Control) Act of 1959 (Chapter 198). Giraffe are listed under Part A of the First Schedule of the Act as animals that may not be hunted or captured in Uganda.

Issues/threats
Uganda is home to the Rothschild's giraffe (*Giraffa camelopardalis rothschildi*), one of the most imperilled giraffe (sub)species remaining in the wild. Illegal hunting, agricultural expansion, human encroachment, and habitat degradation, fragmentation and destruction have led to the extirpation of Rothschild's giraffe from almost all of its former range (GCF 2013; USAID 2011; Fennessy & Brenneman 2010; Sidney 1965). Only a few small and isolated populations of Rothschild's giraffe remain in Uganda (and Kenya), all of which are now confined to national parks and other protected areas (GCF 2013; Fennessy & Brenneman 2010).

In the 1960s, wildlife numbers and diversity in Uganda was high, roaming freely both inside and outside of protected areas in the country (Rwetsiba & Nuwamanya 2010; Olupot *et al.* 2009; Rwetsiba & Wanyama 2005). The breakdown of rule and law in the country during the 1970s and early 1980s resulted in large-scale illegal hunting for bush meat by starving local people and soldiers, causing a significant decease of wildlife numbers, including giraffe (Rwetsiba *et al.* 2012; Smith 2012; Rwetsiba & Nuwamanya 2010).

Northern Uganda has experienced ongoing conflict between Uganda Government forces, the Uganda Peoples Defence Forces (UPDF) and the Lords Resistance Army (LRA) since 1986 (Nampindo *et al.* 2005). Nevertheless, protected area management has improved since the late 1980s, and numbers of most wildlife species in Kidepo Valley and Murchison Falls National Parks have since increased steadily (Smith 2012; Rwetsiba *et al.* 2010; Lepp 2008; Rwetsiba 2005). However, protected areas in the region still face several problems related to anthropogenic influences, including large-scale landscape changes (USAID 2011; Nampindo *et al.* 2005).

Illegal hunting for the bush meat trade (frequently by using snares) as a result of food insecurity and for cultural reasons, remains rampant and limited manpower and resources are available to conduct anti-poaching patrols (MTWA 2012; USAID 2011; Olupot *et al.* 2009; Nampindo *et al.* 2005). Giraffe are predominantly hunted for medicinal purposes, their meat, coats and their tail hair (Brenneman *et al.* 2009).

National parks in Uganda are increasingly being encroached upon by neighbouring communities and their agricultural developments (MTWA 2012; USAID 2011). Widespread, frequent, and severe human-wildlife conflicts occurs around both Kidepo Valley and Murchison Falls National Park as a result of wildlife movements from inside these protected areas into the surrounding agricultural and pasture lands (USAID 2011). Crop raiding cases are regularly reported by communities neighbouring these parks and along with other forms of human-wildlife conflict are two of the key drivers of illegal hunting (MTWA 2012; Olupot *et al.* 2009). An increasing number of incidences of human-wildlife conflict can be expected as a direct result of the high human population growth rate around protected areas (USAID 2011).

Recent oil and gas exploration have shown substantial commercial quantities within Murchison Falls National Park and the adjoining areas (USAID 2011). Oil sector development has already resulted in destruction of wildlife habitat and the two preliminary studies undertaken to assess the impacts of oil exploration activities on large mammals in Murchison Falls National Park found giraffe to be one of the mammal species most negatively affected (Ayebare 2011; Prinsloo *et al.* 2011; USAID 2011). The results of these studies suggested indirect habitat loss at different temporal and spatial scales as giraffe showed increased habitat avoidance around the exploration activities (Ayebare 2011).

Estimate population abundance and trends

Historic

The historic distribution of Rothschild's giraffe ranged from the Rift Valley of central-west Kenya across Uganda to the Nile River and northwards into South Sudan (Dagg & Foster 1976).

In the early 1960s, Dagg (1962) estimated Rothschild's giraffe in Uganda at 1,130 individuals. In contrast, Rwetsiba (2005) reported that Rothschild's giraffe in Uganda numbered approximately 2,500 in the 1960s. By the early 1980s, the population had decreased to an estimated 350 individuals (Rwetsiba 2005).

It is important to note that although Dagg (1962) referred to *G. c. cotonni* and *G. c. rothschildi*, *G. c. cotonni* has been subsumed into *G. c. rothschildi* (Dagg 1971) and is now referred to as such.

By the mid to late 1990s East (1999) estimated the total number of Rothschild's giraffe in Uganda at 145 individuals, most of which occurred in Murchison Falls National Park. In contrast to this, Rwetsiba (2005) estimated Uganda's giraffe population to number 250 individuals at the same time.

In 1968, an aerial survey of the Pian-Upe Wildlife Reserve in the Karamoja Region, estimated 899 Rothschild's giraffe in the reserve (Zwick *et al.* 1998; Lamprey & Michelmore 1996). The population decreased to an estimated 109 giraffe in 1983 (Eltringham & Malpas 1993). In 1995, an aerial survey estimated the population at only 10 individuals (Lamprey & Michelmore 1996), and a subsequent ground surveys conducted in 1996 recorded a single indirect sighting of the remains of a giraffe that had been dead for several years. No giraffe were recorded during an aerial survey of the reserve in the same year (Lamprey & Michelmore 1996). Anecdotal reports suggested that the giraffe recorded by Lamprey & Michelmore (1996) in 1995 were hunted to extinction (Zwick *et al.* 1998).

In 1967, 157 giraffe were estimated to occur in the Matheniko Wildlife Reserve (Nampindo *et al*. 2005). By 1983, giraffe had disappeared from the area (Nampindo *et al*. 2005)

In 1968, 207 giraffe were estimated to occur in the Bokoro Corridor Wildlife Reserve (Nampindo *et al*. 2005). The population decreased to an estimated 96 individuals in 1983 and only five individuals by 1996 (Lamprey & Michelmore 1996). This was the last time giraffe were reported in the reserve.

Kidepo Valley National Park, located in the Karamoja sub-region in the extreme north-eastern part of Uganda, formerly supported the country's largest protected Rothschild's giraffe population (East 1999). In the late 1960s to early 1970s there were an estimated 400 giraffe in the park (NEMA 2009; Rwetsiba 2006; Nampindo *et al*. 2005). The population decreased to an estimated 160 giraffe in 1982 (NEMA 2009; Rwetsiba 2006; Rwetsiba & Wanyama 2005) and by 1995, a mere five individuals remained in the park (East 1999). Three Rothschild's giraffe (one male and two females) were successfully translocated from Kenya's Lake Nakuru National Park to Kidepo Valley National Park in 1997 in an attempt to promote the recovery of the park's giraffe population (Rwetsiba & Wanyama 2005; East 1999; Lamprey & Michelmore 1996).

In the early 1970s the Rothschild's giraffe population in the Murchison Falls Conservation Area, consisting of Murchison Falls National Park and the adjacent wildlife reserves of Bugungu and Karuma in the north-western part of Uganda, was estimated at 150 to 200 individuals

(Rwetsiba *et al.* 2012; NEMA 2009; Rwetsiba 2006). Several aerial sample counts of wildlife in the Conservation Area were conducted in the 1990s. The population decreased to an estimated 78 giraffe in 1991 (Olivier 1991). Sommerlatte & Williamson (1995) estimated the population at 100 individuals, while Lamprey & Michelmore (1996) estimated 153 individuals.

Recent

In 2002, nine Rothschild's giraffe were estimated to remain in the Kidepo Valley Conservation Area (Rwetsiba & Wanyama 2005). In 2005, the first aerial total count of wildlife in the Conservation Area counted 14 giraffe, all of which occurred in the southern parts of Kidepo Valley National Park *(*Rwetsiba & Wanyama 2005).

By the new millennium, Lamprey (2000) estimated Murchison Falls National Park's giraffe population at 347 giraffe. In 2002, a total aerial count estimated the population at 229 individuals (Rwetsiba *et al.* 2002). In 2005, sample aerial counts of the Murchison Falls Conservation Area estimated the population at 245 giraffe, all of which were observed in Murchison Falls National Park, north of the Nile River (Rwetsiba & Wanyama 2005). In 2010, aerial sample counts of the Conservation Area estimated the giraffe population at 904 individuals (Rwetsiba & Nuwamanya 2010), however, these results are inaccurate as the analysis and extrapolation were for the whole park rather than the north only where the giraffe inhabit.

According to Rwetsiba (2005) and USAID (2011), Uganda's Rothschild's giraffe population was estimated at a total of 240 individuals in 2003. The population increased to an estimated 259 giraffe by 2006 (Rwetsiba 2006).

Current

Kidepo Valley National Park's Rothschild's giraffe population increased to an estimated current population of 65 individuals (S. Horiszny pers. comm.).

In 2012, aerial sample counts of wildlife in the Murchison Falls Conservation Area estimated the Rothschild's giraffe population at 757 individuals, all of which reside north of the Nile River in the Murchison Falls National Park (Rwetsiba *et al.* 2012). Rwetsiba *et al.* 2012 further reported that the giraffe in Murchison Falls National Park seem to be increasing steadily although on-ground research is required to assess this further.

In summary, current Rothschild's giraffe numbers for Uganda are estimated at approximately 820 individuals, of which approximately 757 occur in Murchison Falls National Park and approximately 65 in Kidepo Valley National Park.

Future Conservation Management

The following are proposed conservation management options for giraffe in Uganda:

- Development of National Giraffe Strategy for Uganda;
- Identification of priority conservation efforts for giraffe conservation, specifically for the viable remaining population in Murchison Falls National Park and Kidepo Valley National Park; and
- Support to dedicated giraffe conservation, translocation, habitat protection, education and awareness initiatives (government, NGO and academic).

Acknowledgements

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Contact:
Andri Marais
andri@giraffeconservation.org

Okapi Conservation Project 2012 – Summary

Okapi Conservation Project

The Okapi Wildlife Reserve (OWR) experienced an escalation of illegal activities in 2012 driven by the increasing global demand for ivory, gold, coltan and timber. The Institute in the Congo for the Conservation of Nature (ICCN), supported by OCP and partners, responded with a crackdown on those involved in the killing of elephant and mining of gold inside the reserve. In retaliation for this crackdown, a force of MaiMai Simba rebels launched an attack on Epulu, 24 June 2012 and destroyed ICCN headquarters, killed six people, slaughtered the 14 okapi at the research station and looted OCP offices and equipment.

An international outcry resulted and a call to action, led by our zoo partners and many friends, raised funds to provide food and medical help for the many families displaced by this brutal act against nature and humanity. The response to our appeal for support was overwhelming, coming from the farthest corners of the world. Several more attacks were subsequently launched by the same group of criminals in an effort to destabilize government control of the area and secure access to gold and elephant within the Reserve. Throughout it all, the ICCN rangers and the Congolese army (FARDC) soldiers have fought valiantly, sustaining several casualties, and eventually succeeded in driving the armed militia outside the borders of the Reserve. This combined ICCN and FARDC operations continue on a daily basis to secure the region and assist with anti-poaching efforts throughout the Reserve. With the generous support of all our friends, OCP staff has been able to sustain important community outreach programs and work to rebuild damaged infrastructure in Epulu. Our education team traveled village to village around the Reserve under extremely dangerous conditions to bring needed assistance to schools, health clinics and farmers in an effort to ensure that our 25 year commitment to their communities would not be undermined. Today our relationship with the various communities inside and around the Reserve is stronger than ever as we have shown our determination to keep our staff in the field and our programs fully operational during these challenging times.

The Okapi Wildlife Reserve harbors the largest population of okapi, forest elephant and chimpanzees in all of the Democratic Republic of the Congo. The Okapi Conservation Project and our partners are committed to protecting the wildlife of this World Heritage Site through support of the ICCN rangers and by maintaining our commitment to the communities around the Reserve seeking to improve their quality of life through sustainable use of resources.

Life is slowly getting back to normal at the Epulu Station thanks to the determination of OCP and ICCN personnel and an international community of supporters that responded generously to the unprecedented needs of the past year. 2013 holds many challenges but progress will come with time, effort and encouragement.

To read more about the Okapi Conservation Project visit its website at http://www.okapiconservation.org/ or download the full report at http://www.okapiconservation.org/okapi-conservation-projects-annual-reports/

Contact:
info@okapiconservation.org

Rothschild's giraffe identification on the Soysambu Conservancy for long-term monitoring

Emilien Dautrey, AgroParisTech

According to recent estimates there are less than 1,100 Rothschild' giraffe remaining in the wild (GCF pers. comm.). This is a very precarious number for any animal (sub)species and Rothschild's giraffe were classified as Endangered on the IUCN Red List in 2010. Therefore, efforts for their conservation have never been more crucial.

Soysambu Conservancy is estimated to have the second largest population of Rothschild's giraffe in Kenya, after Ruma National Park. In 2009 Dr. Julian Fennessy initiated a study on the Rothschild's giraffe in Soysambu, which has been continued and extended by Zoe Muller into what has now become the Rothschild's Giraffe Project (www.girafferesearch.com), the longest continuous study of Rothschild's giraffe in the wild.

