IUCN SSC Species Survival Commission
GOSG GIRAFFE & OKAPI SPECIALIST GROUP

Giraffid

Newsletter of the IUCN SSC Giraffe & Okapi Specialist Group

Note from the Co-Chairs

Giraffe humming… where did that come from? Growing up I was always told that elephant trumpet, lion roar and giraffe, well… they are silent! Far too many references still list giraffe as inaudible and mute, however, anyone who has spent time with these raucous (well let's not get carried away!) creatures will know that they definitely make noises. Most recently some colleagues in Germany published studies of humming giraffe, which became news the world over – always brilliant to see giraffe in the news for positive reasons! Personally I think this news is only the tip of the iceberg and with the various cough and roar noises they make in mind, I am sure it is only a matter of time that we see published evidence of giraffe communicating by infrasound – just like elephant and cetaceans. These guys are clever, far more than many give them credit for, and after many years of watching them in the wild I can only assume they are 'talking' at times.

Two other exciting internal giraffe events were held since the last Giraffid issue: the second-ever World Giraffe Day (WGD) – 21 June, and Giraffe Indaba III in South Africa. WGD 2015 focussed on not only creating awareness and education across the globe, which it did well, but also raising critical funds for 'Operation Twiga' – an initiative of GCF and Uganda Wildlife Authority to translocate endangered Rothschild's giraffe back into their former range within the country. This was an overwhelming success and shows that conservation of giraffe is important to you and others out there. Stay tuned for early 2016 to see the stories from this historic initiative.

Our recent third Giraffe Indaba, a meeting of the wild giraffe and okapi worlds, was held in South Africa in August and provided the opportunity for all involved to talk shop about these two species. This year saw a wide representation of okapi and giraffe folks, including people from the field, government, NGOs and academic institutions both in Africa and international, and the first ever full session on okapi research and conservation (see abstracts in this issue). It was a great week and was kicked off by a pre-IUCN SSC GOSG meeting to update on activities and planned next steps.

While the okapi remains the lesser-known species for this issue of Giraffid, a considerable amount of work has been going on behind the scenes including the finalisation of the first ever Okapi Conservation Strategy 2015-2025 – so watch this space! The GOSG website is now live – www.giraffidsg.org – so please take a look, and send us feedback, ideas and contributions, as it is still a work in progress.

As always, this issue of Giraffid brings you new and exciting news from across the African continent and the world. From DRC to Ethiopia, Uganda to Zambia, USA to France and Germany, this issue is packed, and that's before we start on the new questions arising around giraffe taxonomy… What more can one ask for to relax over the upcoming festive season – enjoy the read!

Noëlle Kümpel & Julian Fennessy
Co-Chairs IUCN SSC GOSG

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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.

IUCN SSC 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 at steph@giraffeconservation.org

ZSL LIVING CONSERVATION
GCF GIRAFFE CONSERVATION FOUNDATION

Giraffe Indaba III – Sticking our necks out for giraffe conservation in Africa

Steph Fennessy, Giraffe Conservation Foundation

The third Giraffe Indaba, a dedicated conference on the conservation and management of giraffe and okapi (their closest relatives) in the wild, was held at the Southern African Wildlife College in Hoedspruit, South Africa, in late August 2015.

The Giraffe Indaba was the third of its kind, oranised and hosted by the Giraffe Conservation Foundation (GCF) and the IUCN SSC Giraffe & Okapi Specialist Group (GOSG). After previous Indabas in Namibia (2011) and Kenya (2013), it once again brought together international giraffe and okapi experts involved in research, management and conservation from across the world to discuss, debate and plan for the future of these iconic species. Presentations and discussions took place under the overarching theme: Sticking our Necks out for Giraffe Conservation in Africa. As giraffids still do not feature prominently on the conservation hit list, it is about time to draw more attention to the continuous decrease in giraffe and okapi numbers and range across the continent.

Giraffe numbers have plummeted from a little more 140,000 in the late 1990s to approx. 80,000 today, whilst okapi numbers are thought to have halved in the same period. Sadly, giraffe have become extinct in at least seven African countries over the last century. These dramatic losses have gone largely unnoticed. The main threats to both species are habitat loss and fragmentation, and human population growth with associated impacts such as disease and illegal hunting/poaching.

Conservationists warn that immediate action must be taken to secure the future of both giraffe and okapi before it is too late. Already two giraffe subspecies as well as the okapi are listed as 'Endangered' on the IUCN Red List and a new review is likely to add a few more giraffe subspecies as well as the giraffe as a species to this precarious list.

Located within the official boundaries of Kruger National Park, the Southern African Wildlife College offered a prime location for discussing the many conservation and management issues facing giraffe and okapi across the African continent.

The Giraffe Indaba III programme contained scientific and conservation presentations and posters on a range of issues from across their range in Africa and the captive world, including giraffe and okapi ecology, population dynamics, taxonomy, social structure, foraging behaviour, conservation management and veterinary medicine (see form page 44 for Indaba presentation and poster abstracts). Additionally, it included a dedicated workshop session on giraffe conservation and management strategies in Africa with a hope to discuss how best to formulate a framework strategy for giraffe across Africa. As important, Giraffe Indaba III provided a setting for networking amongst fellow giraffid experts during the week. Keynote speakers included Dr Sam Ferreira, Large Mammal Ecologist at South African National Parks and Ms Theresa Sowry, CEO of Southern African Wildlife College. Delegates also had the opportunity to see South Africa's giraffe and other wildlife on game walks and drives in the greater Kruger National Park.

Prior to the Indaba, the IUCN SSC Giraffe & Okapi Specialist Group (GOSG) took the opportunity for a face-to-face meeting at the same venue. Key issues discussed were the current status and review of the IUCN Red List status for giraffe and okapi, current and future genetics and taxonomy of both species, and the development of a conservation framework strategy for giraffe in Africa. The IUCN SSC GOSG is currently conducting the first-ever detailed assessment of giraffe as a species as well as all its nine subspecies, and it is expected that by early to mid 2016 more may end up in one of the IUCN Red List threatened categories.

A special thank you goes to the Leiden Conservation Foundation for their invaluable financial support for Giraffe Indaba III.

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World Giraffe Day – 21 June 2015

Steph Fennessy, Giraffe Conservation Foundation

21 June 2015 marked the second ever World Giraffe Day (WGD) and it was met with and celebrated around the world with as much enthusiasm as last year's first special day for this amazing species. When the WGD concept was developed in late 2013, it was just an idea in an attempt to draw attention to the plight of giraffe in Africa. There were no high expectations and as a result we were just overwhelmed by how WGD developed its own legs, especially in the zoo community, but also with others around the world, and has since established itself as a firm annual fixture in many calendars around the world.

Earlier this year the new and improved WGD website was launched with a fresh look and feel: www.worldgiraffeday.org. It was developed by an anonymous giraffe enthusiast who just wanted to get involved to make sure that giraffe will still be around when his kids and grandkids grow up. Thanks again – you know who you are!

Thanks to US-artist Kevin Halfhill, GCF was also able to offer a whole new range of exciting WGD and GCF merchandise – if you happened to miss this, you should visit the website: http://wearehalfhill.com/store/animalia/giraffe/

While the first WGD focused on all giraffe in the wild, this year GCF launched a targeted campaign with Operation Twiga: a dedicated effort to save the endangered Rothschild's giraffe in Uganda. With less than 1,500 Rothschild's giraffe remaining in the wild and 95% of the natural population concentrated in one national park in Uganda, this subspecies has been listed as 'Endangered' on the IUCN Red List since 2010. This high-risk scenario is exacerbated by increasing mining pressure as oil has been discovered in the giraffe core area at exactly this location: Murchison Falls National Park.

GCF in collaboration with the Uganda Wildlife Authority (UWA) decided to dedicate WGD 2015 to raising support for the critical translocation of Rothschild's giraffe to increase their range and create satellite populations in new areas within Uganda to ensure their sustainable long-term survival.

This dedicated and very worthwhile fundraising effort was very successful and again championed by GCF's VIP Partner Leiden Conservation Foundation, who matched all WGD donation of a minimum of US$1,000 received in the USA dollar-for-dollar up to a total of US$25,000. Talk about truly sticking your neck out!

WGD 2015 was again celebrated by over 150 zoos, schools, NGOs, governments, institutions, conservation organizations and individuals around the world, who all hosted events as part of WGD. Ranging from talks to giraffe feeds, garage sales to pub nights, chocolate sales to coloring competitions, the amazing support and efforts from people across the world has given giraffe an international voice they did not have before WGD. WGD is well on its way to become an annual event at many zoos and organisations around the world and marks a milestone in giraffe conservation.

The feedback was just overwhelming and many people, particularly some giraffe keepers, went over and beyond their normal duty to ensure this special day for giraffe became a success – we cannot thank these amazing ambassadors for giraffe conservation in Africa enough – and also for supporting Operation Twiga.

GCF together with UWA are currently organizing the details of the implementation of Operation Twiga and all partners are set for the operation to go ahead in mid January 2016. Exciting times and we will certainly keep you posted!

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World Giraffe Day – A different perspective

Billy Dodson, Patron of the Giraffe Conservation Foundation, Savanna Images

"To see a giraffe in the cool highlands, with the purple-red African sun setting behind its tall, slim outline, is one of man's great visual experiences. Or to travel through the chill of an African dawn, and see the graceful outline of a herd of giraffe moving across the savanna, gives one a feeling of the world when it was new … " Bradley Smith, The Life of the Giraffe, 1972

Overview

June 21st 2015 has been designated the day on which the wildlife aficionados of this planet celebrate the giraffe, one of Africa's most beautiful denizens and iconic symbols. This acknowledgment is, in my estimation, long overdue. The giraffe is unheralded and generally taken for granted, but as Mr. Smith so elegantly observes in the above quote … it's difficult to imagine the impeccable, colorful and symbolic African landscape of our dreams without our elevated friends punctuating the view. But there is a hard reality that accompanies World Giraffe Day. And it is this: when an animal species is assigned its own day of special recognition, that's a compelling indicator that its future is, at best, uncertain and, at worst, in serious doubt. Owing to the efforts of the Giraffe Conservation Foundation, the species now has its own dedicated day in the sun.

The giraffe may be an unpretentious and unassuming creature, but it is every bit as representative of its troubled continent as its more glorified cohabitants. The giraffe may never garner the love and attention showered on elephants and big cats, but that doesn't mean they are less deserving. The elephants touch us with their extraordinary intelligence and deep devotion to family. The cats enthrall us with their strength and majesty. Giraffe are quiet, shy and, despite their towering stature, unobtrusive. They may be the world's tallest animals, but they maintain a low profile. And that's why most people don't realize that their numbers have declined at a rate that is commensurate with or greater than Africa's more celebrated species.

State of the Species

Giraffe have few natural enemies. Lions do hunt them from time to time and have a fairly high success rate in some parts of the continent. But reaching a giraffe's hindquarters is a hell of a stretch, and the very act of trying leaves the lion's underside vulnerable to powerful, potentially fatal, kicks. The decision to prey on a giraffe is not one to be taken lightly, and for that reason giraffe are not always the preferred target. Hyenas, ever the opportunists, have also been known to hunt them. They will certainly take down a young giraffe if circumstances are in their favor. But Africa's other predators tend to leave them in peace. So how is it, that despite the relative paucity of natural enemies, giraffe numbers have decreased by over 40% in the past fifteen years? This shocking reduction in population is directly attributable to the relentless encroachment of humans on their traditional ranges and, to a lesser extent, the mindless scourges of illegal hunting and poaching. Here's a demographic summation of the nine subspecies:

Angolan giraffe – Estimated at fewer than 15,000. Probably extinct in Angola, its range includes most of Namibia and central Botswana. Ongoing research is expected to (a) confirm the distribution, and (b) define the extent of the genetic differences between the Angolan and South African giraffe. Extralimital populations (those outside the natural range) have been translocated to South Africa and probably to Zimbabwe and Botswana as well.

Kordofan giraffe – Fewer than 2,000. The Kordofan giraffe's range encompasses some of Africa's most hostile areas: southern Chad, Central African Republic, northern

Cameroon, the northern Democratic Republic of the Congo and probably South Sudan.

Nubian giraffe – Fewer than 650. 200 or so likely remain in western Ethiopia, and possibly 450 or less in South Sudan.

South African (or Cape) giraffe – Fewer than 17,000. Their range includes the northern part of South Africa, southern Botswana and southern Zimbabwe. There is currently an initiative underway that would re-introduce this subspecies to Mozambique. Extralimital translocations have occurred in Angola, Senegal and Zambia.

West African giraffe – Population has risen from about 50 in the late 1990s to about 400 today. This giraffe is only found in a tiny corner of southern Niger, sharing its living space with villagers in an area where no other large animals exist. Fortunately, the government of Niger is now fully committed to the protection of this subspecies. The West African giraffe was classified as endangered and placed on the IUCN Red List in 2008.

Reticulated giraffe – Fewer than 4,700. This exquisitely patterned animal has been decimated in the past two decades, with its total population reduced by over 80%. Current range includes northeastern Kenya, southern Somalia and possibly southern Ethiopia.

Rothschild's giraffe – Fewer than 1,100 in the wild. Resident in northern Uganda and west central Kenya. The Rothschild's giraffe was declared endangered and placed on the IUCN Red List in 2010.

Thornicroft's giraffe – Fewer than 550. Resides exclusively in the South Luangwa Valley of Zambia and is geographically separated from any other giraffe by at least 400 kilometers. However, recent research appears to indicate that the subspecies is not as genetically distinct as previously assumed. Its taxonomy must be carefully reviewed to determine if it should be categorized with the Masai giraffe or if it remains 'split' on ecological grounds.

Masai (or Kilimanjaro) giraffe – Approximately 37,000, the healthiest population of any subspecies. Its range encompasses central and southern Kenya, Tanzania and parts of Rwanda (extralimital population).

The IUCN listing of giraffe as a species in their "least concern" category (despite the placement of two subspecies on the Red List) indicates an urgent need for reassessment. The precipitous 40% decline in giraffe populations should be disconcerting to anyone with an interest in conservation. At one time in the not so distant past, giraffe were resident in almost every part of sub-Saharan Africa and numbered more than a million animals. No more. They are now confined to isolated areas in just a few countries. Fortunately for the species, the much needed re-evaluation has been initiated and is well underway. The research and analysis is being conducted by the IUCN SSC Giraffe & Okapi Specialist Group with support and assistance from the GCF.

The Way Ahead

The first order of business is to acquire a more precise understanding of the health of the species. But even without additional study, the following two statements are irrefutable … (1) giraffe numbers are in deep decline, and (2) the primary reason for that decline is human pressure. The GCF is leading the way in defining the current state of affairs. Individual country profiles are in development for each nation with a giraffe population. These profiles incorporate historical data, existing research results, anecdotal information and every other scrap of data that might help complete the puzzle. Armed with this data, the GCF will be better equipped to support the sustainment of current giraffe populations and expand habitat to accommodate what will hopefully, eventually be a numerically healthy population. The GCF is also engaged in a number of conservation projects throughout giraffe range states; study subjects include demographics, conservation management, ecology, genetics/taxonomy, compatibility and co-existence with human populations, environmental education and much more. The intent is to expand the aggregate knowledge of the challenges to the species, and, using that knowledge as a foundation, develop and execute a comprehensive strategy for reversal of the current negative trends.

Why The Fight is Critical

There is a good deal of justified hand-wringing over the plight of elephants. I often see them referred to as "gentle giants". But anyone who has ever crossed paths with a musth bull or edged a little too close to a mother elephant with calf underfoot would of necessity concede that elephants are not gentle all the time. Likewise the lion. There are many retribution killings against the great cats because of their raids on livestock in areas where human settlement overlaps traditional wildlife territories. And under the right circumstances, they can and will destroy human life. But giraffe very rarely invade crops or attack livestock. They are notoriously peaceful … not only would they never threaten humans in an aggressive way, they are not in the business of threatening any living thing.

Despite isolated instances of success in the war to preserve these animals, the decline of the giraffe is proceeding steadily. As with the elephants and lions, this is yet another example of how the mighty continue to fall. The higher profile species have a powerful network of NGO marketing and social media support … and the efforts to save them are well documented and widely publicized. But it's rare to pick up a magazine or newspaper and read an article about human-giraffe conflict, or to see any hard statistics on the numbers of giraffe remaining in a given African reserve.