The aim of the project is to conduct research into the requirements of the Rothschild's giraffe in the wild i.e. their ecological requirements, behavioral and social structures, threats, population distribution and management issues.

Knowing the exact number of Rothschild's giraffe in Soysambu and regularly monitoring their population dynamics are essential for the conservation of this (sub)species. In July 2013, Soysambu decided to develop a programme of long-term population monitoring in order to learn more about its giraffe's population dynamics. The first step was to find out the exact number of giraffe in Soysambu. We decided that the best solution we had to identify all the individuals was by their physical characteristics and features. These features include their unique coat patterns, tail length, color and facial features. To identify these unique patterns, we used direct observations in combination with a photographic database that was printed and taken into the field for immediate comparison.

For the giraffe already known on Soysambu we used the same ID number as the Rothschild's Giraffe Project but from August 2013 we also collected our own data when encountering a giraffe: ID number (a new one if not previously recorded), any obvious social relationships, sex and age class. We also took new photos for the file, taken from different angles (left, right, front), with unique features highlighted by an arrow or a circle and preceded by their description. Concurrently, we incorporated other field data into another database, including time, location, GPS location, activity, health and herd composition. These data are important to establish a better understanding of their social structure.

Example of an individual files inside the identification database.

In August 2013, we identified 71 individuals: 39 male adults and 22 female adults (18 and 11 respectively of these has been known previously), and 10 juveniles. At the end of August we estimated that the majority of the giraffe population had been identified. This preliminary identification study will be updated as an ongoing activity and previously unidentified giraffe will be added to the database accordingly during this long-term monitoring exercise.

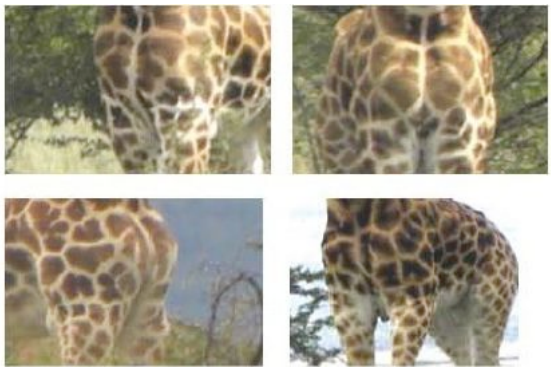
In the month of fieldwork we observed four different types of herds:

- Bachelor herd: a herd of only males (up to nine individuals) with a hypothesis that there is a dominant male walking behind the group.
- Mixed herd: a herd composed of one male adult, several females and juveniles and sometimes some male sub-adults (up to 21 individuals).
- Lone male
- Other mixed herd: the oldest giraffe was a female (maybe dominant) and the other giraffe were sub-adults or young males (this was only observed once).

Except for the herd of females with their juveniles, we noticed that we never saw the same giraffe together.

When a herd of males joined a herd composed of one male with females and their offspring, it became unclear how dominance was established as no visible fights broke

out between the males. However, every time we returned after 48 hours, new groups had been formed.



Symmetrical spots on the chest of 4 individuals.

Finally, identification by direct observation has brought forward some unexpected results. We noted similar patterns on different individuals. For example, two symmetric spots were seen on the chest of several individuals.

With continued research, some patterns may give us information about relationships between individuals located in the same area. This information could help us learn more about the social structure of Rothschild's giraffe, and maybe of other (sub)species as well.

Contact:
Emilien Dautrey
emilien.dautrey@gmail.com

Update from Kigio Wildlife Conservancy

Renate de Boer & Erika van Oldeneel, Project Abroad

Feeding preferences and long-term habitat sustainability for Rothschild's giraffe in Kigio Wildlife Conservancy

Since 2007 the Rothschild's giraffe is seen as an individual genetically important unit, the equivalent of the importance of at least an individual species. Estimations of approximately 1,100 individuals remaining in the wild make it necessary to carry out conservation measures. One of the measures taken is the re-introduction and close monitoring of Rothschild's giraffe into protected areas in Kenya.

In 2002, seven Rothschild's giraffe were introduced to Kigio Wildlife Conservancy, Central Rift Valley, Kenya. The herd has now grown to 27 individuals. The effects of the introduction and population growth of this species on the ecology of this small conservancy are not yet known. To be able to make long-term predictions about the effects, it is important to fully understand the feeding behaviour and feeding preference of the giraffe.

From November 2012 until the end of October 2013 giraffe feeding behaviour was observed. A total number of 1,696 feeding observations were recorded and it was noted that only nine plant species were utilised. Preference for species differed greatly with *Acacia gerrardii* the most browsed accounting for 68.3% of all feeding observations. Other observed browsed plant species in order of recorded observations were: *Solanum incanum, Tarchonanthus camphoratus, Acacia drepanolobium, Acacia xanthophloea, Rhus natalensis, Euphorbia candelabrum, Maytenus senegalensis* and *Psiadia punctulata.* None of these species made up a significant part of their feeding behaviour. Interestingly, 76.9% of all observed feeding behaviour was on *Acacia* species.

By using the Jacob's index to calculate preferences and avoidance, it was shown that despite feeding on them, giraffe avoided *Solanum incanum, Maytenus senegalensis* and *Psiadia punctulata.* This analysis is particularly important as *Solanum incanum* accounts for 63.6% of all vegetation in Kigio.

The index values also showed that giraffe prefer *Acacia gerrardii* and *Acacia xanthophloea.* This significant forage preference might cause problems in the long-term, as signs of over-utilisation of these trees can already be seen in Kigio.

The preference for and over-utilisation of these *Acacia* species might mean that it is not possible for Kigio Wildlife Conservancy to support a larger giraffe population in the long-term. Habitat suitability might decrease due to the high browse pressure that is caused by the existing giraffe population. In order to be able to make exact predictions for the maximum carrying capacity of giraffe in Kigio, further research is needed.

Giraffe vet intervention

In the afternoon of Thursday 26 September we prepared the jeep to go and check on Jackie, a female giraffe in Kigio Wildlife Conservancy that was pregnant. The previous day, Jackie had shown signs of labour and when we spotted her again this morning, she had still not given birth. When we found her in the afternoon, the calf was still not fully delivered and, unfortunately, it appeared that the calf had died. It seemed stuck and with Jackie apparently unable to fully deliver the calf, she was not also in danger of dying from this birth complication.

We immediately called the Kenyan Wildlife Service to ask for medical assistance. A mobile vet unit led by Dr. Ndambiri arrived at Kigio Wildlife Conservancy. We had only driven for a few minutes to meet them when it started raining and thundering. The sky was dark and the wind was blowing a gale. To make things worse, the rain turned into hail. We had to seek shelter for a while before moving on. At last the rain stopped and we again went in search for Jackie.

Once we found her, the vet prepared a syringe to help keep Jackie calm during this stressful process. The vet team shot her with the syringe and after only a couple of minutes she came out of the bushes into an open area. Once the vet team got Jackie down onto the ground, the Projects Abroad volunteers and Kigio rangers kept her head, neck and body down. Dr. Ndambiri speculated that one of the front legs of the baby got stuck inside the mother at a strange angle and this was the reason why it had not been able to come out. This also meant that pulling the dead baby out would be difficult.

NJenga, KWS Ranger, KWS vet Dr. Ndambiri, and Projects Abroad volunteers

Finally, the team succeeded in pulling the dead baby out. The vet gave her antibiotics and hormones to stop milk production and help her recover quicker. Before getting up Jackie had to be turned 90 degrees on the ground, to make it safe for her to stand on the muddy ground. Then it was time to release her. Everyone stepped away and she raised her neck and head, and within thirty seconds she was standing on all four legs.

Turning the body so Jackie could stand up safely

We saved Jackie's life but unfortunately not her baby. Jackie seemed healthy after all she had been through and the next day we spotted her feeing and drinking without any apparent problems. This was her first pregnancy, which could have been a contributing factor to the difficult birth. However, she is a young giraffe, born in 2008, so hopefully she will be able to give birth to a healthy baby one day.

Thanks to the Kenya Wildlife Service mobile vet unit for their quick and professional response.

Contact:
Tonny Kipkurui
tonnykipkurui@projects-abroad.org

Tall Tales

Bloem giraffe does BMW leap

A Bloemfontein businessman has told how he got a huge fright when a giraffe jumped over his BMW sports car, nearly hitting him with one of her hooves. Buks Westraad, owner of the Emoya estate outside Bloemfontein, was driving through the estate on Saturday morning with the hood down – when the 5-year-old giraffe cow, Kammie, came running along at a blistering pace and jumped over his car, reported Die Burger. Westraad said he was driving quite slowly at between 10 and 15km/h and was heading for a guesthouse on the estate when it happened.

"She must have gotten a fright and came running over my car. Her one hoof hit the bonnet like a gunshot and the other just missed my head and came flying past my face. I could feel the wind. Her legs are several metres long and it took just one stride and she was over the car. I only later realised that I could also have been in my glory," said Westraad, whose first thought was for the safety of the uninjured giraffe.

He estimated that damage to the car was valued at R48 000.

This article was reprinted from http://www.news24.com/SouthAfrica/News/Bloem-giraffe-does-BMW-leap-20130618

Predator smuggling case postponed

A case in which Kealeboga Gasejewe of Seole Ward in Maubelo near Tsabong is charged with hunting and capturing wild animals without a license has been postponed.

Initially, the 27-year old man was jointly charged with others who have since saved the Tsabong Magistrate court's time by admitting guilt. They were fined P5,000 each. The accused were caught in a joint operation by security forces at Magobeng ranches in the Kgalagadi last year. Gasejewe and others are said to have hunted and captured two cheetahs without a permit or license.

This is one of the many cases Mmegi investigated in May following reliable information that a number of syndicates have found a lucrative business in the Kgalagadi in capturing and smuggling lion and cheetah, across the border to South Africa. Meanwhile, the police weekly crime report indicates that four men were arrested on suspicion that they killed a giraffe without a permit, near Matsibi cattle post near Maun.

The men were arrested last week Wednesday after they were found in possession of meat suspected to be of a giraffe. They are likely to be charged for causing death of 59 vultures found dead at the scene where the giraffe was killed. The suspects are believed to have poisoned the carcass of the giraffe causing the death of the vultures. In another incident the police have arrested two suspects for hunting a wild animal suspected to be a kudu without a license. The two men were arrested last week Thursday at Nxaraga village. Since 2012, Maun police have report six incidents of hunting without licenses and 25 suspects were arrested in connection with the crimes.

This article was reprinted from http://www.mmegi.bw/index.php?sid=1&aid=968&dir=2013/June/Friday21

Giraffe dies of broken neck during journey

In a tragic incident, one of the three giraffe shipped from the Negara Malaysian Zoological Society in Malaysia died en route its journey to India a few days ago. Of the three giraffe being shipped, a female giraffe aged less than two years died reportedly after its neck broke during the five-day journey from Malaysia to Chennai.

The other two giraffe (a male and a female) were later shifted from Chennai to Hyderabad's Nehru Zoological Park by road a couple of days ago. According to sources, the young female giraffe suffered a fractured neck during the course of the journey and though the veterinarians on-board tried to treat it, the giraffe was unable to

complete its journey and succumbed to injuries. It was to be housed at Hyderabad zoo which had lost a female giraffe a few months ago. “It was a very unfortunate incident. We came to know that the neck of the giraffe broke and though medical attention was given, she was unable to survive”, an Indira Gandhi Zoological Park (IGZP) official said.

According to another IGZP official, “In a freak mishap on the second day of the journey, she accidently got toppled while turning in her enclosure on. Her neck got twisted between her legs and her blood pressure shot up, affecting her brain and we lost the animal.”

The giraffe were being shipped via sea route as they had grown to a height of more than 10 feet, due to which they could not be accommodated on a flight.

The surviving giraffe have currently been quarantined at Hyderabad zoo and will be transferred to IGZP in the first week of November. The two giraffe are now being kept under observation as they travelled for nearly six-and-half days from their destination in Malaysia. While the travel from Malaysia to Chennai took five days, it took another one-and-half-day via road to Hyderabad.

Of the two, one is a male aged about two years and the other is a female, less than one year. Giraffe are usually bought at a young age and they have a life span of around 20 to 25 years in captivity. A source at the zoo said, “We had planned everything carefully and managed to get them before Phailin occurred. The sea was also very calm during their journey, still one of the giraffe died.”

Meanwhile, the 11-year-old one-horned Asian Rhinocerious Nakul, which had created a ruckus on its arrival about seven months ago, has now been unofficially released for public viewing. Nakul, who had been sharing an enclosure with the sambars, was shifted to his own enclosure last month. Sources said that with visitor numbers to the zoo having dropped by nearly 50% due to the Samaikyandhra stir, Nakul was expected to result in an increase in visitor footfalls at the zoo.

This article was reprinted from http://economictimes.indiatimes.com/environment/flora-fauna/giraffe-dies-of-broken-neck-during-journey/articleshow/24223366.cms

Too confusing for animals: Leopard print clothing banned at Chessington World of Adventures

Leopard print clothing has been banned at Chessington World of Adventures amid concerns it is confusing the theme park’s animals.

Animal print may be one of the hottest trends in the UK at the moment, but it has left rhinos and giraffe at the park’s new ZUFARI attraction in a muddle.

Bouncers have been employed to enforce the zero-tolerance ban at the park after staff noticed a number of the animals trying to communicate with visitors or running away scared. Zebra, giraffe, leopard and African wild dog prints are among a number now banned at the zoo.

Chessington officials have put the confusion down to the new 22-acre ZUFARI trail being a near exact replica of the Serengeti plains, meaning print-wearing guests puzzle the animals. ‘Since the launch of ZUFARI, guests have interacted with the animals more closely than ever before and we have noticed a lot of animals becoming baffled by animal-print-wearing guests,’ explained ZUFARI spokeswoman Natalie Dilloway. ‘It’s no wonder the animals are getting confused when they see what they perceive to be zebra and giraffe driving across the terrain in a 7.5 tonne truck.’

Guests who wear animal print will be supplied with Chessington clothing when going on ZUFARI, which sees guests journey off-road to with animals including white rhinos, giraffe and flamingos.

This article was reprinted from http://metro.co.uk/2013/09/24/chessington-world-of-adventures-bans-leopard-print-clothing-on-zufari-4100645/

Testy giraffe attacks cyclist and his bike

A giraffe chased a mountain biker several times around a bush and then trampled his bicycle at the Groenkloof nature reserve east of Pretoria. Louis-John Rex’s mountain bike, which cost R30 000, was completely mangled by the giraffe. Rex and his friend Ryk van Niekerk were cycling through the nature reserve, where they are both members, on Sunday. “We were pedaling up a steep

incline when the animal suddenly appeared on the track in front of me. He had a mate with him, but that one disappeared into the bush. I waited for [the giraffe] to go away, but it kept coming closer. A giraffe is quite fast. It has long legs and in one step it is upon you. I just had time to jump off my bike — there was no time to cycle away," Rex said yesterday.

While he put a bush between himself and the giraffe, the animal trampled his bike. Van Niekerk photographed the entire incident on his cellphone. The video, Only in Africa: Giraffe attacks cyclist, is on YouTube. The giraffe later decided Rex's bicycle was flat enough and moved a short distance away, but he was not yet finished with the cyclists.

"Just as I went to pick up my bike, it turned around and started to chase me — round and round the bush we went. It was obviously very irritated," Rex said. He said it was not his first encounter with wildlife in the reserve. Van Niekerk said the incident was initially very funny – until the giraffe started chasing them. "It is an enormous animal," he said. When the giraffe finally left them, Rex carried his mangled bike about three kilometres to his car.

This article was reprinted from http://www.witness.co.za/index.php?showcontent&global[_id]=105783

Giraffe's baby-making record puts Koreans to shame

Jang-soon, a giraffe based at a safari park just outside Seoul set a world record on Sunday after she gave birth to her 18th calf, park operator Samsung Everland said. Until Sunday, Jang-soon had shared the record of 17 offspring born in a controlled environment with a giraffe named Lamba at Paris zoo, which died in 2005.

Jang-soon belongs to the endangered reticulated giraffe subspecies characterized by white-lined polygonal shapes on a brown coat. There are less than 5,000 reticulated giraffe living in the wild, mostly in eastern African nations like Somalia, Ethiopia and Kenya, according to the Giraffe Conservation Foundation.

Sunday was coincidentally the mother's 27th birthday, Everland said. She was born in 1986 and gave birth for the first time at age four. The gestation period for a giraffe is around 15 months, meaning Jang-soon has been carrying offspring most of her adult life. She once gave birth to twins.

The new world record will be certified by the International Species Information System, an international database of animals in zoos and aquariums, the Everland statement said. Samsung Everland is a de facto holding company of the Samsung Group and operates the 77.36-hectare amusement park Everland Resort in Yongin, about 40 kilometers (24.85 miles) south of Seoul. It is the largest amusement park in the country. The zoo couldn't confirm whether all of Jang-soon's offspring were fathered by the same male giraffe.

This article was reprinted from http://blogs.wsj.com/korearealtime/2013/09/09/giraffe-shows-koreans-the-baby-making-trick/

Kenya to host conference on giraffe Monday

The Kenya Wildlife Service (KWS) and the Giraffe Conversation Foundation are on Monday set to host the second international conference on giraffe at the Masai lodge near the Nairobi National Park.

The four-day conference will be taking stock of the current status of the giraffe population in the country and come up with recommendations on their conservation and management. "We want to come up with better ways of protecting giraffe because we are worried about the rate at which they are declining," Dr. Charles Musyoki, Senior Scientist Department of Species Research Programs KWS said.

According to the scientist, giraffe numbers in Africa have suffered a 30 percent drop due to habitat encroachment and severe poaching in recent years. Lately, poaching of elephant has been on focus but other animals like giraffe are also affected as Kenya struggles to preserve its biggest income earner through tourism. "Giraffe may appear like they are out of danger conservation wise, but they are facing increasing pressures which has impacted on their numbers and distribution in Kenya and elsewhere across the continent," he said.

Musyoki further indicated that there are nine sub-species of giraffe naturally occurring in the African continent with Kenya being the only country with three of the sub-

species. “Given Kenya’s heritage in terms of giraffe diversity, it is fitting that we will become the first country to develop the first ever conservation strategy dedicated solely to giraffe anywhere on the African continent,” he said. He said Kenya has a high stake in the preservation of giraffe since ‘it is home to about 60% of the global population of wild Rothschild’s giraffe with Ruma National Park having the single largest meta-population (140+ individuals)’.

The conference with participants from Africa, Europe and America also aims at developing the first ever conservation strategy for giraffe.

This article was reprinted from http://www.capitalfm.co.ke/news/2013/08/kenya-to-host-giraffe-conference-monday/

Japan scientist launch freeze-dry animal sperm bank

Japanese scientists have launched a sperm bank for endangered animals that uses freeze-drying technology they hope could one day help humans recreate animal populations on other planets, the chief researcher said Wednesday.

The team at Kyoto University's Institute of Laboratory Animals Graduate School of Medicine successfully preserved sperm taken from two endangered primates and a type of giraffe, associate professor Takehito Kaneko said. They mixed the sperm with special preservation liquid and freeze-dried it in a way that allows them to store it at just 4 degrees Celsius (39 Fahrenheit), Kaneko said. The temperature is much higher – and less energy intensive – than conventional ways of storing sperm.

Kaneko and his researchers have previously successfully freeze-dried sperm from rats and mice without the use of bulky liquid nitrogen equipment, and were able to prove the viability of the spermatozoa up to five years later. "In this way, scientists will be able to obtain genetic information more easily, which means we could help to preserve endangered animal species," Kaneko said.

Kaneko is quick to point out that there is presently no human application for the technology, but adds it is an avenue that may be explored in the future. "This may sound like a dream, but we could in future take genetic information into space," he said, adding it may allow for the transfer of material to help establish animal populations on future colonies. More immediately, the technology makes it possible to store sperm at room temperature for short periods, meaning it would be safe in the event of power failures caused by a natural disaster, for example.

A challenge now, said Kaneko, is to develop a way to apply the method to the other side of the procreative equation. "Now we have to use fresh eggs or those frozen conventionally," he said. "We are studying methods to freeze-dry eggs as well."

This article was reprinted from http://www.thenewage.co.za/105703-1021-53-Japan_scientists_launch_freezedry_animal_sperm_bank

Why don’t giraffe fall over more often?

One of the major reasons psychologists think we have mental representations is to overcome delays in the nervous system. Information has to come from sensors such as the retina and travel the distance to the visual cortex. This takes time. That information must then be processed and combined with other information to generate adaptive responses. This takes time. Delays in a control system that relies on feedback are a big problem for stability. The more time it takes for feedback about how well you are doing to reach the brain, the less relevant that feedback information is – it's no longer about what you're doing *right now.* This makes it difficult to make sensible error corrections and it ups the chances that something will go badly wrong. A lot of people therefore claim that the only solution is prediction, and there's a strong research industry investigating how the nervous system predicts so well.

There are, however, embodied solutions to delays in nervous systems. *Prospective control* is the strategy of controlling your behaviour using information about how events are unfolding over time. If you have information about this dynamic, then perceiving something at time *t* tells you something useful about what's happening at time *t+delay* and with a little calibration you're running in real time. There is a lot of evidence that this is a very common strategy; the evidence mostly comes from interception tasks, because identifying the dynamics and the information that dynamic might be producing is a tractable problem for psychologists. Prospective control isn't always an option though; sometimes there isn't information about what's going to happen next (for example, there's no information about upcoming changes in friction, which is what makes ice so dangerous). In addition, prospective control still requires information to get into and be processed by the nervous system, so delays might still be an issue.

Motifs are a neural architectural solution to delays; the brain takes a little bit of time to set this organisation up but then runs with zero lag between widely spread networks modules.I don't yet know enough about these to know how widespread or effective a solution they are, however**.**

One interesting model system for thinking about the consequences of neural delays is the giraffe. Adult giraffe stand 5-6m tall, so the feet are a long way from the brain. Anything that happens to the feet as they walk (say,

tripping on a tree root) will potentially not be registered fast enough for the brain to issue a response.

Do giraffe, in fact, fall over much? I've been poking around Google Scholar and Twitter with no luck; there just doesn't seem to be much research on giraffe locomotion. Alexander chased some in a car to get them up to top speed and do some biomechanical analysis (because he is awesome and unafraid of the obvious experiment; Alexander, Langman & Jayes, 2009) but I don't think any fell over. There's some work on the basic mechanics of giraffe locomotion, but there just isn't much information about how *well* the whole thing works.

Their long legs are a fact, though, so why don't giraffe fall over often enough that people (not to mention evolution) notice it as a thing?

Faster neurons?
One option is to invest in more and faster neurons. However, More *et al.* (2013) measured the conduction velocities of eight male giraffe and found that they have the expected number and the speeds averaged around 50m/s, fairly typical for mammals. Giraffe have not invested in this solution, suggesting that it either wasn't an option or they have another solution that works better. More *et al.* don't have an alternative beyond falling back on prediction, though (this story featured on Quirks & Quarks a while ago, and it's what got me thinking about this topic).

Cautious gait?
Their gait is a very typical quadruped lateral sequence gait (hind limb comes up and followed right away by the forelimb on the same side). Do they have behavioural modifications to this? Do they perhaps only ever walk slowly, to give themselves time to cope with any problems? Typical walking seems to be quite chilled out so that fits. But chilled out walking is pretty common in animals that don't have to be anywhere immediately (it conserves energy) and giraffe can run at 60km/h and sustain 50km/h for some distance.

Some videos show them turning and maneuvering quite well but in the open and not at full speed as they run through the trees. They do live in fairly well behaved terrain; flat grasslands. There isn't a lot to trip them, and they don't move at full speed when there is. But other than these fairly normal behaviours, giraffe don't seem to be doing anything in particular to cope with these neural delays. This suggests that the delays aren't actually a problem.

Maybe the brain isn't where it's at
Neural delays are potentially a problem for a wide variety of animals. One known solution is to offload responsibility for limb control onto the local limb dynamics. For example, arms are often arranged as low dimensional damped mass springs; this allows them to oscillate stably with minimal control requirements, and they respond to perturbations without explicit instructions. They simply do what nonlinear dynamical systems do and self-reorganise themselves back to where they were, if they can. This sort of solution is common and it works well (another example is the equilibium point control hypothesis, e.g. Feldman, 1986). Giraffe almost certainly do this kind of thing too.

Another solution is to shorten the distance to the neural control circuitry. The main solution here is the spinal cord, which recent research has revealed to be a complex and very sophisticated piece of neural hardware and not just a way station for signals heading to cortex.

Another related idea (from Sabrina) for which I have no evidence: If a giraffe trips, where does the most relevant information come from? Are they built in a way that the information about a trip or perturbation is actually generated at, say, the hip?

A call for some good biology follow-ups
Cognitive science loves a good case study that demonstrates a point, and whatever the giraffe is doing to cope with the fact that it's brain is 5m away from it's feet will be a great demonstration of how to cope with neural delays. Prediction is always an option, but the data typically never favour it and it's an unstable solution for the same reason as delays are a problem: it's hard to make sure the prediction is about what actually happens. An embodied approach using our four research steps can guide research here as readily as it can in psychology, and we would love to see biologists exploring this question comprehensively and without jumping straight to prediction as the only alternative.