In the late 1990s ABC news correspondent Lynn Sherr wrote an exquisite little book called "Tall Blondes", a

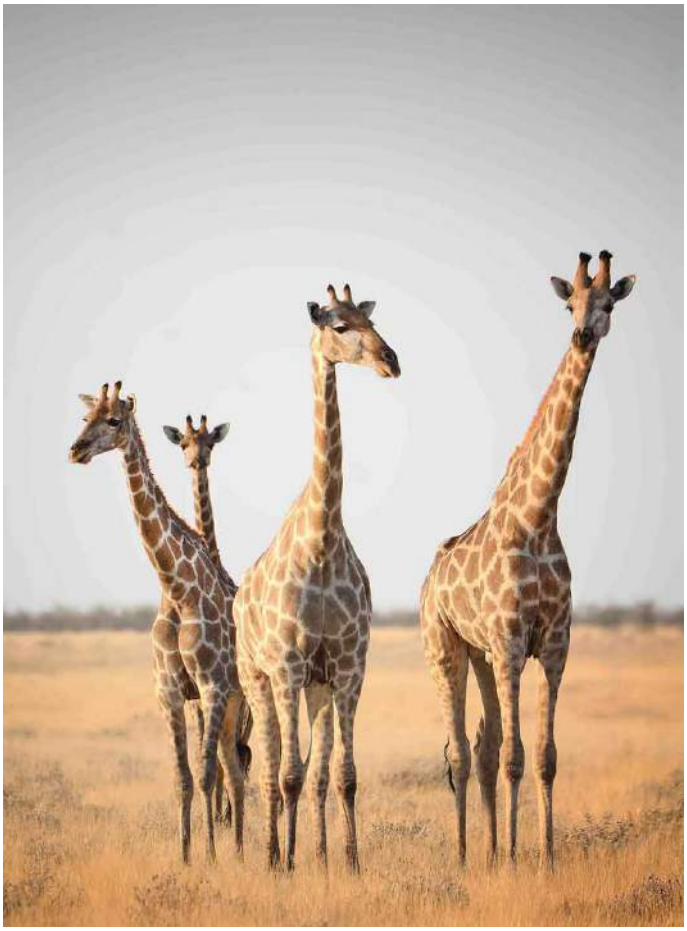
loving tribute to her favorite of all animals. In one passage, she notes that the giraffe's "ability to accommodate modern civilization may be explained by their innate curiosity and friendliness. Giraffe just seem to like people, and with their peaceful nature, seem perfectly willing to let us share their planet while they explore what we've done to it." Lynn's assessment is accurate, but the giraffe's tolerance of humanity may be its undoing. Direct, sustained contact with people works to the detriment of these animals 100% of the time. Giraffe may be willing to share their planet with us, but we've demonstrated no inclination to reciprocate.

In many respects, Africa represents the last vestige of wilderness on earth. While the wildlife of other continents has been destroyed or effectively imprisoned, pieces of Africa remain true bastions of nature – pristine, beautiful and primordial – as it was designed to be. Its sweeping landscapes comprehend the gamut, from deep rain forest to snow-capped peaks to arid desert. The breadth of Africa's animal species is compelling testimony to life's ability to adjust and thrive. But there is a limit to the ability of animals to adapt, and in this case, live peacefully in close proximity to humankind. And it is this conflict, more than any other, that has decimated all nine subspecies of giraffe over the past century.

Summary

I once read in a Stephen Jay Gould essay that 99.9% of all species that have ever lived are now extinct. In other words, the curtain will one day fall naturally on the giraffe, as it will for *homo sapiens* and every other form of life. The cycle must and will continue, as one species gives way to make room for another. But it is an anomaly, a crime against nature, for one species to bear complete responsibility for the unnecessary and unjustified eradication of another. This is particularly true in the case

of the giraffe, which, despite its surpassing grace and elegant beauty, is defenseless against our exploding numbers and burgeoning settlements. It's past time for the pendulum to swing the other way, and it's up to us, the animal lovers and conservationists of the world, to make that happen.



And here's the cool part. We can do it. The numbers as depicted above are discouraging, to be sure. But the movement to counter the losses is becoming a groundswell and its momentum has begun to mushroom. It is true that we have the collective power to destroy, but we also possess the intelligence and ingenuity to sustain these magnificent animals. At this point it is a simple matter of will. We must develop the determination and perseverance to ensure a viable future for the world's most statuesque animals. It is therefore incumbent on us all to act immediately to broadcast the conservation message and save giraffe from further habitat loss and eventual extinction.

So as we celebrate these spectacularly patterned, highly threatened emblems of Africa on this auspicious day, we should take some comfort in knowing that there are capable people in emerging organizations like the GCF who are committed to the protection of the species. And let us dedicate our own efforts to the preservation and propagation of giraffe, and resolve to take whatever actions are necessary – collectively and individually – to preserve this most beautiful and implausible of animal species.

"The sight of a herd of giraffe walking leisurely across an open piece of ground, or feeding through a country of scattered trees and bush, is one which, once seen, must ever linger in the memory; for there is something about the appearance of some few of the largest animals still extant upon the earth which stirs the imagination as the sight of smaller but more beautiful animals can never do."
Frederick Selous, 1908

Hear, Hear.

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Announcement

Chicago Zoological Society/Brookfield Zoo in concert with the Giraffe Resource Group will host a giraffe/okapi conference from **9 to 12 May 2016** in Chicago, Illinois, USA.

For more details, contact

GiraffeConference@czs.org

Giraffe taxonomy: where are we now?

Colin Groves, Australian National University

Until recently the taxonomy of giraffe, like that of all ruminants, was based on work published 100 years ago: that of Lydekker and Blaine (1914), who recognised two species, *Giraffa reticulata* (with two subspecies) and *Giraffa camelopardalis* (with 12 subspecies). In the mid-20th-century, Ellerman *et al.* (1953:173) reduced the two species to one: *G. reticulata* "appears to be nothing more than a form of the one and only species *G.camelopardalis*. We have seen a photograph of a herd on the Loroghi Plateau which contained both forms". During the latter half of the 20th century, although a number of authors discussed giraffe taxonomy, all accepted the single-species hypothesis. Most of these late 20th century commentators more or less accepted Lydekker & Blaine's arrangement into subspecies, although there was a general feeling that there were probably too many subspecies because there was a lot of variation.

The status quo was not challenged until 2007 when, almost simultaneously, two DNA papers reported consistent differences between some of the described "subspecies" (Brown *et al*., 2007; Hassanin *et al*., 2007); the former, in particular, urged that certain of the eastern and southern African "subspecies" be considered distinct species.

Utilising the new DNA data as well as their own studies of museum specimens and photographs from the wild, Groves & Grubb (2011) produced the first new taxonomic scheme for nearly a century, recognising eight species (with no subspecies):

1. Northern giraffe. Adult males have well-developed median frontal horns. The dark blotches on the body and neck are more or less entire, with at most very small emarginations, and the limbs below the knees and hocks are white or ochery fawn, with very little spotting. The four species of the northern group are:

Giraffa camelopardalis, from Northwest Kenya and eastern Uganda, formerly north through western Ethiopia and eastern Sudan to the latitude of Khartoum. The northern populations, known as Nubian giraffe, are probably extinct; the surviving populations are those known as Rothschild's giraffe.

Giraffa reticulata, from north-eastern Kenya and, formerly at least, south-eastern Ethiopia and southern Somalia. Known as the Reticulated giraffe.

Giraffa antiquorum, from Kordofan (if it still exists here) to western South Sudan, the northern Central African Republic, Chad, and Garamba National Park in the Democratic Republic of Congo. Known as the Kordofan giraffe.

Giraffa peralta, now apparently restricted to southern Niger and Waza National Park, Cameroon. Western giraffe.

2. Southern giraffe. The median frontal horn of the male is fully expressed or absent. The blotches tend to be stellate, and the limbs below the knees and hocks tend to be darker and often spotted. The four species of the southern group are:

Giraffa tippelskirchi, from southern Kenya and apparently all of the giraffe range in Tanzania. Known as the Maasai giraffe.

Giraffa thornicrofti, from the Luangwa Valley, eastern Zambia. Thornicroft's giraffe.

Giraffa giraffa, from parts of Namibia and Botswana, Zimbabwe, and northernmost South Africa. Southern giraffe.

Giraffa angolensis, from Angola, parts of Namibia and Botswana, and part of Zimbabwe. Angolan giraffe.

Why species, not subspecies? After some decades of discussion and dissatisfaction with the "not interbreeding" concept, a majority of professional taxonomists have come to accept that species are evolutionary lineages, and that the best way of recognising such lineages is that they are "diagnosably distinct", in other words, that they differ 100% from each other. Species are lasts objectively recognisable units of biodiversity. The subspecies, on the contrary, are a rather subjective concept: geographic segments of a species which differ as a whole, but not absolutely. The eight species of giraffe listed above differ absolutely from each other: they are evolutionary lineages. Brown *et al*. (2007) demonstrated that mitochondrial lineages correspond exactly to coat pattern,

with just a very few hybrids. Thomassen *et al.* (2013) showed that the three East African species are sharply differentiated according to rainfall regimes. Bock *et al.* (2014) found a curious interdigitation between the ranges of the Southern and Angolan giraffes in Namibia and Botswana.

There is certainly more to be discovered about the taxonomy of giraffe:

What are the giraffe of the Selous, in Tanzania? The mtDNA of Thornicroft's giraffe is distinct from that of the Maasai giraffe, but a sample from the Selous is equally distinct (Fennessy *et al*., 2013; Bock *et al*., 2014). We need more information about the Selous giraffe: photos from the wild, measurements of pickup skulls. Could there be a ninth species?

Does the White Nile form a barrier between the Nubian/Rothschild and the Kordofan giraffe? We *know* that the White Nile as fluctuated during the Late Pleistocene and even the Holocene – at times, it might even have dried up before its confluence with the Blue Nile. Today, all the known occurrences of the two species are separated by the Nile, but was this so in the recent past? Very few precise localities are known from the northern end of the range of the Nubian giraffe.

What is, or was, the boundary between the Kordofan and Western giraffe? The Shari/Logone system is a known barrier for some antelopes, such as hartebeest (*Alcelaphus major* west of it, *A.lelwel* east of it) – is it the same for giraffe?

The giraffe of the Garamba National Park, in the north-eastern Democratic Republic of Congo, were described as a separate taxon *congoensis*. Groves & Grubb (2011) could find no difference from *Giraffa antiquorum*, but we had not much evidence. What, really, is their status?

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Disappearing giraffes

Fred Bercovitch, Kyoto University

Sadly, it is not a magician's illusion, but a genuine plummeting in giraffe numbers across Africa. After a two-year effort spearheaded by the Giraffe Conservation Foundation, members of the International Union for the Conservation of Nature [IUCN] Giraffe and Okapi Specialist Group met in advance of the 3rd International Giraffe Indaba to assess the conservation status of giraffes and okapis. Both meetings were held at the Southern African Wildlife College, just outside Kruger National Park. Forty-five delegates attended the meetings, representing about a dozen countries.

The IUCN maintains a Red List that categorizes species according to a set of criteria that indicate the threat of extinction. Threatened species are labeled according their risk of extinction as Vulnerable, Endangered, or Critically Endangered. The okapi lives only in the dense, tropical forests of Central Africa and has recently been classified as "Endangered" by the IUCN. The closest living relative of the okapi is the giraffe, a species that lives outside the Congo Basin, in a variety of habitats ranging from desert to woodland/savanna. Although resident across Africa, giraffes live in mostly disconnected pockets that are home to specific subspecies. Nine subspecies of giraffes are currently recognized. While two subspecies of giraffes are considered to be "Vulnerable", the species *Giraffa camelopardalis* is classified as "Least Concern" by the IUCN. However, the current situation, as discussed at the recent meeting, questions this classification, because giraffes are threatened with extinction.

The number of giraffes has almost been cut in half within the last few decades. From an estimate of close to 150,000 individuals not too long ago, their numbers have plunged to just under 85,000 giraffes today. To put this drastic decrease into perspective, consider two other large African mammals: elephants and chimpanzees. About 100 elephants are killed every day, and elephants are classified as "Vulnerable" by the IUCN, but the African continent contains about six times as many elephants as giraffes. Chimpanzees are officially classified as "Endangered", thus more at threat of extinction than either elephants or giraffes, yet they are 2 ½ to 3 ½ times as numerous as giraffes. The subspecies that I have studied with Phil Berry in Africa, Thornicroft's giraffe, lives only in the Luangwa Valley, Zambia, and probably numbers fewer than 600 animals, or about 75% as many as the mountain gorilla, a species classified as "Endangered".

The crisis in numbers is a complicated and complex situation because of differences in population trends across Africa. For example, Kenya, Tanzania, and South Africa are home to about 70% of all giraffes, but numbers are decreasing in the first two countries, yet increasing in the latter country. Giraffe numbers have doubled in both South Africa and Namibia, two countries, which, ironically, allow for giraffe hunting, as well as ownership of giraffes on conservancies and private land. On the other hand, one of the giraffe subspecies frequently found in zoos around the world, the Masai giraffe, has diminished in numbers by close to 60% in its homelands in Kenya and Tanzania. Unlike elephants and rhinoceros, who face significant challenges from illegal hunting, giraffes are rarely the object of poaching. The primary threats to giraffes are the trio of habitat loss/fragmentation, resource extraction, and human population growth across Africa.

Giraffes are an iconic species popular in zoos and on African wildlife safaris, yet scientists are only now beginning to crack the secret code regulating giraffe ecology and behavior. Giraffes are browsers, so eat mostly from trees, but their diet is very diverse and includes a lot more than Acacia leaves. In Zambia, for example, they have been recorded feeding on nearly 100 different types of plants. However, as in other locations, over half their diet consists of a handful of species. The large number of plant species eaten ought to reduce their prospects for extinction, because they can subsist on a variety of plant types, but because of landscape changes, the areas available to giraffes are shrinking. Giraffe home ranges can be as small as 10 square kilometers, or 4 square miles, or in excess of 1,000 square kilometers. Giraffe home ranges overlap with each other, and depend upon the habitat, but average home range size is close to 130 square kilometers. Giraffes not only tend to have large home ranges, and a diverse diet, but their home ranges shift between wet and dry seasons, when they favor

different plants. Hence, mapping giraffe habitat for conservation purposes is an arduous task.

One of the most intriguing findings to have emerged from recent reports, as well as presentations at the 3rd Giraffe Indaba, is that giraffes live in a complex social system, called "fission/fusion", resembling the societies that elephants, dolphins, and chimpanzees live in. Giraffes do not simply wander their home ranges and bump into other giraffes at a preferred food resource. Instead, their society resembles a cocktail party: some individuals spend a lot of time with few others, some spend a little time with many others, some are withdrawn wallflowers; some congregate around a limited resource (such as the sangria bowl or water hole), and some are on the lookout for a mating partner. How giraffes recognize each other, maintain long-term friendships, decide when to join or leave a herd, and communicate with each other are active areas of current research. Assembling the information can help in devising conservation management plans, especially if habitats are shrinking and giraffes are relocated to new areas as a conservation measure.

One recurrent theme of both the IUCN GOSG meeting and the Indaba was that preservation and conservation of giraffes must incorporate a better understanding of landscape dynamics and ecosystems processes. Animals cannot be saved in the absence of also saving the areas where they live, but given that they move about over large areas, setting up permanent lines on a map might not be the best solution. Some conservation ideas, such as drilling boreholes and providing a permanent water source to help animals cope with dry season conditions, have backfired because the waterholes are magnets for multiple species which then tend to overgraze the vegetation and ruin the environment. A second theme was that promoting awareness and education of the plight of the giraffes is fundamental to saving the world's tallest animal. Such campaigns ought to target both the local communities and the international donors. However, unless the people living in the neighborhood of the giraffes realize a benefit from residing next to the giraffes, then the prospects for preservation are reduced. Not every place where giraffes live is prime for ecotourism, so alternative avenues of income are necessary. One of the more heated and contentious topics on the agenda was whether or not the controlled hunting of giraffes ought to be encouraged in some places as a conservation tactic. The concept that aesthetics should drive conservation sounds wonderful, but is most often a wealthy, Western approach that falls on tin ears and empty stomachs in Africa.

The disappearing giraffe was a depressing topic to discuss, but meeting participants expressed optimism about the future. A focused change in mindset, coupled with real action, rather than interminable and incessant discussion, appeared as a major ingredient in the recipe for saving giraffes. The Western viewpoint about gay people has largely shifted within one generation from consignment to psychiatric treatment to acceptance in marriage, sometimes with children. The hope is that the mindset of people can rapidly change in a similar fashion regarding the plight of the giraffes and that the potential classification of giraffes as "Vulnerable" will launch more concerted conservation efforts that prevent the species from erasure from the planet.