At the moment this question just needs some data. Falling is a failure of the control of locomotion, and so how and when it happens provides clues to the limits of that control and therefore how the control is organised. What happens when a giraffe trips? How often do they fall? Where do they look as they walk (or, more interestingly, run)? What is the information they have access to? Could we use eye trackers like the ones on these peahens? Combinations of structured observations of wild behaviour and more experimental tests of giraffe in zoos could potentially provide many useful clues (and an answer to this question is the kind of thing that would make a great contribution to our research topic too!).

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This article was reprinted from http://psychsciencenotes.blogspot.com/2013/08/why-dont-giraffes-fall-over-more-often.html

Mind your heads! Truck carrying bizarre cargo of four giraffe winds its way through African savannah

A four-headed giraffe was spotted in central Kenya today, sparking rumours there may be many more of the incredible beasts roaming the savannah. We might be sticking our own necks out a bit here, but the bizarre creature was photographed having hitched a ride on the back of a flatbed truck on its way to the capital Nairobi.

The animal, or possibly animals, were on their way to the Giraffe Manor Hotel which is also home to a large family of warthogs, exotic birds and the elusive bush buck. They were forced to dip and dive to avoid getting tangled in telephone cables during the bumpy journey. The animals look surprisingly relaxed as they watched workers clear the way for them and were happy to pluck a few tasty leaves from trees as they passed by.

"There are ten giraffe currently at the manor", says Giraffe Manor representative Julia Perowne. "The giraffe come for breakfast and then appear sporadically throughout the day and in the evening. They eat the horse pellets that we leave out for them, but anything they can get their hands on they seem to enjoy."

Built in 1932, the popular manor has been visited by the likes of Mick Jagger, Richard Branson, Walter Cronkite, Richard Chamberlain, and Ewan McGregor.

Julia added: "The guests at the manor absolutely love the giraffe. They are so interactive and visit every room except one, and especially love the kitchen. It is obviously very important to remember that they are wild animals and ultimately do what they want to do, and they could all easily be released back into the wild. Because of this, we would never dream of making them do something they clearly weren't happy with."

Shortly after purchasing the Manor, the owners learned that the only remaining Rothschild's giraffe in Kenya were in danger. Since the Manor was already home to three wild bull giraffe, named – Tom, Dick and Harry – they agreed they would take in one of the giraffe themselves, Daisy. Soon after this Daisy was joined by another baby giraffe, Marlon, and since then the Manor has run a breeding programme to reintroduce the Rothschild's giraffe into the wild.

This article was reprinted from http://www.dailymail.co.uk/news/article-2385487/Another-TALL-story-Four-headed-giraffe-spotted-Kenya.html

Giraffe Rescue in the Okavango Delta

"We are always looking to help the Anti-Poaching Unit (APU) for the wildlife department wherever possible and last week our teams found a giraffe caught in a snare. They got in touch with the APU and informed them about the incident.

Sanctuary Stanley's and Baines Camps arranged for the Anti-Poaching Unit to come out and assist us to help the giraffe. It had a wire snare around its leg, which needed to be removed. Our concession team located the giraffe and had the APU come in and dart the animal with a tranquilizer. They had to dart it in the water, when the giraffe went to sleep the guys had to keep its head out of the water to prevent it from drowning. They managed to remove the snare and awaken the giraffe without incident.

We are happy to report that the giraffe is making a full recovery now! We need to preserve our wildlife and help out wherever possible, and this was a great effort by all involved!"

(In the pictures are Wimpie, Pastor, Eddy & Tibro as well as the APU Gift and John.)

This article was reprinted from http://blog.africageographic.com/africa-geographic-blog/wildlife/giraffe-rescue-in-the-okavango-delta/

Using okapi as a flagship to conserve DRC's forests

The okapi, a close relative of the giraffe, is endemic to the tropical forests of central and north-eastern Democratic Republic of Congo (DRC). The species is a national icon, but as a result of its elusive nature and the challenges of fieldwork in DRC, it remains poorly known and has received little conservation attention. The plight of the okapi reflects the state of conservation in DRC more widely. Following decades of civil conflict and under-resourcing, capacity to manage and protect the forests okapi inhabit has been substantially reduced, with increasing human population densities and poverty, compounded by resettlement of displaced peoples and movement of rebels, exerting immense pressure on forest resources through deforestation, forest degradation and hunting.

In the face of these challenges, with the support of the Darwin Initiative, in 2010 the Zoological Society of London (ZSL), in collaboration with the Institut Congolese pour la Conservation de la Nature (ICCN) and partners across the okapi range, launched a major collaborative project to conserve okapi and the biodiverse forests it inhabits. After a promising start collaborating on a major inventory of the Réserve de Faune à Okapi (RFO) and other field surveys, much of our subsequent planned fieldwork suffered from a number of setbacks. This included a savage attack by an armed group of poachers and illegal miners on the headquarters of RFO in June 2012, where the ZSL project team were in the course of setting up a long-term study to compare okapi monitoring methods. Seven people and all 14 of the captive okapi housed at the headquarters were killed, equipment was looted and infrastructure destroyed. This and the deteriorating security situation further east due to the advances of the M23 rebel group unfortunately led us to evacuate our project coordinator from DRC in August 2012.

The abandonment of fieldwork did however mean that we were subsequently able to focus on a number of other key aspects of the project. Following the collation and collection of historic and current okapi survey data, alongside genetic analysis through an associated PhD project through ZSL's Institute of Zoology and Cardiff University, an okapi status review was written, detailing the biology, ecology, historic and current distribution, threats, relevant research and current conservation efforts related to okapi across its range. In March 2013, a new IUCN SSC Giraffe and Okapi Specialist Group (GOSG) was formed, with project leader Dr Noëlle Kümpel as co-chair and ZSL as institutional host for okapi.

In May 2013, a multi-stakeholder workshop to develop the first-ever species-wide conservation strategy for the okapi was held in Kisangani, in the centre of the okapi's range. The workshop was hosted by the Governor of DRC's Orientale Province and organised by ZSL and the GOSG in partnership with ICCN. Around 40 government representatives (including site directors and key rangers from every protected area in the range), community chiefs, NGO workers and scientists from across the range

attended this collaborative, participatory workshop, some journeying by river or road for up to three days each way. The continued buy-in of all these stakeholders will be critical in ensuring implementation of the strategy.

Workshop participants first reviewed and updated the okapi status review prepared by ZSL, and then agreed a vision, goal, objectives and activities necessary to ensure the long- term survival of the species. The workshop highlighted that the okapi is faring worse than previously thought, being threatened throughout its range by the presence of dangerous rebels, elephant poachers and illegal miners. This information was used to conduct a reassessment of the species for the IUCN Red List of Threatened Species, and the okapi's new threatened status will be announced soon.

Next steps for the project include a number of associated outputs, such as the establishment of a centralised okapi database, an awareness- raising event at ZSL London Zoo to raise the profile of okapi and the threats it faces, and the drafting of a paper evaluating previous okapi population surveys with a view to making recommendations for monitoring. The okapi conservation strategy is being finalised and prepared for publication and the GOSG will play a vital role in supporting ICCN and partners to raise awareness and funds to implement this strategy and halt the decline of this unique, evolutionary distinct, flagship species.

This article was reprinted from the Darwin Initiative Newsletter (July 2013) http://darwin.defra.gov.uk/newsletter/July2013newsletter.pdf

Uganda: Standing tall, beautifully

Marasa Safaris shows off Murchison Falls National Park's unknown and endangered treasure: the world's largest population of rare Rothschild's giraffe.

"Ladies and gentlemen, welcome to the ferry crossing station to Paraa Safari Lodge", announces Musa, our driver. We have just arrived at Paraa landing site on the edge of the mighty River Nile in the Murchison Falls National Park, in northwestern Uganda.

Our driver sounds relieved after the exciting and excruciating 400km safari van drive from Kampala city through Masindi and the unpredictable park. It is 1.45 pm and we are an hour 15 minutes late for the ferry. Several other latecomers are lounging around, their vehicles scattered all over the landing site.

"The people at Paraa will be wondering what happened to us," says Corne Schalkwyk, the head of Marketing and Sales at Marasa Africa, who had arranged our tour, as he folds the sleeves of his white shirt, pulls up his sunglasses and gets his Canon camera to join others photographing such birds like kingfishers and honey bee eaters as we wait for the ferry. Fortunately, out hosts sent a boat to pick us for the short crossing and in no time we are in Paraa, freshening up and sipping cold fresh juice before heading into a very late lunch at 3pm.

Crispus Mwamidi, the general manager in his well-pressed Khaki pants and white shirt came to usher us to the cafeteria, which still had a sizable noisy crowd of guests. Waitresses skim our tables piled with glasses of drinks. I settle for French fries, lamb, and a glass of orange crush. Soon our party of ten was off again for an evening game drive.

Marvel of nature

Barely five minutes from Paraa Safari Lodge and already the tall creatures with long slender necks that we had driven out to see were visible in the distance. They are the tall blonde rare Rothschild's giraffe.

An endangered species, only about 1,050 of them are estimated by the International Union for Conservation of Nature (IUCN) to still survive in their natural habitat, the shrub and acacia thorn bushes of Kenya and Uganda.

As we approach, I am struck by their catwalk gait, a graceful sway from side to side because, like camels, giraffe move both feet on one side of the body simultaneously as they move. Their large bodies have big dark, rectangular blotches set irregularly against a cream background and lower legs noticeably white and not patterned. When mature, a Rothschild's giraffe can grow to about 18 feet tall, about as tall as a two-storied building. They have gentle eyes, with beautiful eyelashes that captivate anybody's attention. They are generally peaceful animals and only become aggressive when protecting their territory.

On each Rothschild's head are five horns, called ossicones, that look like extra pointed ears. Two of the horns point up, two out at the back as lamps, and one in front as a ridge. Some Rothschild's giraffe become darker as they grow older although one I could see an obviously young male with the same dark features. They are a marvel to watch as they feed on their favourite food, the thorny acacia, with their extra-long tongues, some as long as the forearm of an average side adult person. The tongue goes around the stem of the acacia, pulls it back and strips it of all leaves in one deft sweep.

Apparently, giraffe have developed mechanisms to protect themselves against the thorns of acacia. Their saliva is thick like an oil lubricant and protects their tongue. Instead of thorns penetrating the tongue, they just slide off. But in another marvel of the wild, the trees too have also devised a survival strategy. As soon as the tree is attacked, it sends out a warning by producing a

chemical that spreads quickly all over the tree, making their leaves taste bad.

As a result the giraffe eats only a little of the tree before it starts tasting bad. To beat this defense, giraffe have an ingenious maneuver, it involves approaching the tree from the opposite direction of the wind which makes the process of the trees warning each other difficult. Such are the things one learns in the Murchison Falls National Park, the biggest game reserve in Uganda, which is home to over 750 of the world's remaining Rothschild's giraffe.

They live in their natural range and until now, little has been known about this group of mega herbivores. But the Giraffe Conservation Foundation (GCF), a team of volunteers committed to the conservation of giraffe, are determined to change that.

Founded four years ago, this non-profit NGO is led by conservation scientist Dr Julian Fennessy, a Namibia-based Australian. He is the co-chair of the IUCN's SSC Giraffe and Okapi Specialist Group. Others on the team are fellow GCF trustees and researchers Andy Tutchings, a Germany-based Brit and Fellow of the Royal Geographic Society, and Stephanie Fennessy, a Namibia-based German, both also members of the GOSG.

The group is working with two Ugandan government entities: the Ugandan Wildlife Authority (UWA) and the Wildlife Education Centre (UWEC), and Marasa Africa, a private safari company. Their mission is to create an information database on Rothschild's giraffe in the wild and, says Dr Fennessy, this will help develop and implement effective conservation strategies. Their project is intended to provide the first scientific review of the Rothschild's ecology, behavior and habitat requirements for meaningful conservation inititiatives. These include the provision of technical support, funding, and results data sharing.

Dr Fennessy is anxious that the Rothschild's giraffe do not suffer the same fate as the giraffe of Angola in southern Africa that were either eaten or killed into extinction during the civil war that ravaged the country. "We are carrying out the research because we consider the Rothschild's giraffe an endangered sub species", he says.

After a quiet night, disturbed only by the grunts of hippos grazing on the lawns outside, it was morning and time for a cruise on the Nile on the Paraa Voyager, a new executive boat that offers excellent views. One thing that you are guaranteed to see in plenty on this ride hippos, locally call 'raa'. Together with the "pa'" which means the place; they give Paraa its name which means "place of hippos".

Our boat captain and guide, Amon Assimwe, tells us hippos sleep in the water during day and graze on land at night, travelling over 20kms to find food sometimes. They live in schools of over 40, controlled by one male who welcomes only females and submissive males. We also see plenty of crocodiles and various species of birds until the ride takes to the point where the Victoria Nile pushes its way through a narrow seven-meter gap, before taking a beautiful 43-metre deep fall to continue its journey to Lake Albert.

Best views in the world:
By the time we return to the lodge, it is time to head out again; this time to see Chobe Safari Lodge, another Marasa holding about 95 kms away. Like Paraaa, the Chobe lodge was designed facing the pool amidst lush lawns and a health club that was voted by CNNGo as the 5th among the gyms with the most amazing views in the world.

Unfortunately, after a night at Chobe, it was time to head back to Kampala and its chaos. But the memories are forever. Chobe, like most of the Murchison Falls National Park area, is a haven for nature walks. The park is blessed with over 72 species of mammals, including four of the big-five; elephant, buffalo, lion and leopard, and over 400 bird species.

This article was reprinted from http://allafrica.com/stories/201309090821.html?viewall=1

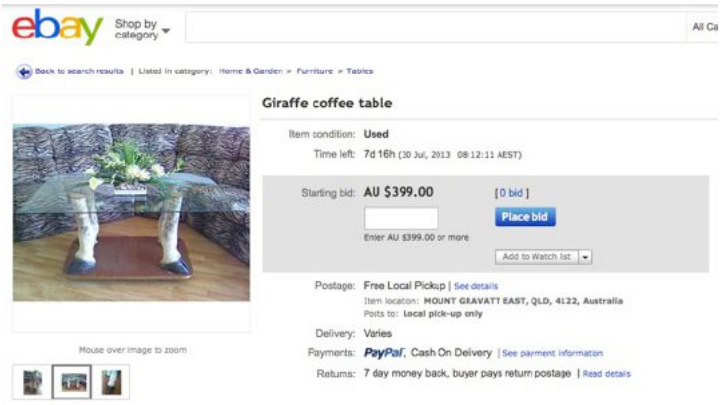
How often does a giraffe chew its food?

While observing the activity pattern of the Rothschild's giraffe in Kigio Wildlife Conservancy, Kenya Abroad volunteer Lex Tervelde started wondering, how many times a giraffe ruminates or chews the returned food or cud? In the following days he recorded 33 observations of giraffe chewing and found that they chewed their food on average 50.5 times before swallowing, with the smallest number of chews recorded as 39 and the highest as 56. There you go – something you probably also always wanted to know. Thanks Lex!

Male Rothschild's giraffe with Redbilled Oxpeckers at Kigio Wildlife Conservancy.

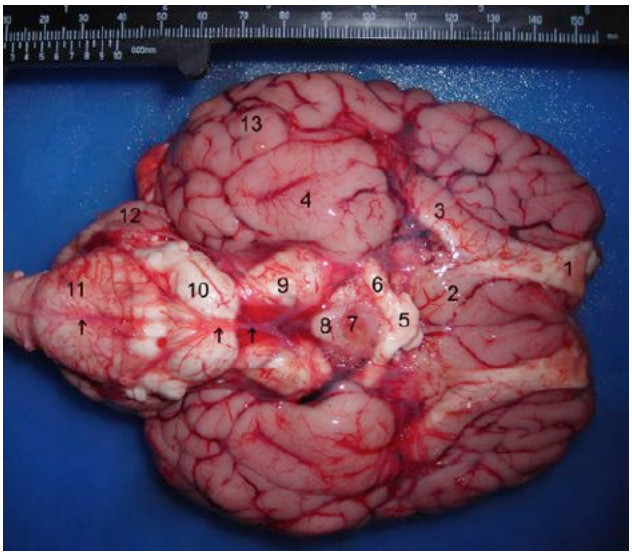
A crime against good taste on Australian eBay

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) aims to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species in the wild, and it accords varying degrees of protection to more than 34,000 species of animals and plants. As there only is negligible recognised international trade in giraffe, the species is not listed under the convention and giraffe products can therefore be traded legally – however, giraffe leg tables should be considered a crime against good taste!

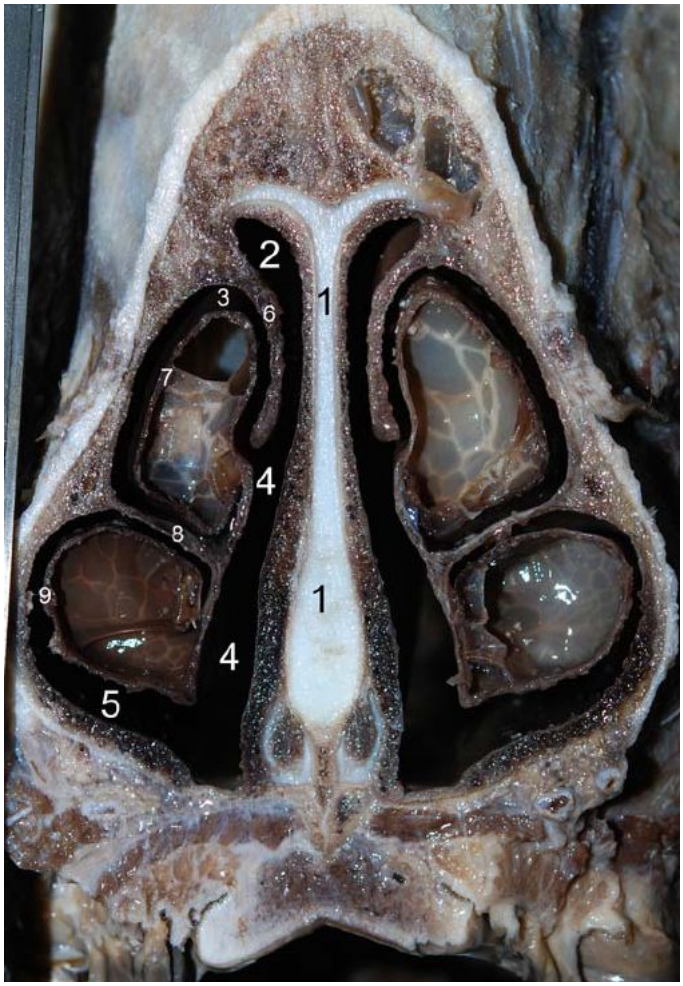


Giraffe dissection

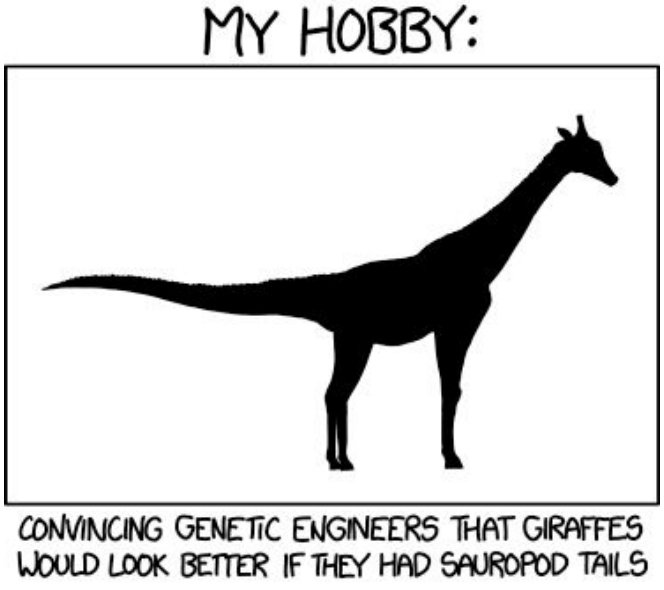
Prof. William Pérez, an expert in animal anatomy from the Universidad de la República in Montevideo, Uruguay, has sent us the following images. The giraffe died at a local zoo and was consequently dissected at his university. The legend below each of the images explains what can be seen. Please contact William Pérez directly, if you have additional questions or comments: *vetanat@gmail.com*.



Ventral aspect of a giraffe brain. 1: Olfactory bulb; 2: Medial olfactory tract; 3: Lateral olfactory tract; 4: Piriform lobe; 5: optic chiasma; 6: Optic tract; 7: Part of Pituitary gland; 8: Mamillary body; 9: Cerebral peduncle; 10: Pons; 11: Medulla oblongata; 12: Cerebellum; 13: Cerebrum, caudal part. Arrows: Basilar artery.



Transverse section of adult giraffe head at the level of Cavum nasi (rostral part). Meatus and concha of the Cavum nasi are visible. 1: Nasal septum; 2: Dorsal nasal meatus; 3: Middle nasal meatus; 4: Common nasal meatus; 5: Ventral nasal meatus; 6: Dorsal nasal concha; 7: Dorsal part of ventral nasal concha; 8: Ventral nasal concha; 9: Ventral part of ventral nasal concha.



http://imgs.xkcd.com/comics/giraffes.png

Giraffe Indaba II: Save Our Species! – Is there a future for giraffe in Africa?

Julian Fennessy, Giraffe Conservation Foundation

The Giraffe Conservation Foundation (GCF) in collaboration with the IUCN SSC Giraffe & Okapi Specialist Group (GOSG) and the Kenya Wildlife Service (KWS) hosted the second ever international conference on giraffe conservation in Africa. The *Giraffe Indaba 2013: Save Our Species! Is there a future for giraffe in Africa?* attracted 48 people from thirteen countries across the globe and a range of disciplines, including African students, scientists, captive managers, policy makers and conservation managers. The conference was held at Masai Lodge, adjacent to Nairobi National Park in Kenya from 25 to 30 August 2013.

The Indaba brought together experts to share ideas, develop collaborations and strategise about the future opportunities for giraffe conservation and management plans throughout Africa. Kenya was specifically chosen for its central location in Africa and due to its significance in giraffe conservation for hosting three (sub)species of giraffe.

The aims of Indaba II were to:

- Increase awareness and education on the plight of giraffe in Africa
- Share information about the behaviour and ecology of giraffe in different locations that can be beneficial for designing conservation management plans.
- Host a successful international conference bringing together local African and international experts, students and conservation managers
- Engage African scientists and community conservation managers
- Build collaborative partnership for long-term sustainable conservation of giraffe

Delegates had the opportunity to listen to 23 inspiring presentations (all abstracts are including in this issue of Giraffid, starting on the next page), view four posters and participate in four workshop sessions/meeting that were held throughout the week: a lively group discussion on branding giraffe conservation, a film/photo presentation on Southern Africa, the first meeting of the giraffe group of the IUCN SSC Giraffe & Okapi Specialist Group and a GCF Board meeting.

It was unanimously agreed that the Indaba was a great success, well run and facilitated. The increased involvement of a growing number of African conservationists as compared to the first Giraffe Indaba was applauded and the addition of excursions to local attractions (Giraffe Center courtesy of A.F.E.W and Nairobi NP courtesy of KWS) allowed for more informal discussions between delegates in a relaxed atmosphere while at the same time allowing delegates to see more of Kenya's great conservation efforts. All delegates felt that the Indaba struck the right balance between work and play, contributing to a conducive atmosphere to start more collaborative giraffe work in the future.

So where to from here? All participants agree that the two Indaba's to date are an important platform for giraffe conservation and management and a must to be held in the future. South Africa in 2015 has been touted as the next opportunity (thanks Francois Deacon!) and we welcome one and all to come, present and participate – give me a shout if you want to learn more. We would like to encourage ongoing African conservationist involvement, especially those working with okapi. Some of the key areas to report back on and discuss in 2015 will be the IUCN Red List updates for both species, development of giraffe translocation guidelines and possibly, the production of the first-ever Conservation status Report for giraffe. So stay tuned and look forward to seeing you (again) soon in South Africa!

Acknowledgements: GCF would like to thank KWS, the African Fund for Endangered Wildlife, IUCN SSC GOSG and Flash Pals for their generous support in helping to host Giraffe Indaba II.

Contact:
Julian Fennessy
julian@giraffeconservation.org

Giraffe Indaba II: Presentation Abstracts

Maasai Lodge, Nairobi, Kenya, 25 – 30 August 2013

The composition and social associations of giraffe in all-male herds in Zambia

Fred B. Bercovitch & Philip S. M. Berry
Primate Research Institute, Kyoto University, bercovitch@pri.kyoto-u.ac.jp

All-male social groups are found in a number of mammals. In some species, 'bachelor bands' operate as a reproductive strategy, but in other species their function is unclear. Male giraffe, *Giraffa camelopardalis*, are solitary most of the time, but are frequently observed in all-male herds. We analyzed 34 years of data collected from 36 male Thornicroft's giraffe, *G. c. thornicrofti*, in the Luangwa Valley, Zambia, to scrutinize the composition and possible function of all-male herds. We found that all-male herds were significantly smaller than mixed sex herds, usually contained a mature bull, and were not dependent upon season, although the largest all-male herds occurred during the dry season in riverine habitats. Dyadic associations between males in single sex herds were quite weak and only about 15% of possible dyads established herds together. We evaluate four possible functions of giraffe all-male herds (predator protection, practicing aggressive skills, prolonging life, and information transfer). Our data are best explained as a resource learning strategy adopted by males in order to obtain more extensive knowledge about the habitat, including both food and female distribution. Secondary benefits in the form of predator protection and sharpening competitive skills for future contests over estrous females might also mediate formation of all-male groups.