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Status of giraffe in Ethiopia – the case of Gambella National Park

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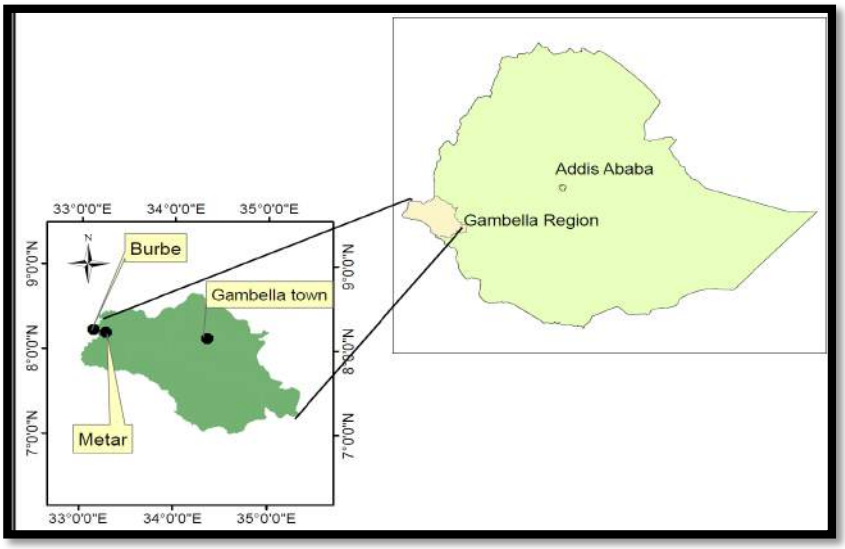
Introduction

Gambella National Park

The Gambella National Park (GNP) is located in the Gambella People's Regional State in Ethiopia. The Park can be accessed from Gambella town, which is located some 764km west of Addis Ababa, the Capital of Ethiopia. There are two dirt-roads leading to the Park. One of these roads is in the western direction. It extends for about 184km and terminates at a small village called Burbe, which is a located on the border with South Sudan. The border is demarcated by the Baro River with South Sudan only a few meters from Burbe across the river. The road bisects an outlying corridor of the Park inserted between two villages (Chot Kuach and Gnengniang). The other road extends southwards for about 140km ending right at the Park boundary at the Pugu base-camp. Ulaw and Ongogi are two villages at the end of this road. This road also bifurcates at Pachala village and extends to a village called Jor. From there, the Park can be accessed on foot within a few kilometers.

Gambella National Park has a total area of 5,061km^2 and is the second largest protected area in Ethiopia after Babile Elephant Sanctuary, which covers an area of 6,982km^2. April-October is the rainy season with annual average rainfall of 1,400 mm. The mean annual temperature is 27.6^{o}C. The vegetation is open deciduous woodland and savannah. The Park is drained by the Alwero and Gilo Rivers which eventually join the Baro and Akobo Rivers, respectively. Baro and Akobo Rivers merge as they leave the Ethiopian border into South Sudan and form the Sobat River.



A total of 41 mammalian and 154 bird species have been documented within the Park. The major mammals of the Park are: roan antelope, white-eared kob, Nile lechwe, topi and elephant. Roan and topi numbers were reported to have declined rather drastically over the past 20 years.

The Park seems to have insufficient capacity of protection and law enforcement. The actual protection scheme is based on locally recruited scouts under what is referred to as *Community Protection Strategy*. Currently, there are 25 scouts who have received training for two months before deployment. The first month training was on security and law enforcement and the second was on wildlife. The scouts are provided with communication radios and ranger uniforms. Four automatic rifles are available to reinforce park protection. Scouts patrol the Park regularly on foot. Vehicles are not deployed for patrolling and this makes the task arduous and unsatisfactory.

Violation of the Park protection laws and regulations (illegal hunting and/or cutting of trees) is detected mainly through reports from local inhabitants. If a person is caught in violation of the rules, s/he will be educated about the benefits of wildlife conservation for the local community and the country at large. S/He will also receive a warning to refrain from such illegal activity. If a person is caught violating Park laws repeatedly, s/he will be jailed.

Giraffe in Ethiopia

Two giraffe sub-species are reported to occur in Ethiopia. The Nubian giraffe (*Giraffa camelopardalis camelopardalis*) is confined to GNP unable to expand eastwards due to the Omo River barrier. Historically, the Nubian giraffe was believed to have ranged along the western lowland corridor adjacent to the Sudanese border. The second sub-species is reticulated giraffe (*G. c. reticulata*), which occurs east of the Omo River. It is believed to be distributed in the Mago and Omo National Parks, Tama Wildlife Reserve, Borena province and Ogaden district. The author conducted a reconnaissance survey

of giraffe in Mago National Park and Tama Wildlife Reserve at the beginning of 2013. Information obtained from the warden of Mago National Park and long-serving scouts suggested that giraffe have been completely exterminated from the Park for a long time already. Men of the local tribal community living close to the Park have a traditional practice of making necklaces from giraffe tail-hair which provides the major drive for hunting giraffe. It was also reported that local people consume giraffe meat opportunistically. It was, however, reported that a few giraffe still occur in the Tama Reserve. Unfortunately, considering the lack of proper protection schemes in the reserve, the fate of these remaining few individuals seemed gloomy. Thus, conservation interventions should be put in place by both government and non-government conservation agencies with immediate effect.

Efforts to understand the status of the giraffe populations in Borena and Ogaden have been minimal. As a result, these populations are the least known of all and future efforts should address this gap.

The Country Profile of giraffe prepared by GCF is the most comprehensive data compilation available to date. The following data is extracted from this source:

No	Number of individuals	Year of estimate	Possible subspecies	Locality	Original source
1	1000 - 2000	1971	Nubian and reticulated	National	Dagg and Foster, 1982
2	800 - 1600	1978	Reticulated	Omo-Mago-Tama complex	Stephenson and Mizumu, 1978
3	200	1994	Reticulated	Omo-Mago-Tama complex	Lamprey, 1994
4	160	1999	Nubian (Probably Reticulated?)	Omo National Park and Tama Reserve	East, 1999
5	140	1999	Reticulated	Borena and Ogaden	East, 1999
6	20	2006	Reticulated	Omo National Park	Renaud, 2006
7	90	2009	Nubian	GNP	L.Siege (Pers. Comm.)

The Ethiopian Wildlife Conservation Agency (EWCA) together with its international partners has conducted annual aerial surveys in GNP since 2009. However, the data have not yet been released to the public and shared with researchers.

Trip to Gamella National Park

The author conducted a field trip to GNP between 13-20 April 2015. The purpose of the trip was to collect data on the status of giraffe in the National Park pertinent to numbers and threat factors. According to preliminary information obtained from the Park manager, it was known that giraffe are restricted to the Akobo area of the Park close to the border with South Sudan. This area is not accessible by road, but can only be reached by foot from the village Mun, which is located approx. 165km west of Gambella town. Due to the distance and size of the area, it would be necessary to camp within the Akobo wilderness for several days in order to locate giraffe. The author was advised against entering the area as it was not considered safe due to its proximity to ongoing civil unrest in South Sudan. It was reported that South Sudanese rebels regularly cross the border and can be found in the area. In light of this information, it was decided to rather collect secondary data from the Akobo people who come to the small towns along the Gambella-Burbe dirt road for business purposes.

Trip to Burbe

The first trip was conducted to Burbe, which is a small settlement area on the bank of the Baro River overlooking South Sudan on the other bank. The place is governed by armed and uniformed local police commonly known as *Special Forces*. Two local scouts, Obang Oumed and Nyuon Tut, accompanied the author on the trip. The latter also took over the role of translator.

Burbe is a busy village with what appears to be a high unemployment rate. We found a group of men and attempted to interview them. Nyuon explained the purpose of our visit, however, every person seems rather suspicious and cautious, which was rather obvious from their body language. Despite our assurance that we were only interested in giraffe and had not secret mission, they grew increasingly agitated and we terminated the interviews. We looked for the local police for assistance. We met a group of 6 to 7 men armed with automatic rifles and

wearing uniforms. These were the Special Forces who are entrusted with enforcing law and order in the area. Nyuon explained once more why we were there and asked if they could assist in interviewing people from Akobo. Also they seemed disconcerted by our presence and told us that there was no one from Akobo in the area and advised that we should rather return to Metar. However, they were happy to pose for a group photo. On the way back to Metar, the author realized that the people at Burbe seemed to have suspected us of some kind of secret mission. Indeed, being settlers amidst ongoing conflict, the people might have some secrets that they want to protect from '*strangers'* like us. Otherwise, it was imaginable that some of them have been in Akobo and could have something to tell about giraffe.

Returning to Metar

After ourreturned to Metar Nyuon, who is also resident of the village, started to search for someone from Akobo. Eventually, he met Tut who had just arrived from Trigol, the administrative town of Akobo. Tut worked at the local tourism bureau in Trigol and told us that government employees have to travel from Trigol by boat on the Akobo River to Metar through Burbe to collect their monthly salary.

Tut was happy to share the following information on giraffe in Akobo with the author:

- He spotted three giraffe a few days ago. He identified two males and one female based on their size. He observed the giraffe while surveying their habitat as part of his work assignment on wildlife tourism.
- According to Tut, local people do not hunt giraffe anymore due to fear of prosecution – they could go to jail for that. However, in the past, people killed giraffe for meat.
- People crossing the border from South Sudan still kill giraffe.
- He believed that there were more than 100 giraffe remaining in the area – a healthy population.

We thanked Tut for his time and the valuable information and parted after paying him 20.00 birr as a token remuneration.

The following day, the Park Warden Bement told the author that he knows of people displaced from Akobo during the height of the conflict in South Sudan some 5-6 years ago. This people settled close to Metar at a place called Lomlock. We headed to Metar once again and searched for someone who could help us find these settlers. This time, the scouts did not accompany the author. However, the author met a very helpful person called Tude Rohd. Tude took us to the village and explained the purpose of our visit in detail. Except for few suspicious and cautious people, most agreed to answer a few questions. We promised that they would be remunerated with 20.00 birr each for their time. The author interviewed the volunteers individually. The following questions were posed to them:

- When was the last time you saw giraffe?
- How many individuals have you seen?
- Is there excessive hunting of giraffe by their natural predators?
- Is there excessive hunting of giraffe by local people?
- What is your and the local people's attitude towards giraffe?
- Do you support giraffe conservation?

The responses of the volunteers to all of the questions were consistent and they are summarized below:

- Most people had seen giraffe just before their displacement 5 or 6 years ago.
- The numbers reported differed from 6, 25, 50, 70 to several hundred.
- There was no hunting threat posed on giraffe either by their natural enemies or the local people. It was emphasized that local people never hunt giraffe.
- Local people have strongly positive attitude towards giraffe. Giraffe are loved and respected and no one wishes them any harm.

- There was a general strong support for giraffe conservation.

After analyzing the responses, the author was left with the impression that, even though the respondents could have been honest in their responses, they sounded rather innocent. The people were aware of the condemnation and criminalization of offenses against wildlife. Thus, it was considered possible that they might try to protect their reputation as a wildlife friendly and sympathetic community. Therefore, their responses, as positive and reassuring as they seemed, should be taken with caution until further verification.

Conclusion and recommendations

- It is not feasible to study and monitor giraffe on the ground at GNP at the moment due to security concerns. It is advisable to delay initiatives such as ground surveys until the security situation has improved significantly.
- The regular aerial surveys at GNP should be continued and results should be made available to conservation agencies and local researchers such as GCF and the author.
- Efforts should be made in increase the understanding of the status of giraffe in other parts of the country, such as Ogaden, Borena, Tama Wildlife Reserve, and Omo National Park.
- From the previous survey in 2013, the author realized that Tama Wildlife Reserve is the most feasible locality in Ethiopia to study giraffe on the ground. With the help of scouts and local people, there could be a good chance of finding giraffe in that area. This could also provide an opportunity to collect genetic samples to support the effort on the taxonomic revision of giraffe.
- Efforts should be made by concerned parties to prepare a National Giraffe Strategy which could serve as an important tool for the mobilization and implementation of much needed conservation efforts.

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Acknowledgements

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Kidepo Valley National Park giraffe conservation survey report

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Background

Giraffe (*Giraffa camelopardalis*) are one of Africa's most charismatic and ecologically and economically important megafauna. It was estimated that giraffe numbered >140,000 individuals throughout Africa in 1998; almost two decades later numbers are assumed to be ~80,000 individuals – an estimated decline of over 40% (GCF 2015). Even with the knowledge of this decline, giraffe as a species are currently listed as 'Least Concern' on the IUCN Red List (Fennessy & Brenneman, 2010). To put this classification into perspective, another important megafauna, the African elephant (*Loxodonta africana*) has previously been classified as 'Endangered' and now 'Vulnerable' by the IUCN, with a current population estimate of ~472,000 (CITES 2015), six times that of giraffe. Due to this and other similar discrepancies in species Red List classifications, an assessment of giraffe and all nine currently recognized subspecies is being undertaken by the Giraffe Conservation Foundation (GCF) in support of the IUCN SSC Giraffe & Okapi Specialist Group to ascertain their current conservation status and guide their future management.

Uganda's 'Endangered' Rothschild's giraffe, *Giraffa camelopardalis rothschildi*, is one of the nine extant giraffe subspecies (Dagg, 1971). With an estimated population of less than 1,500 individuals remaining in the wild and an estimated 1,250 and 25-50 in their native range (Murchison Falls National Park and Kidepo Valley National Park, respectively), it is also among the most threatened (Marais et al. 2013). Conservation research on the Rothschild's giraffe has been identified as a conservation priority by GCF and the IUCN SSC Giraffe & Okapi Specialist Group.

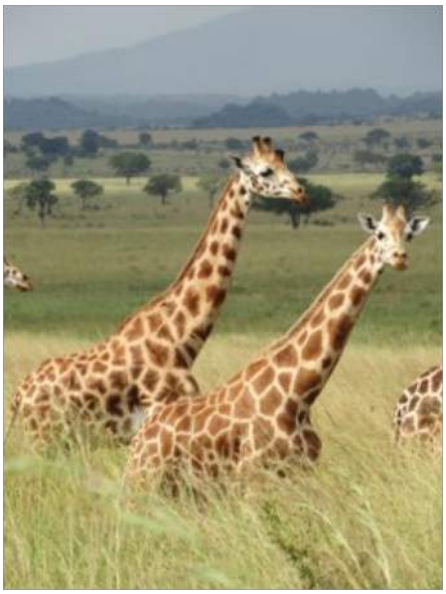
This project seeks to undertake the first comprehensive assessment of Rothschild's giraffe numbers in Uganda with a focus on the little known Kidepo Valley National Park. This survey provides an invaluable baseline to address current gaps in knowledge for the IUCN Red List Assessment of the currently listed 'Endangered' Rothschild's giraffe.

Project Area

In 1962, the same year as Uganda's Independence, 1,259 km^2 of Kidepo Valley National Park was initially gazetted with an additional 181 km^2 being added to the Park in 1967. Up until this period poaching was relatively small scale and localized with traditional weapons. From the late 1970s this scenario changed as Idi Amin's army was overthrown by the Tanzanian army and Obote forces, resulting in the local Karamajong people armed with firearms. This change led to increased violence in the region, including poaching and cattle raiding. In 1986 Museveni took over as President of Uganda, however this change in leadership had little impact on the region and since travel to the Park was limited by air, few people ventured. Interestingly, even the Lord's Resistance Army (LRA) largely avoided the region. Under-resourced Park staff could do little throughout this period to prevent the threats which included grazing in the Park and transhumance activities between Kenya, Uganda and (South) Sudan. Unfortunately, a number of wildlife species became locally extinct, including rhino, roan antelope and African wild dog, whilst giraffe numbers were reduced to an estimated three individuals.

In 2001 various voluntary and forced disarmament programmes were instituted to reduce the estimated 40,000 guns in the Karamajong region. However, this policy lead to a virtual state of war between the local people and the Ugandan army. By 2006 the last remnants of the LRA were forced out of northern Uganda which opened up the route into the region and for the first time in twenty years the Park was safely accessible to drive into (Uganda Wildlife Foundation 2014).