Masai giraffe population dynamics in the Tarangire-Manyara Ecosystem, Tanzania

Douglas T. Bolger & Derek E. Lee
Environmental Studies Program, Dartmouth College, dbolger@dartmouth.edu

We employed photographic mark-recapture to study the population dynamics of Masai giraffe (*Giraffa camelopardalis tippleskirchi*) in the Tarangire-Manyara Ecosystem in northern Tanzania. We employed a robust design with three primary sampling intervals spaced throughout the year each consisting of two replicate sampling events. During each sampling event fixed routes were driven throughout the entire study area and all giraffe encountered were photographed. Each image was classified as a "recapture" or as a new animal to the study by the image matching program, Wild-ID. Based on encounter histories derived from images collected during the period July 2011 to July 2013 we used multi-state open robust design models to produce preliminary estimates of population size, survival, recruitment and movement probabilities for three seasons and five geographic subsections of the population. These methods have succeeded in providing precise, fine-scaled demographic estimates at relevant temporal and geographic scales with immediate conservation and research uses.

Giraffe sociality – new insights from a Namibian population

Kerryn D. Carter
School of Biological Sciences, The University of Queensland, jakcat1@bigpond.com

Giraffe social relationships have historically been described by weak and non-selective associations between individuals, thus depicting societies with little social structure. However, it is now recognised that giraffe exhibit fission-fusion dynamics, which are characterised by frequent changes of associates. Our research on social organisation in a population of 625 individually identified giraffe (*G. c. angolensis*) in Etosha National Park, Namibia has shed new light on the mechanisms that may drive fission-fusion grouping behaviours and social relationships among wild giraffe. We present these findings with comparisons to studies of grouping and social behaviours in other giraffe populations.

Despite such high levels of variability within grouping patterns, giraffe show a definite structure to their associations. Giraffe societies are characterised by both weak and strong relationships between pairs and some pairs exhibit long-term associations. In particular, female giraffe in Etosha National Park exhibited social preferences and avoidances and long-term relationships spanning at least six years with other females, while male-male pairs did not appear to show such preferential or long-term associations. The grouping preferences of males may therefore be determined more by the locations of females than by their relationships with other males. However, the amount of home range overlap and degree of relatedness together only explained 25% of the variation in observed associations among females in Etosha National Park; individual preferences may thus influence associations more than expected.

The ability of individuals to remain in groups with preferred associates may be constrained by dispersal or competition over seasonally fluctuating food resources, which may cause group fission. We found that group sizes, numbers of female associates and strengths of female associations were significantly lower in the dry than the wet season. The flexibility to adjust social bonds during

seasons of low food availability may allow animals to reduce feeding competition without severing bonds completely, and therefore still remain part of a larger community. However, the high daily fission-fusion dynamics of giraffe groups suggests that seasonal resource availability and/or dispersal only play a small part in females' frequent decisions about whether to stay with, or split from groups.

Manding – a case study of two giraffe: the social communication of captive giraffe, the artefact of applied behaviour analysis and its implication on their long term care

Lisa Clifton-Bumpass
A Step Beyond, pawsitivedogs@comcast.net

Giraffe living in captivity are undergoing extensive training and behavior modification to better their lives, reduce the stress and intrusion of daily husbandry care, increase their long-term welfare through mental stimulation and enrichment. As captive giraffe live longer, caring for the normal age related health issues, chronic health problems and their geriatric needs require husbandry staff to develop strategies to create cooperative care protocols.

Exotic and domestic animals are being taught many new behaviors via the science of Applied Behavior Analysis (ABA) which is the arm of psychology focused on the observable relationship of a targeted behavior to the environment. ABA functionally assesses the specific relationship between behavior and its environment by examining the rules by which behavior changes and is maintained. In 1957, B.F. Skinner first classified a group of behavioral signals from nonverbal individuals who use a signal to communicate a specific need for remedy of an internal aversive state that the individual cannot remedy without the help of another, referred to as the mand. The mand is the result of operant conditioning whereby the learner then uses what it has learned to signal it needs relief from an aversive state that the learner cannot remedy; very much like Aesop's fable of Androcles and the lion.

In the Indaba setting, we will examine the care and training of two giraffe living in different holding facilities that independently developed a signal for specific keepers by expressing a need for specialized husbandry protocols. Both individuals use an aspect of their keeper's training cues as a signal for specific relief treatments. Tiki, a 24 year old giraffe cow, developed an Androclesian leg lift to signal rocks collecting in soft tissues of her hooves. Rosie, a 4 year old cow, signals a need for massage care of muscle spasms in her back and thigh region. Both signals are an operant class of behaviors directly related to their training.

Giraffe research over the years

Anne Innis Dagg
Independent Studies, University of Waterloo, Waterloo, adagg@uwaterloo.ca

I will discuss what new research has been carried out on giraffe in the past 30 years, and suggest research topics that might be especially important to undertake in the near future. In addition, I may be able to report on a small infrasound experiment carried out just before the Indaba with reticulated giraffe.

Development and fitting of specially developed GPS collars on female giraffe (*Giraffa camelopardalis*) in the Kalahari region in South Africa

Francois Deacon & G.N. Smit
Department of Animal, Wildlife and Grassland Sciences, University of the Free State, deacon@ufs.ac.za

The lack of long-term studies remains the most limiting factor in understanding the home range, spatial ecology and movements of giraffe. Equipping animals with radio transmitter collars has aided ecological research by allowing remote collection of data on animal movements and home ranges. More recently, advances in satellite technology have enabled the compaction of GPS transmitters to fit onto collars. The ability to transmit data from a collar via satellite has improved the scope and efficiency of field-based research, allowing collection of accurate data on home ranges, seasonal movements, human-wildlife interaction zones and preferred habitats. Though this system is expensive, the cost is justified by its convenience and reduced disturbance compared to aerial surveying and tracking on the ground. Distribution patterns of giraffe are strongly influenced by environmental variables, human persecutions, roads and location of waterholes. Their distributions are also influenced by extrinsic factors such as weather conditions, food supply (deciduous plants), vegetation and human disturbance of the landscape.

The fitting of a GPS collar on a giraffe as a head harness has never been attempted before. After careful planning and experimental testing of two different designs, the final design was refined by fitting the harness on 48 different giraffe sculls and live specimens during the development phase in 2011. In 2012 the GPS collar was fitted successfully on eight female giraffe in the Kalahari (17 months until now without any problems, mortalities or injuries), enabling the tracking and monitoring of their range and movement and so better understand this unique species in an arid environment. Attempts at fitting the collar around the neck proved to be unsuccessful and could be life-threatening to the animal. To ensure that all the necessary precautions could be taken, and the risks involved would be limited, two separate proposals had to be submitted to animal ethical committees. Part of the success can be attributed to the use of a specialized game

capture team, knowledgeable researchers and at least two wildlife veterinarians. To date the custom-made head harness GPS collar proved to be the best developed collar for giraffe research.

Movement pattersn and impact of giraffe (*Giraffa camelopardalis*) on the woody plants of a small fenced area in the central Free State in South Africa

Francois Deacon & G.N. Smit
Department of Animal, Wildlife and Grassland Sciences, University of the Free State, deacon@ufs.ac.za

Various game farmers struggle to find the balance between stocking rate and stocking with suitable species. This statement is in particular true if natural resources are explored and utilised. This study was conducted on a wildlife estate located in the grassland biome of the central Free State. Despite being located within the grassland biome, the vegetation can in part be classified as riparian thicket with an abundance of *Acacia karroo, Searsia lancea, Olea europaea, Diospyros lycioides* and *Ziziphus mucronata* trees. In common with many game ranches in the region some game species were not historically present and it is thus essential to study their adaptation and impact on their introduced habitat. The objectives of the study were to evaluate the movement and the impact of *Giraffa camelopardalis* (giraffe) on the woody plants of the estate.

The species composition, density, height distribution, productivity and condition of woody plants influence the browsing capacity of such areas, and needs to be assessed for application in management programs. Vegetation data was collected over a period of 18 months and involved an estimate of the browsing capacity of the woody plants with the aid of the BECVOL 3 model and the calculation of the browsing capacity based on the leaf and shoot production of the trees on a maximum browsing height of 5.0 m. Movements of the eight giraffe on the estate were monitored for a period of three months by fitting one of the animals with a GPS satellite collar.

The browsing capacity of the estate was estimated at 7.7 ha BU-1 for September (month with the lowest browse availability due to the deciduous nature of some of the tree species) (1 BU = the metabolic equivalent of a kudu with a body mass of 140 kg). Based on this estimate, the estate can only support 26 BU during September without the need for supplementary feeding. At the time it was estimated that all the browsers on the estate represented 70 BU, thus exceeding the browsing capacity by 44 BU. The eight giraffe comprised 42 BU of the 70 BU, the remainder being made up by species such as kudu, nyala and impala. The effect of this overstocking was clearly visible, with tree species such as *A. karroo* showing signs of heavy browsing and broken branches, which will ultimately result in the severe degradation of the browse resource and potential loss of animals. It was also observed that the giraffe do not feed only on the plant material above 2 metres, but that browse material at lower heights is also intensively utilized. This brings the giraffe in direct competition with smaller browsers that can feed only on lower strata. These results emphasize the importance of balancing the stocking rate with the browsing capacity to ensure proper management that will optimise the production of the animals as well as ensure the sustainable utilization of the browse resource.

Reticulated giraffe: you don't know what you've got till it's gone

John Doherty & Jacob Leaidura
Reticulated Giraffe Project & School of Biological Science, Queen's University Belfast, johndoherty@sapiensnetwork.org

As human populations continue to grow, as living standards, expectations and parts per million of carbon dioxide in the atmosphere continue to rise, and as people become increasingly preoccupied by the need to secure scarce resources by any available means, the collateral damage to other species' prospects of survival becomes ever greater. Despite a century of effort, nature conservation has had little impact on the relentless decline in biodiversity worldwide and, against this background, it seems unlikely to become more effective in the future. The conservation of terrestrial megafauna is in any case uniquely challenging. Whether because they are perceived to be dangerous, because they are prized as commodities, because they require extensive areas of suitable habitat or because their capacity for regeneration is limited, large-bodied animals are often in the vanguard of anthropogenic extinction events. In what is part analysis and part opinion piece, drawing on our experience of working with reticulated giraffe in the north-east of Kenya, we seek to address the theme of the conference by asking: if there is a future for giraffe in Africa, what kind of future might that be?

The 'not so' forgotten megafauna

Julian Fennessy, Andri Marais, Andy Tutchings & Steph Fennessy
Giraffe Conservation Foundation, julian@giraffeconservation.org

During the last two years since the first Giraffe Indaba in Namibia, a relative proliferation of giraffe conservation and management activities have occurred across the continent. GCF, its associates and other giraffe researchers have initiated and continued projects to further our understanding of giraffe. Exciting genetic research on giraffe populations in Botswana, Namibia and Zambia has revealed new mysteries. While more research is still required, it appears inevitable that changes in their current taxonomic status at least need consideration.

Additionally, and integrally linked, efforts to better understand post-translocation monitoring of Namibian populations is providing insight into the secret life of 'new' giraffe populations.

Recent development of giraffe country profiles – the first-ever detailed updates on giraffe numbers, distribution and status across their country range in Africa, have already attracted great interest and are establishing a foundation for a major review of the species' conservation status. In an effort to better understand key giraffe populations and associated threats and in turn inform their Rest Listing status, targeted local efforts are being established, including the last remaining wild and viable population of Rothschild's giraffe. In Uganda, a local project was initiated by GCF in collaboration with local Ugandan partners (UWA, UWEC, UCF and Marasa Africa) as a model for future collaborative conservation efforts from partners local and abroad.

What will the next period of giraffe conservation and management bring?

Multi-partner efforts to improve understanding of and conserve the okapi across its range

Noëlle Kümpel & Alex Quinn
Zoological Society of London, noelle.kumpel@zsl.org

The okapi is a primitive relative of the giraffe, and as such makes up the lesser-known half of the IUCN SSC Giraffe and Okapi Specialist Group. Elusive and confined to the rainforests of the Democratic Republic of Congo (DRC), the okapi has long been underfunded and understudied, with no coherent strategy in place for its conservation. It is widely agreed that the okapi's present Red List status of 'near threatened' severely misrepresents the threats the species is facing. To address these concerns, ZSL has been leading a range-wide okapi conservation project in collaboration with the *Institut Congolese pour la Conservation de la Nature* (ICCN) since 2010. Outputs include:

1. A comprehensive okapi status review, collating data from the scientific and grey literature, unpublished reports and studies, and expert and local knowledge from those working on the ground. Threats include habitat loss and degradation, in particular due to mining and small-scale agricultural incursion, poaching associated with the ivory trade and disturbance (and in June 2012, direct targeting) by rebel groups.
2. The first genetic study of wild okapi populations. Preliminary results suggest five distinct genetic lineages within okapi, some over 6 million years old.
3. A conservation strategy for the okapi, developed through a participatory process including all key stakeholders in DRC in May 2013. This is in the process of being written up.
4. An IUCN Red List reassessment. Available data show the okapi population in the Okapi Wildlife Reserve, the best-protected area in the core of the species' range, declined by 43% 1995-2007 and a further 47% 2008-2012.