Located in north eastern Uganda, and bordering (South) Sudan and Kenya, Kidepo Valley National Park is comprised of the Narus River Valley in the south and west and the Kidepo River Valley in the north and east (Harrington & Ross 1974). The Park's rivers are seasonal, with the Narus River Valley being the only location of water sources during the dry season (Aleper & Moe 2006). Ranging in altitude from approximately 1,000 metres to 2,750 metres above sea level (Aleper & Moe 2006) an array of habitat is found within the Park, from arid plains and open treed savannas, to hills, rocky outcroppings, and mountain ranges. A high level of biodiversity is supported, with over 80 species of mammals found within the Park borders (Aleper & Moe 2006).



Estimated population abundance and trends of Rothschild's giraffe in Uganda

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 giraffe (Rwetsiba 2005).

It is important to note, 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 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 figure, Rwetsiba (2005) estimated Uganda's giraffe population to number 250 individuals during the same timeframe.

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 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 and 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). The 1996 survey was the last time giraffe were reported in the Reserve.

Kidepo Valley National Park formerly supported one of the country's largest protected Rothschild's giraffe populations (East 1999), with an estimated 400 giraffe in the late 1960s/early 1970s (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 (likely three) individuals remained (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 (Uganda Wildlife Foundation 2014; Rwetsiba & Wanyama 2005; East 1999; Lamprey & Michelmore 1996).

In the early 1970s, the Rothschild's giraffe population in the Murchison Falls Conservation Area (MFCA), consisting of Murchison Falls National Park and the adjacent wildlife reserves of Bugungu and Karuma, in the north-western parts of Uganda, was estimated at 150-200 individuals (Rwetsiba *et al.* 2012; NEMA 2009; Rwetsiba 2006). Several aerial sample counts of wildlife in the MFCA were conducted in the 1990s. The population decreased to an estimated 78 giraffe in 1991 (Olivier 1991). Sommerlatte and Williamson (1995) estimated the population at 100 individuals, while Lamprey and Michelmore (1996) estimated the population at 153 individuals.

Recent

In 2002, nine Rothschild's giraffe were estimated to remain in the Kidepo Valley Conservation Area (KVCA; Rwetsiba & Wanyama 2005). In 2005, the first aerial total count of wildlife in the KVCA counted 14 Rothschild's giraffe, all of which occurred in the southern parts of Kidepo Valley National Park *(*Rwetsiba & Wanyama 2005). Muller (2011) estimated Kidepo Valley National Park's Rothschild's giraffe population to number less than 20 individuals.

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 MFCA 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 MFCA 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.

In 2012, aerial sample counts of wildlife in the MFCA estimated the Rothschild's giraffe population at 757 individuals, all of which reside north of the Nile River in Murchison Falls National Park (Rwetsiba *et al.* 2012). Rwetsiba *et al.* 2012 further reported that the giraffe population in Murchison Falls National Park seems to be steadily increasing. Recent photographic surveys of giraffe in Murchison Falls National Park corroborate these recent population trends and suggest that the current Rothschild's giraffe population may exceed 1,200 individuals (M. Brown, pers. comm.). Additionally, in July 2015, the Uganda Wildlife Authority (UWA) translocated fifteen individual giraffe from Murchison Falls National Park to Lake Mburo National Park in southwest Uganda (Fig. 1) effectively creating a separate population.

In summary, 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 etimated 259 giraffe by 2006 (Rwetsiba 2006). In 2013, Rothschild's giraffe numbers for Uganda were estimated at less than 780 individuals, of which approximately 757 occur in Murchison Falls National Park and approximately 65 in Kidepo Valley National Park. An aerial survey of Kidepo Valley National Park in 2014 identified 20 giraffe within the Park (Wanyama *et al.,* 2014), but to date, no photographic survey had been undertaken.

Objectives

1. To establish an accurate estimate of current Rothschild's giraffe population size, distribution and threats in Kidepo Valley National Park
2. To provide valuable data for the Uganda country-wide status report of Rothschild's giraffe

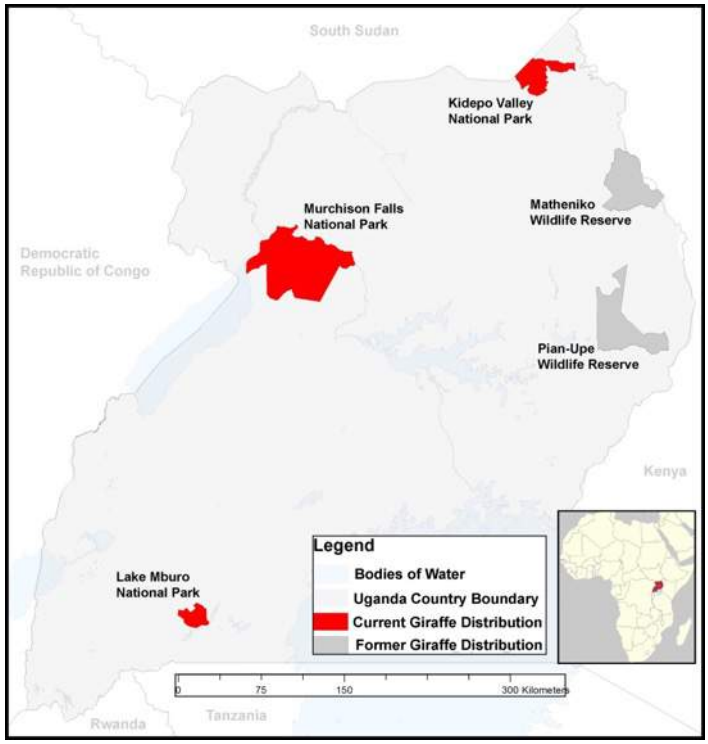


Figure 1: A map of current and historic distribution of *G. c. rothschildi* in Uganda

Project Methodology

The primary data collection method during the survey consisted of driven fixed routes and incidental

photographic surveys, seeking to obtain a total count of giraffe over the survey period. Owing to the fact that each individual giraffe has a unique pelage pattern, photographs of sited giraffe were compared to ensure that repeated sightings of an animal did not result in increased population estimates. Surveys were conducted from 20-23 July, 2015, from approximately 8:30am to 6:30pm each day. Three routes were identified across Kidepo Valley National Park and driven by one of three vehicles during each survey day: (1) North - north of Apoka, (2) South - south of Apoka, and (3) East - the eastern loop (see Fig. 2). Additionally, a survey route to the south of the National Park and into communal land was undertaken to better assess potential areas where giraffe may seasonally move and discuss with communities the frequency of giraffe sightings. Each survey vehicle had a driver, a researcher familiar with the survey equipment and data collection method, an UWA ranger, and two or three additional spotters. The UWA rangers proved invaluable in guiding us to great vantage points within the Park along the various routes and were often the first ones to spot groups of giraffe out in the distance. Their knowledge of the Park allowed us to track the giraffe so that we could get close enough to photograph them.

When encountered, as a minimum the right side of each giraffe was photographed, and the location, age class (Calf: 0-1 year; Subadult: 1-5 years; Adult: 5+ years), sex, group composition, injuries and any visible signs of disease were noted. Additionally, a range finder was utilized to determine distance to the giraffe, which in time will be combined with the recorded focal length to determine various dimensions of giraffe features. These dimensions will better inform the age class categorization. Using pattern recognition software (Wild ID - http://dartmouth.edu/faculty-directory/douglas-thomas-bolger), a database of unique, individual giraffe in the Park was created. As part of long-term monitoring, the capture history records of individual giraffe were generated from repeated photographic surveys which will enable the monitoring of both individual space-use and population distribution over time.

Survey Results

During the survey period, 31 giraffe sightings were recorded. Based on analysis of the photographs, these 31 sightings encompassed 25 unique individuals: eight adult males, ten adult females, five juvenile males, and two juvenile females. One of the adult males and two of the juvenile males were spotted three different times on the survey routes. None of the giraffe seen showed any sign of snare wounds or giraffe skin disease.

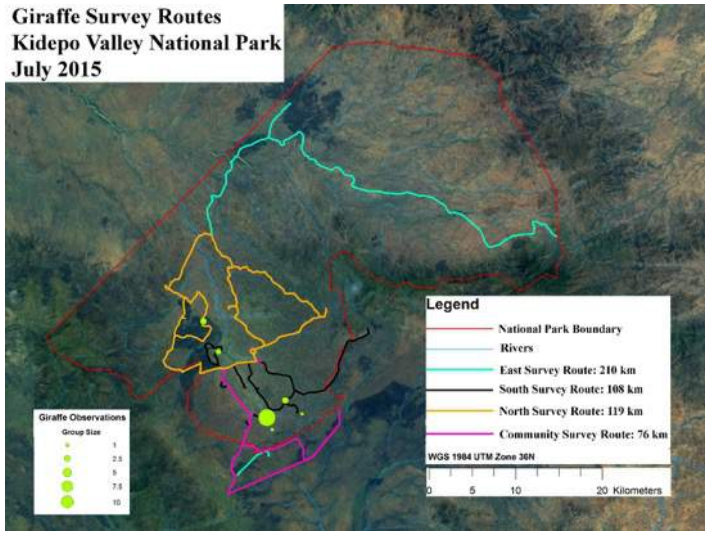


Figure 2: Map of giraffe sightings in Kidepo Valley National Park, July 2015.

The South (108km) and North (119km) Routes were driven four times, the East Route (210km) three times and the Community (76km) once for a total of 1,614km driven during the survey timeframe. 26 giraffe sightings occurred on the South Route and five on the North Route (Fig. 2). No giraffe were seen along the East Route or Community Route.

All of the data collected during these surveys will be added to the Uganda giraffe Country Profile to help inform future conservation measures. The obtained information will also be incorporated into the IUCN Red List assessment of the Rothschild's giraffe by the IUCN SSC Giraffe & Okapi Specialist Group, supported by GCF, which is currently under review.

Additionally, GCF is in the process of developing a 'citizen science' project to monitor the Kidepo Valley giraffe population. Posters and brochures will be created and provided to UWA rangers, tour guides, lodge operators, etc. so that anyone venturing into the Park can identify the giraffe they see, note their location, and submit the information to GCF and UWA to provide additional data to determine true population size and dynamics and inform conservation strategies.

Conservation Outcomes

Kidepo Valley National Park is home to the second largest wild Rothschild's giraffe population in the world, and as such, conservation strategies for this unique subspecies hinge on a detailed understanding of their population dynamics. An evaluation of their numbers and current threats to the population is proposed in collaboration with UWA and UWEC and supported by Dartmouth College, USA. These findings are a critical baseline to help with any conservation efforts for Rothschild's giraffe in the future.

Importantly, conservation translocation has been identified as a key tool to further secure Rothschild's giraffe numbers and range in Uganda. This potential strategy will be of direct relevance for the development of a national giraffe conservation strategy in the future. A detailed understanding of the population structure in Murchison Falls National Park as a potential source population to supplement genetic diversity within the small Kidepo Valley National Park is an essential component of safely removing individuals and using them to propagate viable populations in other areas of Uganda. Additionally, the current studies in Murchison Falls National Park and knowledge of group structure, preferred associations and social dynamics, coupled with detailed understanding of giraffe skin disease issues, may be able to provide a social consideration for selecting individuals for translocations in the future.

With the first-ever photographic estimate of the Kidepo Valley National Park giraffe population, a better understanding of giraffe by all stakeholders can help to further develop their long-term conservation and management. From this preliminary survey, information can be fed into the proposed development of a national strategy in Uganda (none currently exists) from which future targeted efforts can be highlighted and planned appropriately in the broader interest of giraffe conservation, and particularly of the endangered Rothschild's giraffe.

What are the next steps – planned for March/April 2016

This survey report to UWA highlights the results and recommendations for next stages of giraffe conservation and management in Kidepo Valley National Park. As a priority, the following has been highlighted to follow up by GCF in collaboration and with support of partners:

- Sampling of tissue for DNA inbreeding depression analysis – collection of samples from giraffe, sending to lab partner at Senckenberg in Germany, to assess levels of genetic diversity
- Outfitting a sample set of population with GPS satellite collars to assess movements and to help with monitoring and conservation management of giraffe
- Ongoing census and survey using citizen science tool – includes training of UWA staff and others interested (e.g. tour operators)
- Updating baseline information in the Uganda Country Profile for use in the development of the first ever National Giraffe Conservation Strategy planned to start mid-2016

In the future, monitoring the course of any potential translocation is an essential activity and an integral part of translocation design, not an add-on. The effort invested in developing realistic goals and objectives is the starting point for a monitoring programme; its design should reflect the phases of translocated population development and answer at least the following:

- What evidence will measure progress towards meeting translocation objectives and, ultimately, success or failure?
- What data should be collected, where and when, to provide this evidence, and what methods and protocols should be used?
- Who will collect the data, analyse it and ensure safekeeping?
- Who will be responsible for disseminating monitoring information to relevant parties?

All of this information will be developed as part of the next phase of the project planning and assessment process.

Permits

All necessary permits have been approved by the UWA and Uganda Council of Science and Technology. Additionally, a signed MoU between GCF, UWA and Uganda Wildlife Education Centre exists, which guides all giraffe conservation support in the country.

Project Partners

The project is part of a larger collaboration underpinned by a Memorandum of Understanding (MoU) between the GCF and the UWA and UWEC. Additionally, technical support from Dartmouth College, USA was invaluable as they created the free giraffe identification software 'Wild

ID' and designed the survey sampling. All fieldwork was undertaken collaboratively with partners from Dartmouth College, Leiden Conservation Foundation, Chester Zoo, Santa Barbara Zoo and Cheyenne Mountain Zoo.

We would like to give a special thanks to the following for the their valuable financial and/or technical support for this work: Auckland Zoo; Blank Park Zoo; Care for Karamoja; Chester Zoo; Cheyenne Mountain Zoo; Cleveland Metroparks Zoo; Cleveland Zoological Society; Columbus Zoo and Aquarium; Leiden Conservation Foundation, UWA and UWEC. The support is invaluable!

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Identification individuelle des Girafes du Parc National de la Garamba

Aimé Balimbaki Liama, Parc Garamba & Jeff Mapilanga, ICCN

Introduction

Depuis longtemps, la girafe du Parc National de la Garamba est connue comme une sous espèce unique de la République Démocratique du Congo (*Giraffa camelopardalis congoensis*)(De Saeger, 1958).

Cependant, en plus de 15 ans,sa population a régressé de près de 88 %, partant de 178 en 1995, pourbaisser à 82 en 2007 (Amube N.J., Antonínová M., Hillman-Smith K., 2009), ensuite chuter catastrophiquement à 22 en 2012 (Casado, 2012).

Cette allure de décroissance nécessite des mesures de conservation urgentes et efficaces pour éviter le sort du Rhinocéros blanc, considéré comme éteint du Parc National de la Garamba (Verschuren, 2012).

Ainsi, l'identification individuelle s'est avéré être un moyen pouvant servir à établir les bases sur lesquelles unestratégie devra être appliquée afin inverser cette tendance alarmante actuelle.

Cette identification vise l'établissement d'une carte d'identité individuelle du noyau restant de girafes par photo identification.

Méthodologie

L'approche méthodologique a consisté à des patrouilles motorisées et pédestres répétées sur des pistes (routes) couvrant une partie des zones de prédilection renseignées dans la littérature et les rapports de patrouilles précédentes. Il s'agit du secteur Sud du parc comprenant les sous-secteurs (blocs1, 3, 5, 6, 7, 8 et 9 du parc).

Pour ce faire, 1 appareil photo NIKON Coolpix L330, 1 GPS Garmin etrex 20, 1 télescope Opticron ES 80 GA ED v3, Range Finder BUSHNELL,1 paire de jumelles VORTEX 10 x 42, et 1 véhicule LAND CRUISER et une fiche conçue pour la collecte des données ont été utilisés.

Ainsi, chaque girafe observée a fait l'objet de géoréférencement et de prises de photos sur base desquelles, outre les informations contenues dans la fiche de collecte, les individus de girafes ont été caractérisés et identifiés par une équipe de 7 identificateurs (agents de terrain). Cette identification a ciblé particulièrement le sexe, l'âge de l'animal et la taille du troupeau auquel il appartient, la forme deses ossicônes, la longueur de poils caudaux et les signes particuliers de l'animal.

Chaque girafe identifiée a enfin été nommée ou codifiée suivant le préfixe GIR suivi du numéro attribué à l'animal et de l'initial de son sexe.

Toutes les girafes juvéniles n'ont pas été prises en compte.

Résultats

L'application de l'approche méthodologie ci-avant a conduit à l'obtention des résultats ci-après :

Missions réalisées

La carte ci-dessous présente les traces des missions (patrouilles) organisées en vue de l'identification des girafes.

Figure N° 1 : Carte des traces de patrouilles réalisées

Variables enregistrées et nombre de girafes identifiées par sous-secteurs

Le tableau ci-dessous présente les résultats de quelques variables enregistrées ainsi que le nombre de girafes identifiées par blocs du secteur sud du parc.

Le tableau ci-dessus indique que 13 girafes mâles et 19 girafes femelles soit 32 girafes au total ont été identifiées dans 4 blocs sur les 7 blocs parcourus au cours des missions réalisées dans le secteur sud du parc. Il s'agit des blocs 1, 3, 5, 6, 7, 8 et 9. Par contre 44 rencontres de girafes ont été faites au cours de 27 sur les 47 missions effectuées au total.

Distribution des girafes identifiées

La carte suivante positionne les différentes girafes identifiées dans quatre blocs du secteur sud du parc.

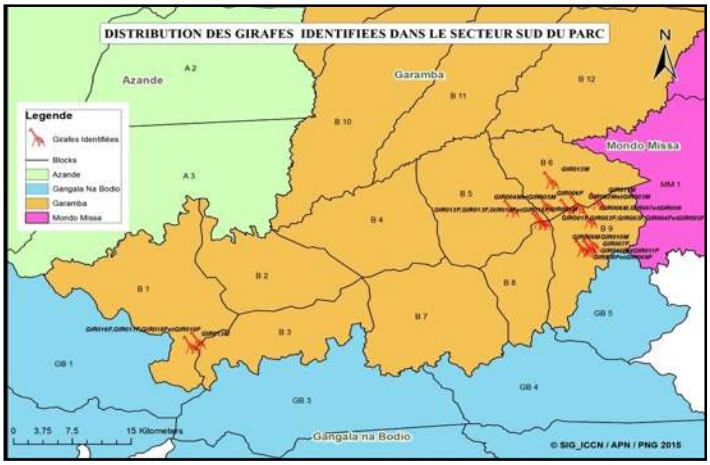

Figure N° 2 : Girafes identifiées et leur distribution dans le secteur sud du parc

Dénombrement de girafes identifiées par troupeau

La carte ci-dessous montre les girafes identifiées dans leurs troupeaux respectifs.

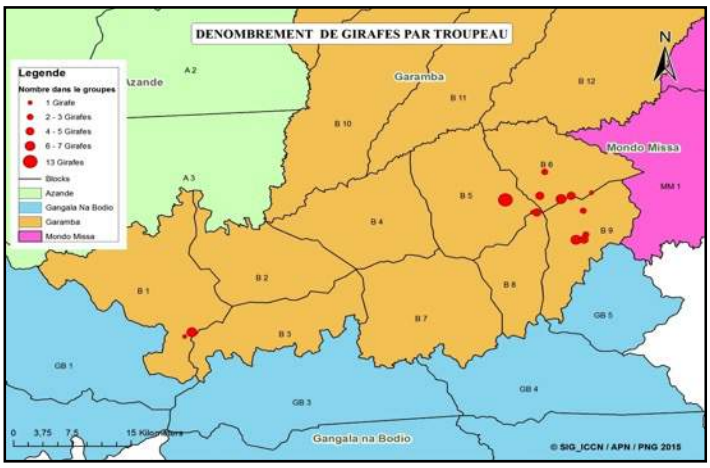

Figure N° 3 : Dénombrement de girafes par troupeau

Tableau N°1 : Variables enregistrées et nombre de girafes identifiées par bloc

Sous-secteurs du secteur Sud du Parc	Nombre de missions	Nombre de missions avec rencontre d'animal	Nombre total de rencontres d'animal	Total des individus rencontrés	Mâle adulte	Femelle adulte	Mâle sub adulte	Femelle sub adulte	Mâle juvénile	Femelle Juvenile	Indeterminé		Girafe mâle identifiée	Girafe femelle identifiée	**Total girafe identifiée**
Sous-secteur Bloc 1	11	7	12	31	4	16	2	0	1	6	2		1	4	**5**
Sous-secteur Bloc 3	2	0	0	0	0	0	0	0	0	0	0		0	0	**0**
Sous-secteur Bloc 5	7	5	4	19	7	5	0	0	0	0	7		3	4	**7**
Sous-secteur Bloc 6	16	10	21	71	14	38	2	5	0	1	11		4	6	**10**
Sous-secteur Bloc 7	2	0	0	0	0	0	0	0	0	0	0		0	0	**0**
Sous-secteur Bloc 8	2	0	0	0	0	0	0	0	0	0	0		0	0	**0**
Sous-secteur Bloc 9	7	5	7	28	9	8	0	2	0	2	7		5	5	**10**
Total	**47**	**27**	**44**	**149**	**34**	**67**	**4**	**7**	**1**	**9**	**27**		**13**	**19**	**32**

Discussion

Les résultats obtenus au cours de la première phase des missions d'identification des girafes a dénombré 32 girafes identifiées dont 13 mâles et 19 femelles. Il s'en dégage un sex ration tendant vers 1:2,4 (soit 1 mâle contre 2,4 femelles), alorsqu'il se situait à 1 :1,6. Si cette tendance se confirme lors des prochaines phases, l'on peut affirmer que l'hypothèse de consanguinité est totalement écartée et que le noyau restant de girafe est vraiment viable.

Outre les individus de girafe isolés et les petits troupeaux de 2 et 3 individus de girafe, ceux de 4, 6, 7 et 13 individus ont été observés dans les blocs 5, 6 et 9. Par ailleurs, les observations des patrouilles de la Lutte antibraconnage du 3 avril 2015 ont renseigné 16 individus de girafes vus dans le bloc 9. Aussi en février 2014, 19 individus de girafes ont été observés dans le même bloc. Ceci porte à croire qu'il y aurait un grand groupe de girafe qui sillonne le secteur précité et qui se scinde de temps à temps à des petits groupes qui se reconstituent lors des rendez-vous spécifiques.

Considérant la zone (blocs) des missions réalisées au cours de la phase I qui s'est soldée par 32 girafes identifiées sans compter les juvéniles et les individus qu'on n'a pas pu déterminer le sexe, intégrant les observations des patrouilles de la LAB faite au premier semestre 2015, on peut s'assurer que le nombre de girafes présent dans le complexe Parc National de la Garamba s'évaluerait à plus45individus.

Conclusion est recommandations

Cette première phase de l'identification des girafes est intervenue au premier semestre 2015. Elle pose la fondation sur laquelle les cartes d'identité des girafes à la Garamba seront actualisées et/ou reconfirmée lors des prochaines saisons. Le taux de rencontre ou la fréquence d'observation des girafes identifiées ainsi que d'autres paramètres statistiques n'ont pas été pris de rigueur dans ce rapport suite à des problèmes logistiques qui n'ont pas permis d'assurer la régularité pendant la collecte des données. L'essentiel a été d'atteindre l'objectif principal fixé qui a été d'identifier les girafes composant le dernier noyau restant au Parc National de la Garamba.

Ainsi, nous formulons les recommandations suivantes pour les prochaines saisons d'identification:

1. Doter l'équipe d'identification d'un appareil photo bien otillé*(Type :Hybride Sony A7 + Objectif 28-70 mm f/3.5-5.6. Capteur CMOS Exmor™ Plein Format de 35,8 x 23,9mm de 24 Mpx. Processeur nouvelle génération BionZ X. Viseur OLED 2M pixels. 9 touches personnalisables*) afin d'obtenir des photos qui soient qualitativement à même de renseigner suffisamment sur les signes particuliers de l'animal notamment sur pelage.

2. Rendre disponible une équipe de sept(7) gardes avec moyen de mobilité pendant le premier semestre de l'année 2015 (saison favorable) afin d'assurer la régularité et l'extension des missions d'identification des girafes lors de la deuxième phase.

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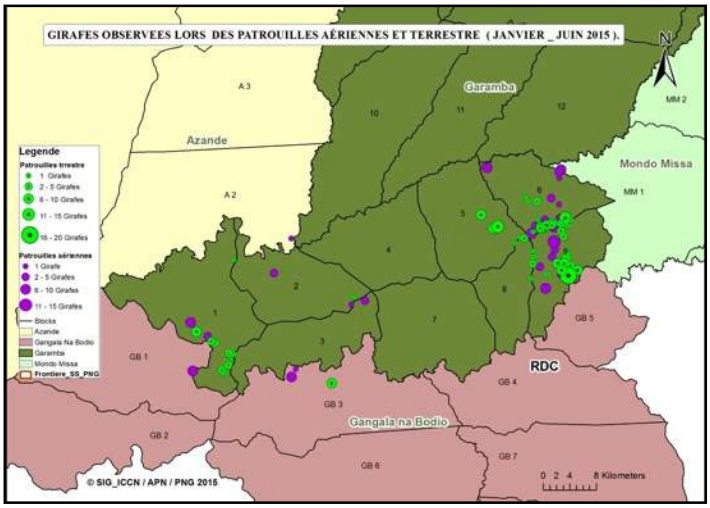

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Giraffe Conservation Status Report – Country Profile: Republic of Zambia

Rachel du Raan, Andri Marais, Stephanie Fennessy, Julian Fennessy, Giraffe Conservation Foundation & Fred Bercovitch, Kyoto University

Sub-region: Southern Africa

General statistics

Size of country: 752,614 km²

Size of protected areas / percentage protected area coverage: 30%

(Sub)species

Thornicroft's giraffe *(Giraffa camelopardalis thornicrofti)*

Angolan giraffe *(Giraffa camelopardalis angolensis)* – possible

South African giraffe *(Giraffa camelopardalis giraffa)* – possible

Conservation Status

IUCN Red List (IUCN 2012):

Giraffa camelopardalis (as a species) – least concern

G. c. thornicrofti – not assessed

G. c. angolensis – not assessed

G. c. giraffa – not assessed

In the Republic of Zambia:

The Zambia Wildlife Authority (ZAWA) is mandated under the Zambia Wildlife Act No. 12 of 1998 to manage and conserve Zambia's wildlife and under this same act, the hunting of giraffe in Zambia is illegal (ZAWA 2015).

Zambia has the second largest proportion of land under protected status in Southern Africa with approximately 225,000 km^2 designated as protected areas. This equates to approximately 30% of the total land cover and of this, approximately 8% as National Parks (NPs) and 22% as Game Management Areas (GMA). The remaining protected land consists of bird sanctuaries, game ranches, forest and botanical reserves, and national heritage sites (Mwanza 2006).

The Kavango Zambezi Transfrontier Conservation Area (KAZA TFCA), is potentially the world's largest conservation area, spanning five southern African countries; Angola, Botswana, Namibia, Zambia and Zimbabwe, centred around the Caprivi-Chobe-Victoria Falls area (KAZA 2015). Parks within Zambia that fall under

KAZA are: Liuwa Plain, Kafue, Mosi-oa-Tunya and Sioma Ngwezi (Peace Parks Foundation 2013).

The goal of the KAZA TFCA is "To sustainably manage the Kavango Zambezi Ecosystem, its heritage and cultural resources based on best conservation and tourism models for the socio-economic wellbeing of the communities and other stakeholders in and around the eco-region through harmonization of policies, strategies and practices." (KAZA 2015).

While the sustainable use of wildlife and its habitats is promoted in national parks through eco-tourism, both settlements and hunting are strictly prohibited (Mwanza 2006).

GMAs in Zambia were established by government to control the hunting of game and protected animals through a licensing and monitoring system. There are 34 GMAs in Zambia which cover a total of 165,700 km^2. Because other forms of land use, such as settlements and agriculture are allowed, GMAs are not strictly protected areas (Mwanza 2006).

The number of Zambian game ranches established by the private sector increased from 30 in 1997 to 177 (~6,000 km^2) in 2012 (Lindsey *et al*. 2013), and support both consumptive and non-consumptive uses of wildlife (Mwanza 2006). Because of the substantial economic benefits derived from game ranching, a number of commercial farmers have opted for game ranching instead of traditional livestock. As a result, game ranching has made a valuable contribution to biodiversity conservation in Zambia, especially of rare and endangered animal species (Mwanza 2006). Despite this high number of game ranches, the industry is performing poorly, due to rampant commercial bushmeat poaching, failure of government to allocate outright ownership of wildlife to landowners, bureaucratic hurdles, perceived historical lack of support from the Zambia Wildlife Authority and government, a lack of a clear policy on wildlife ranching, and a ban on hunting on unfenced lands including game ranches (Lindsey *et al*. 2013).

In February 2015 IUCN Eastern and Southern African Regional Office (ESARO) began implementing a study to assess the potential for consumptive and non-consumptive use of wildlife in Zambia. The study is expected to result in various outputs including a national assessment of Wildlife Based Land Uses and Game Ranching in Zambia, assessing the restoration and replenishment of wildlife of degraded ecosystems of Lower and Upper East Lunga and Luswishi hunting blocks with private sector involvement (IUCN 2015).

Issues/threats

Thornicroft's giraffe

Thornicroft's giraffe (*G. c. thornicrofti* - occasionally also known as Rhodesian giraffe) survives as an entirely isolated population in a small area of north-eastern Zambia (Fennessy *et al.* 2013; Fennessy 2008a). Occurring only in the South Luangwa Valley, the restricted distribution of Thornicroft's giraffe coincides with a limited population size (Stutzman & Flesch 2010). Their geographic isolation is most commonly attributed to the Rift Valley Escarpment which prevents genetic flow with other giraffe in neighbouring areas (Stutzman & Flesch 2010).

The confinement of the entire world's population of Thornicroft's giraffe to the Luangwa Valley renders them susceptible to a genetic bottleneck and other problems inherent in small populations that make them vulnerable to extinction (Bercovitch *et al.* 2014; Stutzman & Flesch 2010). Natural catastrophes or environmental changes can have strong negative impacts on small populations, as can habitat loss and fragmentation, as well as diseases (Bercovitch *et al.* 2014; Stutzman & Flesch 2010). Increasing human population growth in the area could also pose threats to the Thornicroft's giraffe (Bercovitch *et al.* 2014; Simukonda 2012). For example, if the Luangwa River and its tributaries are diverted for agricultural use, then the Thornicroft's giraffe only habitat would be compromised (Bercovitch *et al.* 2014).

The Luangwa Valley GMAs are in a spiral of degradation economically, sociologically and ecologically, and the natural habitats available to support wildlife in GMAs are shrinking due to increased settlements, cultivation, traditional land claims and un-coordinated planning by government departments (Simasiku *et al.* 2008). The Thornicroft's giraffe have lived in protected habitats since 1938 (Bercovitch *et al.* 2014), but most of the GMAs in the Luangwa Valley lack enforceable land use plans to the extent that settlements are largely uncoordinated and not in tandem with wildlife management (Simukonda 2012). Over the past decade, law enforcement has generally failed to control the harmful impact of anthropological threats and very little funding goes to resource protection

(Simasiku *et al.* 2008). Diseases, such as anthrax and rinderpest, have had a history of devastating wildlife populations in South Luangwa National Park. In 1987, an anthrax outbreak swept the Luangwa Valley, killing over 4,000 hippopotami (Siamudaala 2003). Although the exact cause of the anthrax epidemic is unknown, low rainfall, high temperatures and poor drainage probably contributed to the outbreak (Siamudaala 2003). Hippopotamus had an estimated 7% mortality rate during the 1987 anthrax outbreak, and a number of Thorncroft's giraffe also succumbed at the time (Siamudaala 2003). Anthrax can remain dormant underground for long periods of time and is therefore a continuing threat to wildlife as it can re-emerge if conditions that foster the spread of the disease becomes favourable. Global warming could increase the prospects of drought and fire in the Luangwa Valley, which would endanger not only the Thronicroft's giraffe, but also other fauna, as well as flora. Lion hunting is legal, with a permit, in the GMAs adjacent to South Luangwa NP and as a result movement of these lions into the park to avoid hunters is likely. Lion predation can reduce the giraffe population size (Bercovitch *et al.* 2014; M. Becker pers. comm.).

Although only a single confirmed case of direct illegal hunting of giraffe has been recorded within the last few years, snaring, albeit probably aimed at other animal species, does pose a threat to giraffe (Bercovitch *et al.* 2014; M. Becker pers. comm.). Recently, up to five giraffe snaring incidents per year have been reported (R. McRobb pers. comm.). Snaring and illegal hunting are therefore potential threats to Thornicroft's giraffe, but none of these human activities appears to be a major threat at present (Bercovitch *et al.* 2014).