Next steps are the establishment of a database to provide conservationists and scientists with up-to-date, open-access information on okapi, the publication of a paper comparing survey methods to make recommendations for future monitoring and a campaign to raise awareness of the okapi and its plight. Funding is being sought to implement other activities from the conservation strategy, most importantly increasing protection of the Okapi Wildlife Reserve and other Congolese protected areas. It is intended that the new Specialist Group will play a key role in much of this work.

A study on the ecology of giraffe in northern Botswana

Kylie McQualter
University of New South Wales & Elephants without Borders & Giraffe Conservation Foundation, kylie.mcqualter@gmail.com

Wildlife surveys have shown a declining trend in Botswana's giraffe population over the past ten years, particularly in the Okavango Delta. Whilst ecological information is available for giraffe populations elsewhere, the giraffe of northern Botswana have, until now, been little studied. This is the first comparative study examining giraffe ecology and behaviour in Botswana. Two study sites were identified - the Chobe River front where giraffe numbers appear to be stable, and wildlife concession NG26 in the Okavango Delta. Three wet and dry season aerial surveys have been flown over the study areas providing information on the distribution and abundance of giraffe. Four giraffe were fitted with GPS satellite head harnesses providing location data to infer home range, daily movements and habitat preferences. Over 500 individual giraffe have so far been identified along the Chobe River front and 120 in the Okavango Delta allowing for examination of population structure and dynamics, home range and social relationships. Preliminary results over a one year period will be presented.

Giraffe in the Ewaso Basin, Kenya and Park W landscape, Niger: status, issues and approaches

Philip Muruthi, Evans Mwangi & Lucy Njino
African Wildlife Foundation, pmuruthi@awfke.org

Both the giraffe of larger Samburu landscape in northern Kenya and those of Park W landscape in Niger have declined over time, the western subspecies more dramatically than its eastern counterpart. *Giraffa camelopardalis peralta* in Niger exists in very small numbers but seems to be growing to more than three

hundred individuals by 2012. *G. c. reticulata* population is on decline. Key issues and threats associated with these declines are addressed including habitat loss, poaching and competition for resources. Group sizes vary across the landscapes and by season. *G. c. reticulata* stronghold is inside areas long-established with wildlife conservation objectives. Amongst these, protected areas and private ranches secure the larger proportion of the estimated 4,550 *G. c. reticulata*. All *G. c. peralta* occur on communal lands. Institutional and legal arrangements faced by the two species need improvement to contribute to long-term security of the species. We recommend actions targeted at halting population declines, ensuring adequate coverage, long-term viability and resilience of the species.

Conservation planning for giraffe kicks off

Charles Musyoki
Kenya Wildlife Service, cmusyoki@kws.go.ke

To many people, giraffe may not seem to be in need of focused conservation attention. However, giraffe are facing increasing pressures that have impacted on their numbers and distribution in Kenya and elsewhere across the continent. There are currently a total of nine sub-species of giraffe naturally occurring in the African continent. Kenya is the only country with three of these sub-species present. Other countries have either one or two sub-species. Therefore, Kenya is the epi-centre for giraffe speciation. Over the past decade, giraffe numbers in Africa have suffered at least a 30% drop in population as a direct result of habitat encroachment, habitat loss, habitat fragmentation, severe poaching, increasing human populations and human-wildlife conflicts.

Rothschild's giraffe

The Rothschild's giraffe (*Giraffa camelopardalis rothschildi*) is the second most endangered giraffe sub-species with less than 670 individuals remaining in the wild. Once wide-ranging across western Kenya, Uganda, and southern Sudan, it has now been almost totally eliminated from most of its former range and now only survives in a few small, isolated populations in Kenya and Uganda. In Kenya, all known wild populations of Rothschild's giraffe have been extirpated by agricultural development and remnant populations are confined to National Parks, private properties and other protected areas where they have been translocated. These remaining populations are isolated from one another and are not interbreeding. Kenya is home to about 60% of the global population of wild Rothschild's giraffe with Ruma National Park having the single largest meta-population (130 individuals) in the country. Lake Nakuru National Park has 65 individuals, Soysambu Conservancy 63, Kigio Wildlife Conservancy 32, and Giraffe Manor-Karen, Mount Elgon National Park, Murgor Farm in Iten, Mwea National Reserve, Sergoit-Kruger Farm in Iten, Kitale Area Farm and Nasalot Game Reserve all with populations of less 20 individuals.

Reticulated giraffe

Reticulated giraffe (*Giraffa camelopardalis reticulata*) are widely found in northern Kenya and in Somalia. Data on the number and range of reticulated giraffe is limited and incomplete, with as few as 3,000 - 5,000 individuals remaining in the wild. This estimate represents a small fraction of the 28,000 reported to have existed only a decade ago suggesting that the sub-species has recently suffered a major and rapid decline giving rise to concern about its long-term persistence. As an example, estimates for Laikipia District are consistent with a pattern of decline: 1977 - 6,398; 1990 - 5,419; 1994 - 2,118; 1997 - 2,903.

Masai giraffe

The Masai giraffe (*Giraffa camelopardalis tippelskirchi*) occur in southern Kenya i.e. Amboseli, Tsavo and the Masai Mara ecosystems and throughout Tanzania. The Masai giraffe have relatively stable populations compared to the other sub-species in Kenya although reports that their numbers have also suffered in recent years have been highlighted. Current surveys and recent estimates are being compiled for the Masai population and hopefully some more positive news will prevail.

Conservation planning for giraffe

Given Kenya's heritage in terms of giraffe diversity and speciation, it is fitting that we develop a national conservation strategy dedicated to giraffe. The National Giraffe Conservation Strategy for Kenya will provide national guidance on the conservation and management of all three sub-species across Kenya. The guidelines will define the role of the government, conservation partners and other stakeholders whilst raising awareness about the plight of giraffe and highlight the generally declining population trends occurring within Kenya.

Kenya Wildlife Service constituted a National Giraffe Conservation Task Force (NGCTF) to steer the process of formulating the National Giraffe Conservation Strategy. The NGCTF has held meetings to discuss the key features of the Strategy, specific challenges and risk factors facing each of the sub-species. A two day retreat of the NGCTF was held in September 2010 to further consolidate the background information for the sub-species and set the stage for a national stakeholder's workshop. A national stakeholder's workshop was held in February 2011. The workshop developed a vision, goal and strategic objectives for the Strategy. The workshop also provided an opportunity to update numbers and distribution of giraffe in Kenya, as well as incorporate the inputs and views of stakeholders. Activities, indicators and timelines were outlined against each strategic objective.

The conservation planning process is supported by funding from Kenya Wildlife Service (KWS), Giraffe Conservation Foundation (GCF) and African Fund for Endangered Wildlife (AFEW).

Factors affecting habitat use by Masai giraffe (*Giraffa camelopardalis tippelskirchi* Mtschei) in Athi-Kapiti Plains Ecosystem, Kenya

Thadeu Obari, Nathan Gichuki, Samuel Kiboi & Charles Musyoki
Kenya Wildlife Service, tobari@kws.go.ke

The study was conducted to generate information to enhance conservation and management of giraffe in the Athi-Kapiti plains ecosystem. The objectives of the study were to determine giraffe population trends, relative abundance of giraffe food plants, daily ranges of parental and non-parental giraffe, habitat use and preference. The study was conducted in Nairobi and Amboseli National Parks, Kapiti and Konza Ranches. Giraffe populations were determined using total count method. Minimum Convex Polygon (MCP) home range determination program and GIS-ARC View software was used to extrapolate giraffe daily range sizes and distribution patterns. A two sample Mann-Whitney (U) signed rank test method was used to test for significant difference in giraffe daily range sizes. Chi-square test on giraffe densities indicated that they were significantly different in the four study sites ($X^2_{0.05,3}$ = 7.815, p< 0.05). Daily range sizes of parental and non-parental giraffe were significantly different from one another ($U_{0.05, 5, 5}$ = 9.00, p<0.05 and $U_{0.05, 5, 5}$ = 15, p<0.05) respectively. The Chi-squared test on operational sex ratios of giraffe from the four study sites indicated significant differences ($X^2_{0.05, 3}$ = 3.727, p<0.05). A Chi-squared test on habitat use indicated that giraffe uniformly used the habitats ($X^2_{0.05,3}$ = 8.428, p<0.05, $F_{0.05,4,36}$ = 14.8). Giraffe in the four study sites were affected by similar ecological and biological factors.

Role of Uganda Wildlife Education Centre in giraffe conservation in Uganda

Henry Opio Oding
Uganda Wildlife Education Centre, henryopio@yahoo.com

Background of UWEC, 1952- Opened as an animal orphanage, 1962- Became a traditional ZOO in which even exotic species like bears and tigers were kept, 1970s- Because of the political turmoil and inadequate government funding, the ZOO became continually run down. May 1994- Became Uganda Wildlife Education Centre Trust, the only centre/Zoo in Uganda. Membership and Partnerships; PAAZAB- Member, WAZA- Member, NZG-SA, Cincinnati Zoo, Yokohama Zoos, Wetland International, UNDP, Nature Uganda, Africa Geographic, UWA.UWEC mandates, Conservation Education, Rescue and rehabilitation of Wildlife, Captive breeding of endangered species, and Recreation. Conservation Education Programmes at UWEC. On site and outreach conservation education programme Giraffe are used for conservation education and breeding at UWEC to increase on their wild population in Uganda.

Zoo giraffe as ambassadors for wild giraffe

Amy Roberts & **Christina Gorsuch**
Chicago Zoological Society, Christina.gorsuch@czs.org

Chicago Zoological Society's Brookfield Zoo has a long history of displaying and breeding Reticulated Giraffe. Giraffe are continually ranked at the very top of our guests' list of favorite exhibits and animals. We believe this ranking is the result of the giraffe's specific characteristics and their unique ability to form a connection with the visitor. A guest survey in 2012 indicated the giraffe and their exhibit as the 2nd most favorite in the entire zoo; reasons supplied by guests included: giraffe appearance, visibility, and activity. Most specifically it was the giraffe's tendency to look out at people and make "eye contact". This simple, natural behavior elicited a very strong, positive emotional response in our guests and instantly forged a personal bond between them and the giraffe.

We have chosen to promote and display the special characteristics of Giraffe through the use of simple, targeted strategies; VIP tours, Keeper/Giraffe interactions, Chats, Social Media, and Educational Graphics are all used in a very specific to have a high impact effect on our guests. We believe that the experience felt by our guests creates a positive connection and furthermore, that positive connection creates more interest in conservation. We believe giraffe are one of the best natural ambassadors of all zoo animals and all we need to do is properly spotlight them. We will review and share the strategies we have used to create a personal experience for our guests that works to build a bridge between our giraffe here at Brookfield and the wild Giraffe throughout Africa.

BECVOL 3 – a refined model for estimating browse production of woody plants in different height strata

G.N. Smit
Department of Animal, Wildlife and Grassland Sciences, University of the Free State, smitgn@ufs.ac.za

An approach to a quantitative description of woody plant communities that will aid studies on grass-tree competition interactions, bush encroachment, and estimation of food to browser herbivore species as the main criteria, was proposed during 1989. It evolved as the BECVOL-model (Biomass Estimates from Canopy Volume) and differs from other methods that relate tree dimensions to above-ground biomass by being able to provide estimates for both complete plants and plant portions. This is of particular importance in the estimation of available browse within different height strata. In

addition to total leaf DM, stratified estimates of the leaf DM below 1.5 m, 2.0 m and 5.0 m respectively, are also being calculated by the BECVOL-model. These heights were selected because they represent the mean maximum browsing heights of specific groups of African browser herbivore species. The height of 1.5 m represents the mean maximum browsing height of the impala (*Aepyceros melampus*), while 2.0 m and 5.0 m represent the mean maximum browsing heights of the kudu (*Tragelaphus strepciseros*) and giraffe (*Giraffa camelopardalis*) respectively. The previous model provides estimates of the leaf dry mass (total and stratified into the different height strata) at peak biomass, based on the relation between the plant's spatial canopy volume and its leaf dry mass. With the development of the BECVOL 3-model the limitations regarding estimates of the browseable component of woody plants are addressed by including the edible, new season's shoots less than 0.5 cm in diameter. The need for accurate estimations of the wood component of woody plants is also addressed.

Trees of a number of important savanna tree species were harvested and separated into specific biomass fractions, which include the leaves, as well as the shoots and stems in three diameter classes: shoots <0.5 cm, stems >0.5-20 cm and stems >20 cm. The harvested material was dried and weighed. Regression analyses were applied with the different plant dry mass fractions as dependent variables and the calculated spatial canopy volume as the independent variable. Highly significant regressions ($P<0.001$) were achieved with the curvilinear regression models (exponential and multiplicative) that generally yielded the highest correlation coefficients. These newly developed regression equations, once incorporated in the new BECVOL 3-model will enable users to make more accurate estimates of the browseable component of tree populations. Since its inception the BECVOL 3-model has been used on an extensive scale in the estimation of the available browse in a study of giraffe in the Kalahari region of South Africa.