The continued expansion of mining operations in Zambia could pose a potential threat to the Thornicroft's giraffe. Mineral extraction and resource exploitation could hinder the free-flow of the Luangwa River and, although South Luangwa NP is not directly affected by the mining industry, the Luangwa River runs through the park (Bercovitch *et al.* 2014). Should the river become a key water source for mining, or polluted by mining extracts, the wildlife within the Park will most likely suffer (Bercovitch *et al.* 2014). Zambia has the world's second largest reserves of copper, with China being the biggest foreign mining operation extracting not only copper but also coal, nickel, uranium and gemstones (Okeowo 2013).

Angolan/South African giraffe

Sioma Ngwezi National Park in south-west Zambia has a population of giraffe that is taxonomically unknown: they are either Angolan (*G. c. angolensis*) or South African (*G. c. giraffa*) giraffe (J. Fennessy pers. comm.). Once an area teeming with wildlife, these were decimated during the conflicts which have characterised the history of the region (Peace Parks Foundation 2013). The 25-year long Angolan Civil War and illegal hunting devastated wildlife populations in neighbouring Sioma Ngwezi NP (Chase & Griffin 2009; APF 2003; East 1999). The Park's proximity to the Luiana Partial Reserve across the border in south-east Angola, the base of military operations for UNITA, exposed the wildlife of the park to extensive illegal hunting (Chase & Griffin 2009). Refugees also depended heavily on bush meat to survive and illegal hunting is difficult to control in these areas (WCS 2014; Chase & Griffin 2009).

Sioma Ngwezi National Park is highly susceptible to bush fires during the late dry season when neighbouring farmers burn their fields, thereby affecting the distribution and abundance of wildlife outside and inside the park (Chase & Griffin 2009). While previously the economic potential within the park was restricted due to limited to no tourism infrastructure (Chase & Griffin 2009), plans are currently in place to develop the Park under the support of the KAZA Transfrontier Conservation Area initiative (Peace Parks Foundation, 2013).

According to a 2003 report by the African Parks Network (APN, formerly African Parks Foundation), the destruction of wildlife in Sioma Ngwezi National Park was far greater than originally realised and translocation of animals from elsewhere in Zambia was not possible due to the limited supplies of game together with long distances and poor roads (APF 2003). Additionally, the settlements of thousands of people along the Cuando River have cut off this vital water source from the Park interior (APF 2003). African Parks Network initially provided support but withdrew from Sioma Ngwezi in 2003 to commit their resources to other parks in Zambia which have greater prospects for recovery and sustainability (APF 2003). Wedged between the Luiana Partial Reserve in Angola and the Bwabwata National Park in Namibia, the area plays an essential ecological role for wildlife movement along the Kwando and Zambezi Rivers despite it not extending all the way to the Zambezi River. The park and the

surrounding area within the West Zambezi GMA have been earmarked for intensive wildlife recovery. Numerous wildlife species with distribution ranges limited to the area west of the Zambezi formerly occurred in the park and the wildlife recovery will include the restocking of these species – including giraffe (Peace Parks Foundation 2013; ZAWA per. comm.).

As part of their grant to KAZA TFCA, the German Kreditanstalt für Wiederaufbau (KfW) allocated €3.3 million to Sioma Ngwezi NP. Initial efforts were concentrated on field patrols, the mitigation of human-wildlife conflict, participation in the Community Centred Conservation and Development (CCCD) programme, compilation of work plans and finalisation of the Ngonye Falls development plan (Peace Parks Foundation 2013).

Biodiversity in Zambia in general is increasingly coming under pressure from both human and natural factors, including resource conflicts, settlement encroachment, climate change, pollution, and overexploitation of resources, deforestation, introduction of alien species into the ecosystem, and a lack of environmental education (Mwanza 2006). Giraffe are easily killed and poaching is an ongoing problem, not only for trinkets (fly whisks etc.) but more so now for the hide and meat (ZAWA 2015).

Estimate population abundance and trends

Although some authorities have suggested that the subspecies *G. c. thornicrofti* should be elevated into their own species, *G. thornicrofti* (Groves & Grubb 2011), current information regarding their mitochondrial DNA profile indicates that the Thornicroft's giraffe is genetically similar to the Masai giraffe, *G. c. tippelskirchi*, despite it being geographically and ecologically unique (Fennessy *et al.* 2013). Fennessy *et al.* (2013) have thus suggested that the subspecies *G. c. thornicrofti* could be subsumed into *G. c. tippelskirchi* with further research being required before any final taxonomic status is proposed. Additionally, current analysis of giraffe tissue samples from Mosi-oa-Tunya and Sioma Ngwezi National Parks is being undertaken by the Giraffe Conservation Foundation in collaboration with ZAWA and Bik-F Loewe, Frankfurt, Germany. The results of this analysis are still pending (J. Fennessy pers. comm.).

Historic

At the end of the 19th century, giraffe in Zambia were limited to two isolated regions: one in Barotseland, and the other in the Luangwa Valley (ZLS 1965). Previously it was thought doubtful whether giraffe historically existed in any other parts of the country (ZLS 1965; Ansell 1952), however, evidence indicates that giraffe were present in Kafue NP from a letter sent by Mr J Loewen to Mr P. de. V. Moss in 1974, who reported seeing three giraffe within the park. More investigation is required in order to confirm the historical presence of giraffe within the Kafue NP and neighbouring areas.

Thornicroft's giraffe

The stronghold of Thornicroft's giraffe appears to have always been on the east bank of the Luangwa River in the Petauke District, and in the narrow corridor between the Luangwa River and the Mwembezi Hills (Fennessy 2008a).

In the early 1900s, Thornicroft's giraffe were speculatively estimated to number only 30-70 individuals, mostly ranging on the east bank of the Luangwa River in small herds, but these counts came from the impressions of the early British administrators (Berry 1973). By the 1920s an estimate of over 500 giraffe appeared, but is probably inaccurate (Berry 1973). Their range increase north of the Mwembezi Hills is a relatively recent occurrence with giraffe not inhabiting the area before the 1930s (Fennessy 2008a). Pitman (1934) believed that there were about 300 or 400 individuals in the area, an increase on the probable seventy specimens previously recorded (ZLS 1965). In 1958, the population was estimated to number 300 individuals (Fennessy 2008a).

In the 1960s, Thornicroft's giraffe were reported to range primarily along the eastern side of the Luangwa River (Berry 1978; ZLS 1965; Dagg 1962; Darling 1960), but some individuals did cross the river to the western banks (Berry 1973; ZLS 1965; Dagg 1962; Darling 1960). The majority occurred in the Petauke area, although others ranged eastwards into the Fort Jameson District (ZSL 1965). According to Fennessy (2008a), giraffe became well established as far upstream as the Lupande confluence during the 1950s and 1960s at which time the population was estimated to number about 200-250 giraffe (Dagg 1962; Darling 1960). Their limited range restricted their numbers, but they were seldom, if at all, hunted (ZSL 1965).

In 1964, giraffe were reported in the Nsefu Game Reserve, coming either from below the Lupande confluence or the west bank of the Luangwa River (Fennessy 2008a). In 1965, giraffe were observed on the Rukuzye River, north of the Nsefu Game Reserve as well as on the east bank at

the Chibembe pontoon (Fennessy 2008a). Giraffe were further reported at the Katete stream between the Lukusuzi and Rukuzye Rivers in 1967 (Fennessy 2008a). This was the farthest north the subspecies had been recorded on the east bank. In 1967, giraffe were reported near Zokwe on the Luangwa River and near Kalamulilo Hot Springs (Fennessy 2008a). In 1968, the species were observed north of the Mangwalala Safari Camp on the east bank of the Luangwa River; near the Chifuna Villages; and near the confluence of the Kanyu Stream with the Luangwa River (Fennessy 2008a). In 1968, giraffe were recorded at Minuwa Lagoon near the Kanyu/Luangwa Rivers confluence and on the east bank of the Luangwa River opposite the Luwi River (Fennessy 2008a).

By the end of the 1960s, more accurate records of Thornicroft's giraffe population size were obtained. Their range expanded in both northerly and southerly directions (Berry 1973), and by the end of the 1960s, the maximum population size was approximately 300 individuals (Berry 1973; Dagg and Foster 1982). According to Fennessy (2008a), the Thornicroft's giraffe population was estimated to number 300 individuals in 1974 and 270-300 in 1980.

Thornicroft's giraffe was estimated to number 450 in the early 1980s (East 1999). East (1999) reported the bulk of the population to occur in South Luangwa National Park and the Lupande GMA. In 1994, aerial samples counts of South Luangwa National Park estimated the Thornicroft's giraffe population at 275 individuals, while ground surveys of the Lupande GMA estimated a giraffe population of 780 individuals (East 1999). A total of 90 giraffe were further estimated to occur in other GMAs in the Luangwa Valley, while 16 giraffe reportedly occurred on private game ranches (East 1999). The subspecies was only found as vagrant in North Luangwa National Park (East 1999).

A total of 350 individuals were estimated to occur in South Luangwa National Park and the Lupande GMA in 1996; 398 in 1998; and 202 in 1999 (Fennessy 2008a).

Angolan/South African giraffe

The giraffe population in Barotseland (western Zambezi) roamed the western parts of the region, between the Zambezi and Mashi Rivers in the 1960s (Dagg 1962). Referred to as Barotse giraffe (*G. c. infumata*[1]), at the time, these animals occurred on the Siluana Plain and on the borders of the Mashi River in west Barotseland (ZSL 1965). In 1952, the Carp Expedition estimated that there were between 150 and 200 individuals in the region (ZSL 1965). In 1965, the estimated number of giraffe in Barotseland remained the same at 150-200 individuals (ZSL 1965).

According to East (1999) only a small number of these giraffe (clumped in with the 'Southern giraffe' at the time) survived in south-western Zambia by the late 1990s, all inhabiting Sioma Ngwezi National Park.

Recent

Thornicroft's giraffe

An aerial census of South Luangwa National Park and the Lupanda GMA was undertaken in 2002 in order to establish the status of elephant and other large herbivores resident in the area (Dunham & Simwanza 2002). An estimate of 236 Thornicroft's giraffe were recorded for the area, of which 187 occurred in South Luanga National Park and 48 in the Lupande GMA (Dunham & Simwanza 2002).

An aerial survey of selected large wild herbivores in the Luangwa Valley hunting blocks was conducted in 2004 (Simwanza 2004). Giraffe were observed in only one hunting block, namely Nyampala hunting block, and the population was estimated at 41 individuals (Simwanza 2004).

In 2006, 191 giraffe were estimated to occur in South Luangwa National Park and Lupande GMA (Fennessy 2008a). The total estimate of Thornicroft's giraffe in 2008 was 700-880 individuals (Fennessy 2008a). Giraffe observations continue to be reported further north on the eastern bank of the Luangwa River up to Zokwe (Fennessy 2008a). While these are most likely vagrants, it appears that the population continues to dispere north, whilst its strong hold is in the south. This is most likely attributed to human population growth and pressures (Fennessy 2008a).

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[1] *G. c. infumata* is now considered to be a synonym of *G. c. angolensis* (Dagg 1971). Although East (1999) referred to *G. c. giraffe, G. c. angolensis, G. c. infumata, G. c. capensis and G. c. wardi (the latter two synonymous with G. c. giraffe,* Fennessy 2008b*)* collectively as southern giraffe, the subspecies occurring in Sioma Ngwesi National Park are considered to be either Angolan giraffe (*G.c. angolensis*) or South African giraffe (*G. c. giraffe*) as referred to above.

In 2009, giraffe were opportunistically photographed when encountered in the Luangwa Valley (Halloran *et al.* 2014). Individuals were identified using Wild-ID software for photographic capture/recapture analysis, resulting in an estimate of 423 giraffe (Halloran *et al.* 2014).

An aerial survey of the Luangwa Valley Ecosystem in 2011 estimated the giraffe population at 407 individuals (Simukonda 2012). Giraffe were sighted in four areas: South Luangwa National Park, and the Munyamadzi, Lupande and Sandwe GMAs (Simukonda 2012). An estimate of 168 giraffe was recorded in Lupande, 83 in South Luangwa National Park, 57 in Munyamadzi and 82 in Sandwe. The highest population of giraffe was observed in the Lupande GMA though most of these were observed close to South Luangwa National Park (Simukonda 2012).

In 2012, 423 giraffe were estimated in the Luangwa Valley (M. Becker pers. comm.).

Angolan/South African giraffe

In 2004 and 2005, aerial surveys of Sioma Ngwezi National Park estimated 211 giraffe in the area (Chase & Griffin 2009).

In 2008, an aerial survey of Mosi-oa-Tunya National Park, Kazungula and the Sioma Complex (which comprises Sioma Ngwezi National Park and West Zambezi GMA) was conducted. During this survey, 161 giraffe were estimated in the Lower West Zambezi and 420 in Sioma Ngwezi National Park, while 11 giraffe were observed in Mosi-oa-Tunya National Park, giving a total of 581 giraffe for the region (Simukonda 2009). Uncertainty remains with regards to the origin of the giraffe population in Mosi-oa-Tunya although what seems certain is they are an introduced population (M. Nyirenda pers. comm., F. Willems pers. comm.). Anecdotal sources from ZAWA suggest that they could have come from Sioma Ngwesi National Park, while others indicate they may be from north-eastern Zimbabwe (M. Nyirenda pers. comm.). Current genetic analysis will help to unravel this mystery.

Current

Thornicroft's giraffe

In 2013, two systematic surveys of giraffe were undertaken in the South Luangwa National Park (Bercovitch *et al.* 2014). The first survey estimated the density of giraffe at between 0.38/km and 0.53/km, with an average of 0.44/km (Bercovitch *et al.* 2014). The second survey, using a slightly different method for counting subjects along a road, estimated the density of Thornicroft's giraffe to be 0.49 giraffe/km (Bercovitch *et al.* 2014). Giraffe were encountered during both surveys in discrete areas rather than sighted all along the survey area (Bercovitch *et al.* 2014). Given a giraffe density of approximately 0.44/km along the Luangwa River, according to the first survey, and an approximate length of 250km for the Luangwa River between the confluence with the Chibembe River and the confluence with the Msanzara River, then an estimated 110 Thornicroft's giraffe reside in their core area along the roads near the Luangwa River (Bercovitch *et al.* 2014). Given that giraffe rarely range outside of the alluvial zone within 3km of a river (Berry 1978), these figures produce an estimated maximum of 660 Thornicroft's giraffe living in the Luangwa River Valley (Bercovitch *et al.* 2014). Following the same assumptions as for the first survey, according to the second survey, an estimated maximum of 735 giraffe live in the Luangwa River Valley (Bercovitch *et al.* 2014).

The independent methods for estimating the current Thornicroft's giraffe population size are in general agreement. The lowest estimate was 121 individuals and the highest estimate was 735 individuals. The current population seems to be stable and the average value across all of the studies suggests a population size of approximately 556 individuals in the Luangwa Valley (Bercovitch *et al.* 2014).

Angolan/South African giraffe

All of the giraffe on game farms in Zambia are descended from two consignments of animals imported in the late 1980s and 1990s from the Lowveld of Zimbabwe (I. Parsons pers. comm.). In addition there is a population of giraffe in Livingstone Park, however, Parsons believes the individuals found here are possibly inbreeding.

An aerial survey of elephant and other wildlife in Sioma Ngwezi National Park was conducted in 2013 (Chase *et al.* 2013). A total of 232 giraffe were estimated: 44 in Sioma Ngwezi National Park West and 188 in Sioma Ngwezi National Park East (Chase *et al.* 2013).

The Kasanka Trust, working across the southern Bangweulu basin, Chambeshi in the upper Congo system including Kasanka National Park, Lavushi Manda National Park, and the Bangweulu wetlands, report no giraffe occurring in the region (F. Willems pers. comm.).

In summary, the Thornicroft's giraffe population in the Luangwa Valley appears to be stable and genetically viable, with a population estimate of 556 individuals. An estimated population of <260 giraffe, either Angolan (*G. c. angolensis*) or South African (*G. c. giraffa*) giraffe, resides in south western Zambia, <240 in Sioma Ngwesi National Park, thirteen in Mosi-oa-Tunya National Park and four on the property of Zambezi Sun (J. Katampi pers. comm.).

Game Farm/Ranch	Giraffe Numbers (Extra-limital)	From/Comment	Source
Lilay Game Ranch	7	Originally from Zimbabwe in the 1980's	I. Miller pers. comm.
Kafue Lodge, Mpongwe	10	Thought to be from Chamanuka Lodge, Lusaka in 2003	T. Blackenberg pers. comm.
Kwisoko Game Ranch	3	Chamanuka Lodge, Lusaka in 2011	M. Mwanakatwe, pers. comm.
Gamamwe Ranches	6	Translocated in 2008 however their origin is uncertain.	N. Kirkpatrick pers. comm.
Lwimba Ranch	1	Kabwe	C. Clubb pers. comm.
Khal Amaz Game Farm	15	Chamanuka Lodge, Lusaka in 2005	S. Barnes pers. comm.