Selling and saving the wild giraffe

Andy Tutchings
Giraffe Conservation Foundation,
andy@giraffeconservation.org

Populations plummeting. Giraffe images in abundance but giraffe remain *The Forgotten Megafauna*. Popular perception. Sex appeal? Misinformation. Misrepresentation. Untruths! Understudied. Dearth of information. Where we're at. Selling its self. Room for optimism? The way ahead.

Possible PhD project on giraffe social organization

A/Prof. Anne Goldizen, at the School of Biological Sciences at the University of Queensland in Brisbane, Australia, is looking for a PhD student to continue a long-term study of the social organization of giraffe in the Okaukuejo area of Etosha National Park in Namibia. This population was studied first by Dr. Rachel Brand of the University of Newcastle in the UK during 2004-05, then by Dr. Kerryn Carter (then PhD student of Anne's at UQ) in 2009/10, and has now been studied in 2013 by Anne. Thus we have data on the association patterns of this population of 500+ giraffe from three time periods over the past 10 years, with individuals recognizable across this time period. We have published two papers on the social organization of this population in Animal Behaviour (85:395-394 and 86:901-910, both in 2013). Candidates would have to have completed a prior research degree equivalent to an Australian honours degree (a full-time, 9 month research project) or a masters degree to be eligible for the UQ PhD program. Australian students would need to apply for an Australian Postgraduate Award scholarship and non-Australians would need to acquire a PhD scholarship from UQ or elsewhere. Research funds would also need to be sought, with Anne's assistance. It is also important that interested potential students have extensive travel experience or experience working/researching in developing countries.

Email Anne at a.goldizen@uq.edu.au if you would like more information.

Giraffe Indaba II: Poster Abstracts

Maasai Lodge, Nairobi, Kenya, 25 – 30 August 2013

Reticulated giraffe: you don't know what you've got till it's gone

John Doherty & Jacob Leaidura
Reticulated Giraffe Project & School of Biological Science, Queen's University Belfast,
johndoherty@sapiensnetwork.org

As human populations continue to grow, as living standards, expectations and parts per million of carbon dioxide in the atmosphere continue to rise, and as people become increasingly preoccupied by the need to secure scarce resources by any available means, the collateral damage to other species' prospects of survival becomes ever greater. Despite a century of effort, nature conservation has had little impact on the relentless decline in biodiversity worldwide and, against this background, it seems unlikely to become more effective in the future. The conservation of terrestrial megafauna is in any case uniquely challenging. Whether because they are perceived to be dangerous, because they are prized as commodities, because they require extensive areas of suitable habitat or because their capacity for regeneration is limited, large-bodied animals are often in the vanguard of anthropogenic extinction events. In what is part analysis and part opinion piece, drawing on our experience of working with reticulated giraffe in the north-east of Kenya, we seek to address the theme of the conference by asking: if there is a future for giraffe in Africa, what kind of future might that be?

Africa's giraffe: Conservation guide

Andy Tutchings, Steph Fennessy, Andri Marais & Julian Fennessy
Giraffe Conservation Foundation,
andy@giraffeconservation.org

Are giraffe truly Africa's forgotten megafauna? The taxonomic status of giraffe is poorly understood to say the least and there is an urgent need of a review, using current genetic and morphological know-how, to provide a solid scientific baseline. Coupled with these unknowns is the knowledge that giraffe numbers are plummeting across their range and their distribution is shrinking rapidly – along with many other species on the continent. Various threats to giraffe are obvious, from predators to disease, but their social importance in some areas of Africa is little understood and requires long term study. In general, limited research has focussed on the plight of giraffe in Africa, let alone any long-term ecological (or other) research on a population(s) - as such our understanding of their life history, taxonomy and social importance is poor.

Recent research has led to the Red Listing of two giraffe (sub)species as endangered, with evidence indicating others are likely to endure a similar fate. Involvement and integration of giraffe research into actions of government, NGO, private sector and individuals is critical to supporting the long-term conservation of Africa's forgotten megafauna.

How to measure stress in giraffe

Florian Sicks
Tierpark Berlin-Friedrichsfelde, f.sicks@tierpark-berlin.de

Stress responses play a key role in allowing animals to cope with changes in its environment. Therefore the measurement of stress responses is gaining increased importance in wildlife management, conservation biology and behavioural ecology. Here we present two different methods that allow measuring stress in Giraffe:

1. Measurement of glucocorticoid (or metabolites) levels, the key elements in the neuroendocrine stress axis. We used fecal samples because they can be easily collected and the procedure is feedback free. The measurements have been done by a well-established enzyme immunoassay that was applied to giraffe for the first time.
2. Changes in the sleep pattern can provide information about the ability of individuals to cope with changes in their environment. Especially the REM sleep pattern seems to be important here, since it has been demonstrated that the REM sleep pattern changes for example at the beginning of infectious diseases or after traumatic events. Because of their peculiar sleeping position during the REM-sleep phases the giraffe is very well suited to use this method.

The sleeping behaviour of giraffe was observed and faeces samples have been collected before and after the transport of Giraffe to another zoo. While the glucocorticoid metabolite concentration increased after the transports, the time spent in REM-sleep decreased. Both methods are proving to be powerful tools to measure stress in Giraffe.

Recently published research

Bercovitch FB, Berry PSM. 2013. Age proximity influences herd composition in wild giraffe. Journal of Zoology, 260 (4): 281-286.

In many mammalian species, animals form subunits within larger groups that are often associated with kinship and/or age proximity. Kinship mediates fission/ fusion social dynamics of giraffe herds, but the role of age proximity has been unexamined. Here, we analyze 34 years of data from a population of Thornicroft's giraffe, *Giraffa camelopardalis thornicrofti*, living in Zambia in order to assess the extent to which age proximity influences herd composition. We show for the first time that calves born into the same cohort have stronger social associations than calves born into different age cohorts, and that the strength of their association is independent of the strength of maternal associations. Duration of time co-resident in the population did not influence the strength of social associations. Mothers and adult daughters have significantly stronger social associations than do unre- lated adult females. We suggest that giraffe have evolved mechanisms for fostering the formation of social associations with similar aged non-kin. Giraffe live in a complex society incorporating both kinship and age proximity as factors modu- lating the formation of social associations that underlie the fission/fusion dynam- ics of their flexible herd structure.

Carter KD, Brand R, Carter JK, Shorrocks B, Goldizen AW. 2013. Social networks, long-term associations and age-related sociability of wild giraffe. Animal Behaviour, 86: 901-910.

Long-term studies of sociality in wild animals are rare, despite being critical for determining the benefits of social relationships and testing how long such relationships last and whether they change as in- dividuals age. Knowledge about social relationships in animal species that exhibit fissionefusion dy- namics can enhance our understanding of the evolution of close social bonds in humans, who also have a fissionefusion social system. We analysed the social network of wild giraffe, Giraffa camelopardalis, in Etosha National Park, Namibia, from 1102 records of group compositions, including 625 individually identified individuals, spanning 6 years. We found that giraffe, which exhibit fissionefusion sociality, formed a cohesive society with short path lengths across the network that may facilitate passive in- formation sharing about resource availability. Male and female giraffe appeared to contribute equally to the network structure, based on similarities between the sexes for five network metrics. However, using lagged association rates, we found that long-term relationships spanning 6 years were evident among female giraffe, but not males, which may be explained by sex differences in ranging patterns and reproductive priorities. Five network metrics of females were compared between two adult age cohorts to investigate whether females' ages influenced sociability. As younger females reached adulthood, they associated with greater numbers of females and increased their network strength and social connectivity, perhaps because of dispersal. Our study reinforces the value of network analysis and long-term studies for examining the social systems of wild animals.

Kaitho T, Ndeereh D, Ngoru B. 2013. An outbreak of anthrax in endangered Rothschild's giraffe in Mwea National Reserve, Kenya. Veterinary Medicine: Research and Reports, 4: 45-48.

An anthrax outbreak occurred at the Mwea National Reserve between May 2011 and July 2011. This outbreak affected endangered Rothschild's giraffe (*Giraffa camelopardalis* ssp. *rothschildi).* Eleven giraffe carcasses were found during the 3-month period. One lesser kudu (Ammelaphus *imberbis),* the only one of its species in the national reserve, also succumbed to the illness. An investigation was carried out, and the presence of anthrax was rapidly confirmed using bacteriological methods. To stop the occurrence of more deaths of this endangered species, a total of 20 giraffe were vaccinated against anthrax and black quarter. The giraffe carcasses that were found were completely burned; this was done to decontaminate the environment. For a period of 2 years postvaccination, no anthrax-related mortalities in Rothschild's giraffe were reported at the Mwea National Reserve.

Porensky LM, Bucher SF, Veblen KE, Treydte AC, Young TP. 2013. Megaherbivores and cattle alter edge effects around ecosystem hotspots in an African savanna. Journal of Arid Environments, 96: 55-63.

Wild mammalian herbivores and cattle are fundamental drivers of African savanna ecosystems and have strong impacts on woody vegetation. However, few experimental studies have investigated the separate and combined influences of different large herbivores on spatial vegetation patterning. In East Africa, temporary cattle corrals (bomas) develop after abandonment into productive, treeless 'glades' that attract both do- mestic and wild herbivores. Edges of glades exhibit unusually high densities of large trees. We used a long- term, broad-scale manipulative experiment to test whether megaherbivores (elephant and giraffe), wild meso-herbivores (15e1000 kg), or cattle caused shifts in woody plant abundances in glade edges. We also examined cascading effects of megaherbivore and cattle exclusion

on symbiotic Acacia ants and wild meso- herbivores in glade edges. Megaherbivore exclusion resulted in increased densities of tall trees, reproductive trees, and non-aggressive Acacia ant species in glade edges. Cattle presence reduced meso-herbivore use inside and away from glades, but not in glade edges. Our results suggest that megaherbivores and cattle can dampen the magnitude of spatial patterns associated with glades and glade edges. These findings provide insight into the development and maintenance of spatial heterogeneity in savannas, and emphasize that land use change and mammalian extinctions have complex, cascading ecological consequences.

Thomassen HA, Freedman AH, Brown DM, Buermann W, Jacobs DK. 2013. Regional Differences in Seasonal Timing of Rainfall Discriminate between Genetically Distinct East African Giraffe Taxa. PLoS ONE 8(10): e77191. doi:10.1371/journal.pone.0077191

Masai (*Giraffa tippelskirchi*), Reticulated (*G. reticulata*) and Rothschild's (G. *camelopardalis*) giraffe lineages in East Africa are morphologically and genetically distinct, yet in Kenya their ranges abut. This raises the question of how divergence is maintained among populations of a large mammal capable of long-distance travel, and which readily hybridize in zoos. Here we test four hypotheses concerning the maintenance of the phylogeographic boundaries among the three taxa: 1) isolation-by-distance; 2) physical barriers to dispersal; 3) general habitat differences resulting in habitat segregation; or 4) regional differences in the seasonal timing of rainfall, and resultant timing of browse availability. We used satellite remotely sensed and climate data to characterize the environment at the locations of genotyped giraffe. Canonical variate analysis, random forest algorithms, and generalized dissimilarity modelling were employed in a landscape genetics framework to identify the predictor variables that best explained giraffe' genetic divergence. We found that regional differences in the timing of precipitation, and resulting green-up associated with the abundance of browse, effectively discriminate between taxa. Local habitat conditions, topographic and human-induced barriers, and geographic distance did not aid in discriminating among lineages. Our results suggest that selection associated with regional timing of events in the annual climatic cycle may help maintain genetic and phenotypic divergence in giraffe. We discuss potential mechanisms of maintaining divergence, and suggest that synchronization of reproduction with seasonal rainfall cycles that are geographically distinct may contribute to reproductive isolation. Coordination of weaning with green-up cycles could minimize the costs of lactation and predation on the young. Our findings are consistent with theory and empirical results demonstrating the efficacy of seasonal or phenologically dictated selection pressures in contributing to the reproductive isolation of parapatric populations.

Call for institutions keeping giraffe to help with a study about giraffe that have fallen or "gone down"

Two members of the "African Plains" team at Dublin Zoo are looking for further help with a study they are carrying out into the above. They are aware of a number of incidences where huge time and money have been spent in trying to get giraffe to stand with assistance often putting the lives of animal care staff in jeopardy.

A questionnaire has been circulated among EAZA institutions with the approval of the Stud Book keeper and they have had great response to it, although there are a small number yet to respond! The information from zoos and safari parks that have never had any incidence is also of great use as the authors intend to include data on habitat substrates in their final analysis, which should be of use to zoo planners.

At this stage they would like to extend the study worldwide so if you would like to view the aims of the study in full and make contact with the authors please contact Helen Clarke at helen.clarke@dublinzoo.ie