Table 1: Extra-limital giraffe data for game farms/ranches within Zambia. Survey on going.

Extra-limital introductions of giraffe (*G. c. giraffa*) onto commercial game farms have occurred across the central regions of Zambia. There are some game farmers / private reserves that keep them, but only in very small numbers. Typically 1-5 animals, thus "ornamental" rather than commercial (F Willem pers. comm.).

Data obtained from ZAWA game ranch returns and questionnaire surveys estimate giraffe numbers within the Protected Area Network at 757 individuals, while numbers on game ranches were estimated at 757 individuals (29.8%) (Lindsey *et al.* 2013). However, the survey for these extralimital giraffe populations within Zambia is ongoing.

Future Conservation Management

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

- Development of National Giraffe Strategy for Zambia;
- Identification of priority conservation efforts for giraffe conservation; and
- Support to dedicated giraffe conservation, translocation, habitat protection, education and awareness initiatives (government, NGO and academic).

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Training zoo giraffe for hoof care has medical, behavioral & conservation benefits

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Zoos need healthy exhibit animals to drive attendance and to create opportunities for conservation messaging. For giraffe in human care, chronic lameness is one of the most common health problems, often resulting in animals being off exhibit or under medical care. An estimated 80% of giraffe immobilizations are done to address hoof overgrowth; giraffe anesthesia has a 10% mortality rate. When chronic lameness cannot be effectively managed, zoo giraffe are sometimes euthanized due to quality-of-life concerns. Therefore, lameness interferes with zoo giraffe being effective animal ambassadors for their zoos.

Cheyenne Mountain Zoo's giraffe care team developed an operant training program for giraffe hoof care. In less than two years, all 18 giraffe in their herd were trained for voluntary front foot radiographs and front foot hoof trims. All giraffe were trained in a restricted-contact set-up.

Medical benefits to hoof- work training include identifying underlying causes of lameness and giving appropriate treatments. Previously, hoof trims were only possible during anesthetic procedures or with giraffe trapped in restraint chutes. Now, farrier hoof trims can be done with the Zoo's trained giraffe every 6 to 12 weeks, which allows overgrowth to be trimmed back as soon as it develops. With improved foot health and closer monitoring, multiple giraffe have had their chronic lameness improved or resolved.

Hoof work training has also had behavioral health benefits for the herd. This includes increased resilience in new situations and an increased desire to interact with the keepers. They also appear to be more alert and engaged with their environment.

With improved physical and behavioral health, giraffe at Cheyenne Mountain Zoo can live longer, healthier lives and be more effective animal ambassadors for the Zoo and for giraffe conservation messaging. Memorable guest interactions with giraffe create a local community of people with a passion for this species. This impacts wild giraffe through fundraising opportunities, such as CMZ's Quarters for Conservation program. Additionally, educational opportunities to learn about the population

decline for wild giraffe occur daily, with signs and keeper messaging. Special events such as World Giraffe Day are also taking place. Long-term, this could help increase ecotourism to Africa, private or corporate sponsorship for giraffe conservation programs, or impact voting for broader issues that affect wild giraffe.

Cheyenne Mountain Zoo hosts just under 700,000 guests annually and maintains a herd of 17-20 giraffe. The World Association of Zoos and Aquariums estimates that globally, about 700,000,000 people visit zoos each year (10% of the world's population). As of 2015, there were an estimated 2,212 giraffe in human care worldwide (pers. communication, Laurie Lackey). If we can improve zoo giraffe health with trained foot care, there is a tremendous opportunity for zoos around the world to increase funding, education and conservation action for wild giraffe.

Thanks to:
CMZoo vet staff; Bob Chastain, CMZ President & CEO; Tracy Thessing, CMZ Director of Animal Collections; Dr. Susan Friedman, Utah State University; Steve Martin, Natural Encounters Inc.; Steve Foxworth, Equine Lameness Prevention Organization farrier. All of these dedicated individuals contributed to the care of our giraffe herd.

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What does a giraffe sound like? Solving the puzzle of giraffe communication

BMC Series Blog

Whether giraffes can communicate vocally is a controversial topic. New research published in *BMC Research Notes*, finds the best evidence yet that they do – by humming. (http://www.biomedcentral.com/1756-0500/8/425)

The sound of the giraffe

"A lion roars, a dog barks, an elephant trumpets, but what does a giraffe sound like?". So goes the opening sentence of the new research paper by Angela Stoeger and colleagues from the University of Vienna. While this might sound like a line from a children's book, it sums up our knowledge of vocal communication in giraffes: no one knows if such a thing exists.

Undoubtedly, giraffes are far less vocal than many other related mammals. To the casual human observer giraffes, whether in a zoo or in the wild, appear to be silent. Indeed there have been suggestions that the giraffe's iconic long neck makes vocalisation physically impossible, due to the difficulty of sustaining the required air flow from lungs to mouth over such a distance.

Others however have suggested that, while clearly rare, giraffes do communicate vocally. They have been anecdotally described to "bleat", "brrr", "burst", "cough", "growl", "grunt", "low" "moan", "moo", "sneeze", "snore" and/or "snort".

Moreover, recent research has found that, contrary to the traditional view of giraffe herds as loose collections of non-bonded individuals, giraffes have a very structured social system based upon strong social bonds. Other species with this kind of social system (such as elephants and buffalo) are strong vocal communicators, which is thought to be crucial in maintaining group cohesion.

Clearly, resolving this question requires a more thorough investigation of giraffe vocalisations, one that systematically searches for audible patterns that might represent forms of communication. It is exactly such a project that Dr Stoeger and her team undertook in their research, the results of which were published in *BMC Research Notes*.

The giraffe tapes

The researchers collected data from giraffes in three zoos in Berlin, Copenhagen and Vienna. Hundreds of hours of audio recordings were made of these giraffes, mostly recorded indoors at night, but also including recordings gathered outdoors during daylight hours. The team then analysed these recordings, searching for acoustic structures that resembled possible communications.

The vast majority of the recordings showed no evidence of any vocalisation patterns. As the researchers say in their paper: “exploring giraffe vocal communication turned out to be time consuming, tedious and very challenging”.

Tedious perhaps, but in the end worthwhile. Amidst the many hours of recordings, the researchers found a number of instances of a vocal pattern which, based on its acoustic structure, could potentially function as communication between giraffes.

This pattern, recorded 65 times across all three zoos, was a kind of humming vocalisation with a rich harmonic structure never before documented in the scientific literature. Notably this humming vocalisation, recorded only at night, had also never been heard by any of the zoo-keepers looking after the giraffes.

The meaning of humming

If the purpose of this humming is communication, what is it the giraffes are telling one another? Understandably, on this question the researchers can only speculate, especially as they are unable to determine which individual giraffe made the sounds, or provide any other data on the behaviour of the giraffes while humming.

They do however note that humming was only recorded when the giraffes had been separated into individual stalls for the night. This tentatively suggests that the calls allow group members to keep in touch when they are no longer able to see each other. This could explain why the giraffes remain silent during the day, when they can visually locate other group members.

Clearly, as the researchers stress, these are only the first steps in unravelling the mystery of giraffe communication. They conclude their paper with the hope that these tantalising results will encourage others to join the study of acoustic research in giraffes, while cautioning about the difficulty of conducting such research, especially with wild giraffes.

One solution the researchers suggest to this problem is to develop an automated monitoring/detection system that could link audio and video recordings. Given that the Stoeger group recently published research on the development of an automated audio detection system for elephants, perhaps they are just the people for the job?

Reprinted from
http://blogs.biomedcentral.com/bmcseriesblog/2015/09/10/giraffe-sound-like-solving-puzzle-giraffe-communication/

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Heat detection by infrared thermal imaging

Javier Rubio, Zoo de Lyon

Zoo de Lyon has a long history with giraffe since 1973. With no less than 20 births, this institution has a significant experience in managing this species. Zoo de Lyon has now in its collection a group of 2.4 giraffe (*Giraffa camelopardalis*).

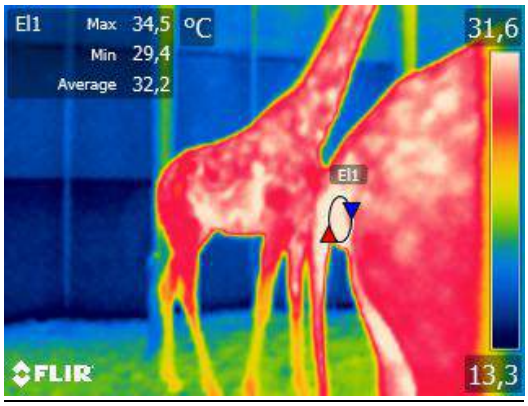
With the purpose of studying the chances of detecting heat by the use of infrared thermal imaging, a study was conducted in Feb-Apr/2015. This technology has revealed itself as a very useful tool for veterinary diagnosis, even more when working with wild captive animals, dangerous and easily stressed.

Therefore, with this techniques, zoo staff is able to take medical and managing decisions without the stress of capturing the animal, and reducing the risk of being accidentally attacked by the animals.

Thermal imaging has already been used in oestrus detection of domestic species such as cattle or gilts, with encouraging results. The aim of our study was to evaluate the positive correlation between thermography and behavioural detection of heat.

So as to achieve that goal, and also to gain statistical value, we took more than 1.500 thermal images of two females. The other two females were not considered for this study. One has showed instability in her oestral cycle, and the other one is too young and thus is not cycled yet.

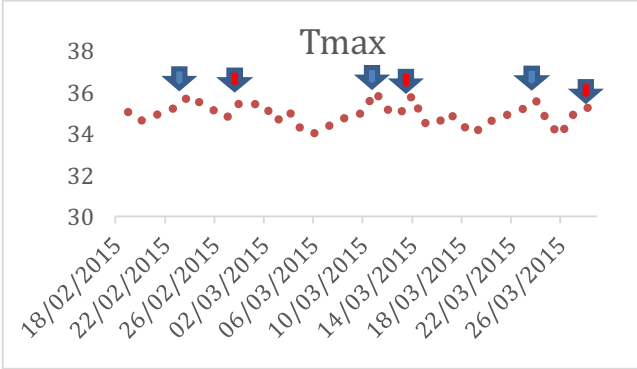
Heat detection by infrared thermal imaging:



The pictures were taken during 80 sessions in their sheds, with stable relative humidity and room temperature, measuring the temperature of the vulva with an infrared camera Flir E5. Data was treated with Flir Tools, a simple and useful software.

This measurement instrument reveals itself as a tool full of possibilities for wildlife veterinary practitioners, and its cost is decreasing over time. These characteristics make this kind of resources more and more eligible.

When trying to detect temperature peaks around the moments where behavioural changes occurred within the female in oestrus, data was tough to analyse, and results challenging to interpret; as it happened in other species such as cattle and swine.



Results were interesting, because we can see two peaks with two or three days of delay, and at the same time we observed the behavioural changes associated with heat. This might correspond to hormonal peaks in giraffe, and its typical correlated hormonal behaviour.

It would be highly advisable to repeat this experiment, with an accurate measure of hormones in faeces and urine.

To sum up, these promising results encourage us to continue investigating in order to elucidate the meaning of maximal temperatures around the oestrus and we will continue working on this subject, to get more information on these data.

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Sticking our necks out for giraffe in Germany

Anna Lena Burger & Paul Dierkes, Goethe-University Frankfurt, Martin Becker, Opel-Zoo Kronberg

The 21st of June is the longest night of the year in Germany: the perfect occasion to celebrate the animal with the longest neck! On World Giraffe Day, launched by the Giraffe Conservation Foundation, giraffe lovers around the world celebrate the highest mammal on Earth. We want to draw attention to giraffe and their situation in the wild, and increase their protection and preservation.

But where exactly does a giraffe life, how does their biology work, and most importantly - what can we do to protect these unique creatures? To get to the bottom of these and many other questions, we, the group of the Opel-Zoo Foundation Professorship "Zoo Animal Biology" of the Goethe-University Frankfurt teamed up with the Opel Zoo educators, and with support of Stephanie and Julian Fennessy (GCF), designed an exhibition in the Opel Zoo Kronberg for World Giraffe day.

From June to September, three columns with three partitions (1x2m) offered visitors an attractive opportunity to educate themselves about giraffe. The main themes of the three pillars were biology, habitat and distribution, as well as species conservation. Within these there was much to discover about the life of a giraffe. For example, the pillars were used to illustrate the different subspecies of giraffe, where they occur and how you can tell them apart. In addition, visitors could gain insights into the structure of the herd and the feeding behaviour of giraffe in the wild and learn about the conservation breeding program in zoos. A further pillar was devoted to the questions of why giraffe are hunted, other reasons for their threatened survival and especially what we can actively do for their protection and conservation. The third pillar with the theme of biology explains how a giraffe gives birth, how giraffe sleep and what makes the neck of a giraffe so special.

For the actual World Giraffe Day on 21st June we came up with something special. So that even the youngest Zoo visitors could learn about the Giraffe, we built an activity stand. There, visitors were be able to compare the skull of a giraffe bull with that of an okapi, examine food and droppings from giraffe, and look at a series of images showing the birth of barely three weeks old baby Giraffe "Kabale". A special highlight was the cervical vertebrate puzzle, allowing young and old to bring a real neck back into the correct order. As well we appreciated the support of Prof. Axel Janke from Senckenberg Biodiversity and Climate Research Centre who gave an introduction on the genetics of giraffe.

Both the day itself, as well as the exhibition was a great success and we are looking forward to the 2016 Giraffe Day already. To find out more about this unique and valuable animal until then, we are conducting research on the social and sleeping behaviour of giraffe in the framework of a doctoral thesis. That means we keep sticking our necks out until the next World Giraffe Day!

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Tall Tales

Researchers discover clues on how giraffe neck evolved

Scientists have long theorized that the long neck of modern-day giraffes evolved to enable them to find more vegetation or to develop a specialized method of fighting. A new study of fossil cervical vertebrae reveals the evolution likely occurred in several stages as one of the animal's neck vertebrae stretched first toward the head and then toward the tail a few million years later. The study's authors say the research shows, for the first time, the specifics of the evolutionary transformation in extinct species within the giraffe family.

"It's interesting to note that that the lengthening was not consistent," said Nikos Solounias, a giraffe anatomy expert and paleontologist at NYIT College of Osteopathic Medicine. "First, only the front portion of the C3 vertebra lengthened in one group of species. The second stage was the elongation of the back portion of the C3 neck vertebra. The modern giraffe is the only species that underwent both stages, which is why it has a remarkably long neck."

The study, which includes a computational tracking model of the evolutionary elongation, is published in *Royal Society Open Science*. Solounias and Melinda Danowitz, a medical student in the school's Academic Medicine Scholars program, studied 71 fossils of nine extinct and two living species in the giraffe family. The bones, discovered in the late 1800s and early 1900s, were housed at museums around the world, including those in England, Austria, Germany, Sweden, Kenya, and Greece. "We also found that the most primitive giraffe already started off with a slightly elongated neck," said Danowitz. "The lengthening started before the giraffe family was even created 16 million years ago." But the main discovery came after the researchers analyzed anatomical features of the various fossils and compared them to the evolutionary tree. "That's when we saw the stages playing out," said Danowitz.

Solounias and Danowitz found the cranial end of the vertebra stretched initially around 7 million years ago in the species known as Samotherium, an extinct relative of today's modern giraffe. That was followed by a second stage of elongation on the back or caudal portion around one million years ago. The C3 vertebra of today's giraffe is nine times longer than its width -- about as long as an adult human's humerus bone, which stretches from the shoulder to the elbow. As the modern day giraffe's neck was getting longer, the neck of another member of the giraffe family was shortening. The okapi, found in central Africa, is the only other living member of the giraffe family. Yet, rather than evolving a long neck, Danowitz said this species is one of four with a "secondarily shortened neck," placing it on a different evolutionary pathway.

The researchers next study area is the evolution of the giraffe's long leg bones.

This article was reprinted from http://www.eurekalert.org/pub_releases/2015-10/nyio-rdc100615.php

Paignton Zoo's giraffes may be to blame for humming noise which keeps nearby residents awake at night

Long-suffering neighbours near a Devon zoo are being kept awake at night by giraffes humming. Residents have complained for over a year of a unusual rumble that was thought be coming from a boiler in the giraffe house at Paignton Zoo. A group of 20 even signed a petition urging the council to soundproof it, but the zoo couldn't locate the problem after checking all the equipment. However, new research suggests the giraffes themselves may be to blame for the hum.

Scientists in America now believe giraffes can communicate in infrasound, at frequencies too low for humans to hear. They have a larynx, but it is not clear how it is used since the neck is so long.

Zookeepers find it unusual, the research says, that mother giraffes seem to make no sound towards their young so it was believed they could use infrasound frequency instead. Researchers from the University of Vienna and the Berlin Tierpark zoo collected almost 1,000 hours of audio recordings from zoos in Berlin, Copenhagen and Vienna. They found the usual snorts and grunts but also found 'harmonic, sustained and frequency-modulated "humming" vocalisations' during night recordings. The suggestion is that the humming may be giraffes communicating with one another, and the sounds were only heard at night and in a zoo environment.

Angela Stoger of the University of Vienna, told New Scientist magazine: "I was fascinated, because these signals have a very interesting sound and have a complex acoustic structure." The science-based American website Doubtful News reported: "It sounds like an animal sound or someone snoring in the distance. "We can imagine how it might be disconcerting to people who don't know what it might be."

However, staff at Paignton Zoo raised doubts about whether the new research shed any light on its humming mystery. A spokesman said: "It's an interesting subject and could shed new light on behaviours and relationships among the species. "However, we can see no link between this research and reports of a sound effecting a neighbour last year. "We are aware that elements of the media are linking the two in a fairly light-hearted fashion, but we need to be clear that there is no such link. "In over 900 hours of recordings, none of which was made at Paignton Zoo, the scientists found just 65 giraffe hums. "These were very short calls, lasting a matter of seconds at most, which is not consistent with the sounds reportedly heard by the neighbour. "It was reported in a New Scientist article that one of the authors of this report has cast doubt on these sounds being in any way connected to the issues previously reported. "We have sympathy for our neighbour's problems, and wish we could help, but remain convinced that this matter is in no way related to the Zoo.".

This article was reprinted from
http://www.westernmorningnews.co.uk/Paignton-Zoo-s-giraffes-blame-humming-noise-keeps/story-27909655-detail/story.html

A giraffe rescue

When you get a call asking you to bring your students to assist in getting a giraffe out of a waterhole, the mind boggles. Only when you see the bad design of the waterhole do you understand. A small drinking hole surrounded by a circle of smooth concrete allows no traction for hooves, making it easy to fall in. It was an accident waiting to happen and, unfortunately for this old giraffe bull, the accident happened to him and he could not get a firm footing to step out. When we arrived at the scene in Balule Nature Reserve in Limpopo, the reserve warden and his team, as well as Provet Wildlife veterinary staff, were already in attendance and had darted the giraffe with sedatives.

Once the vet, Dr Peter Rogers, had given the go-ahead, the senior veterinary nurse, Janelle Goodrich, approached the giraffe and then attached a rope around his neck.

With the might of a Land Rover, the giraffe was pulled about a meter from the waterhole. His legs were then lifted and placed in a position that would allow him to be pulled free. To alleviate the pressure on his neck another rope was placed around his forelegs.

With male giraffes averaging a hefty 900kg, the Land Rover was struggling to make any headway in getting the body free from the waterhole. Warden, Craig Spencer, called for everyone to get onto the back of the vehicle so he could get traction. It worked and the giraffe was pulled free!

Immediately the ropes were freed and everyone except the veterinary team retreated. Reversal drugs were administered and we waited… and waited… and waited. Heartbeats raced as we feared that this ordeal was all too much for the old boy who just lay motionless.

With all eyes focused on his rising and falling chest, it was the longest nine minutes in history.

Suddenly the giraffe sat upright. Not out of the woods yet, the next concern was that he had injured his legs falling into the waterhole or from being cramped in there for several hours. He was a little stiff but in four manoeuvres he was up! In front of his rescuers he stood in all of his splendour, a little muddy and somewhat bewildered. Changes to the design of the waterhole are currently being implemented and are almost complete. The waterhole is being make shallower and will have stones set around it to allow for traction in order to avoid an incident of this nature from reoccurring.

And then he turned and walked off, without any hindrance, into the bush!

This article was reprinted from http://africageographic.com/blog/giraffe-rescue/

The National Nigerian Space program that will celebrate it's 20 years next week has scheduled to send a giraffe into space to commemorate the historical event.

"We wanted to send a clear message to the world, something typically Nigerian. Russia sent a dog, we wanted to do better!" explains an official spokesman of the event. "And what says Nigeria more than a giraffe?!" he adds, visibly enthusiast. "The use of an animal such as a giraffe within the space program is not just for show", comments astrophysicist Kenbo Alabe of the University of Abuja. "Giraffe brains have an uncanny resemblance to our brains, they process information in the same manner. It is much easier to transmit orders and commands to a giraffe then a dog, a fish or a turtle", admits the scientist. "This experiment could possibly revolutionize our ways of thinking about space, giraffes and the whole universe", he adds, very excited.

The launch should gather millions of tourists and space travel fans from all over the world claim local newspapers.

This article was reprinted from http://worldnewsdailyreport.com/nigeria-to-send-first-giraffe-in-space/

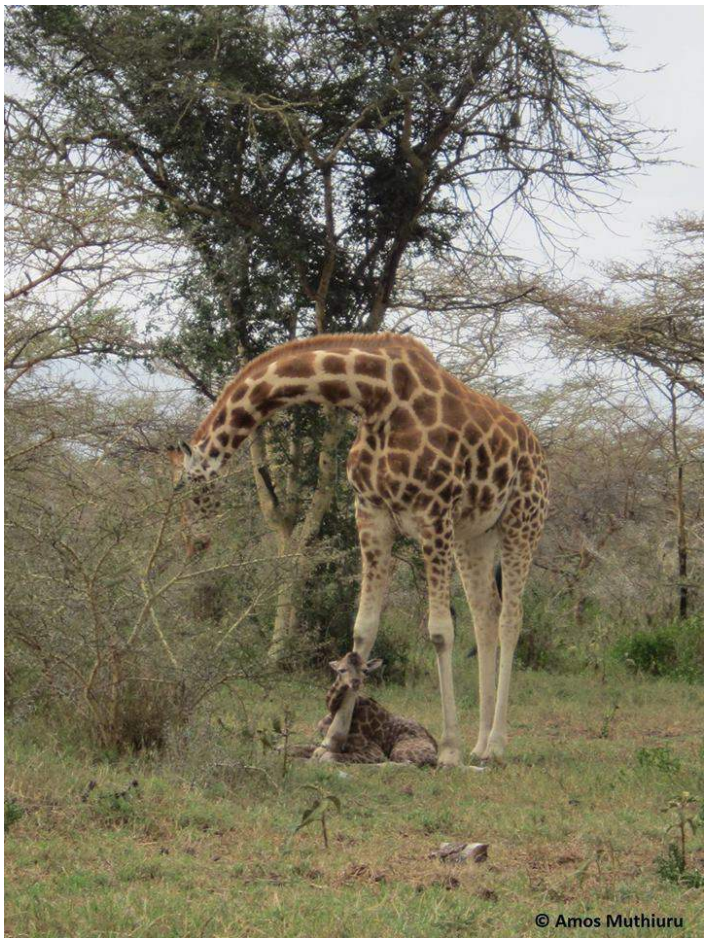
Rare photos show the incredible moment a wild giraffe is born

Amos Muthiuru was conducting research in Kenya when he and his team spotted something extraordinary: a pregnant giraffe who was readying to have a baby. "There was no doubt [she was] going to give birth soon, as we could tell by her behaviour," Muthiuru, of the Rothschild's Giraffe Project (RGP), tells The Dodo.

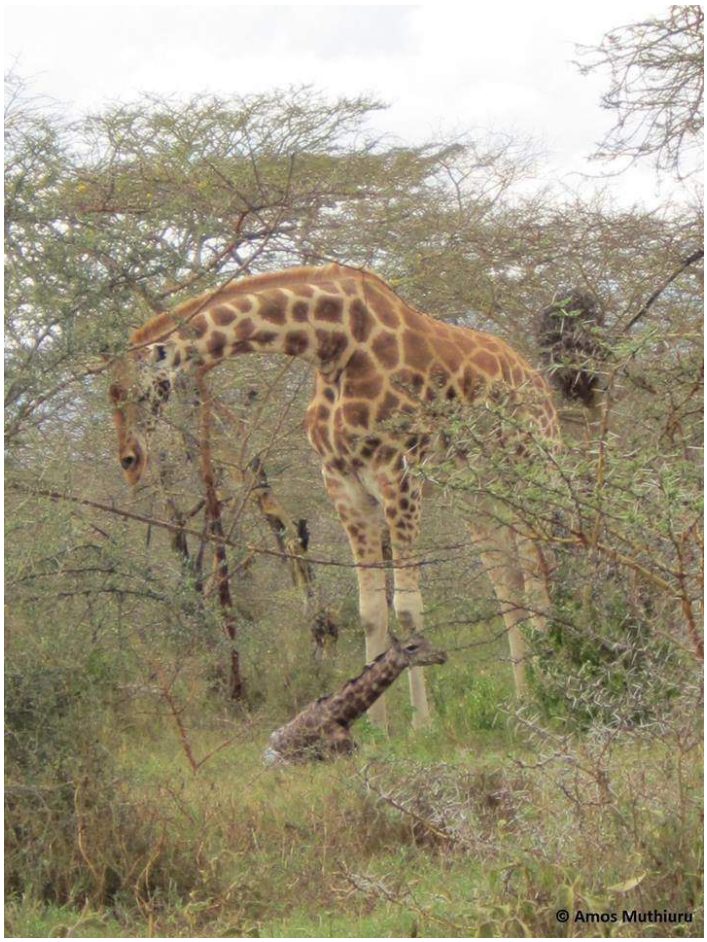
The team waited in a warthog den inside the Soysambu Conservancy. And watched. And four hours later "the baby dropped to the ground and a new life was born!" says Muthiuru. "The calf was up within moments and although unsteady on its feet at first," Muthiuru says of the encounter. But the newborn "was soon running around and suckling from mum."

It's incredibly rare to watch a giraffe give birth in the wild — so rare, in fact, that Zoe Muller, founder of RGP, says that in her 10 years of research, she's never seen it happen. She's thrilled at the news. "This new giraffe calf has helped to increase the population of Rothschild's giraffes left in the wild, and we are hoping he will contribute to the future of the species in Africa," she tells The Dodo.

There are fewer than 1,100 Rothschild's giraffe left in the wild, and it's the second most endangered giraffe species, says Muller. In fact, giraffes across Africa are in desperate conditions. According to recent research, population numbers are plummeting: Since 1998, there's been a 43 percent decline, with only 80,000 giraffes "patchily" roaming 21 African nations. As for the species' newest arrival, Muller says researchers won't know the baby's gender until the animal is least 3 months old. But so far, she says, "We are continually monitoring the mother and baby — and both are doing well."



This article was reprinted from https://www.thedodo.com/baby-giraffe-born-photo-1389407383.html



Recently published research

Baotic A, Sicks F & Stoeger AS. 2015. Nocturnal 'humming' vocalization: adding a piece to the puzzle of giraffe communication. BMC Research Notes, 8:425.

Background

Recent research reveals that giraffes (*Giraffa camelopardalis* sp.) exhibit a socially structured, fission–fusion system. In other species possessing this kind of society, information exchange is important and vocal communication is usually well developed. But is this true for giraffes? Giraffes are known to produce sounds, but there is no evidence that they use vocalizations for communication. Reports on giraffe vocalizations are mainly anecdotal and the missing acoustic descriptions make it difficult to establish a call nomenclature. Despite inconclusive evidence to date, it is widely assumed that giraffes produce infrasonic vocalizations similar to elephants. In order to initiate a more detailed investigation of the vocal communication in giraffes, we collected data of captive individuals during day and night. We particularly focussed on detecting tonal, infrasonic or sustained vocalizations.

Findings

We collected over 947 h of audio material in three European zoos and quantified the spectral and temporal components of acoustic signals to obtain an accurate set of acoustic parameters. Besides the known burst, snorts and grunts, we detected harmonic, sustained and frequency-modulated "humming" vocalizations during night recordings. None of the recorded vocalizations were within the infrasonic range.

Conclusions

These results show that giraffes do produce vocalizations, which, based on their acoustic structure, might have the potential to function as communicative signals to convey information about the physical and motivational attributes of the caller. The data further reveal that the assumption of infrasonic communication in giraffes needs to be considered with caution and requires further investigations in future studies.

Danowitz M, Vasilyev A, Kortlandt V & Solounias N. 2015. Fossil evidence and stages of elongation of the *Giraffa camelopardalis* neck. R. Soc. Open sci. 2: 150393.

Several evolutionary theories have been proposed to explain the adaptation of the long giraffe neck; however, few studies examine the fossil cervical vertebrae. We incorporate extinct giraffids, and the okapi and giraffe cervical vertebral specimens in a comprehensive analysis of the anatomy and elongation of the neck. We establish and evaluate 20 character states that relate to general, cranial and caudal vertebral lengthening, and calculate a length-to-width ratio to measure the relative slenderness of the vertebrae. Our sample includes cervical vertebrae (*n*=71) of 11 taxa representing all seven subfamilies. We also perform a computational comparison of the C3 of*Samotherium* and *Giraffa camelopardalis*, which demonstrates that cervical elongation occurs disproportionately along the cranial–caudal vertebral axis. Using the morphological characters and calculated ratios, we propose stages in cervical lengthening, which are supported by the mathematical transformations using fossil and extant specimens. We find that cervical elongation is anisometric and unexpectedly precedes Giraffidae. Within the family, cranial vertebral elongation is the first lengthening stage observed followed by caudal vertebral elongation, which accounts for the extremely long neck of the giraffe.

Horova E, Brandlova K & Glonekova M. 2015. The first description of dominance hierarchy in captive giraffe: Not loose and egalitarian, but clear and linear. PLoS ONE 10(5): e0124570. doi:10.1371/journal.pone.0124570

Wild giraffes live in extensive groups in the fission fusion system, maintaining long social distances and loose social bonds. Within these groups, resources are widely distributed, agonistic encounters are scarce and the dominance hierarchy was reported in males only, while never deeply analysed. In captivity, the possibility to maintain inter-individual distances is limited and part of the resources is not evenly distributed. Consequently, we suggest that agonistic encounters should be more frequent, leading to the establishment of the dominance hierarchy. Based on the differences in resource-holding potential, we suggested that the rank of an individual would be affected by age and sex. Based on hypotheses of

prior ownership, we tested whether rank was positively affected by the time spent in a herd and whether it was stable in adult females, which were present long-term in the same herd. We originally monitored four herds of Rothschild giraffes (*Giraffa camelopardalis rothschildi*) in Dvůr Králové zoo (n = 8), Liberec zoo (n = 6), and two herds in Prague zoo: Prague 1 (n = 8) and Prague 2 (n = 9). The Prague 1 and Prague 2 herds were then combined and the resulting fifth herd was observed over three consecutive years (2009, 2010, and 2011) (n = 14, 13, and 14, respectively). We revealed a significantly linear hierarchy in Dvůr Krá- lové, Prague 2 and in the combined herd in Prague. Rank was significantly affected by age in all herds; older individuals dominated the younger ones. In females, rank was positively affected by the time spent in the herd and adult females in Prague maintained their rank dur- ing three consecutive years. This study represents the first analysis of the dominance hierarchy in the captive giraffe, and discusses the behavioural flexibility of the social structure in response to monopolisable resources in a captive environment.

Souter K. 2015. The behaviour and dietary preferences of Southern Giraffe (*Giraffa camelopardalis giraffa*) on the Umphafa Private Nature Reserve, Kwa-Zulu Natal. Nottinghm Trent University. BSc Thesis.

The giraffe (*Giraffa camelopardalis*) has been severely neglected among the scientific community in terms of research. This investigation explores their behavioural patterns with focus on feeding behaviours and dietary preferences under influencing factors, which provides vital information for conservation in situ and population management ex situ. The behaviour and dietary composition of nine Southern Giraffe (*Giraffa camelopardalis giraffa*) was observed in situ over a period of seven weeks. Dietary composition was recorded on a time sheet correlated with behavioural observations on an ethogram. Dietary composition and relevant behaviours were extracted and statistically analysed to answer the aims. The results demonstrated that giraffe allocate the largest proportion of their time budget to feeding behaviours. No significant difference found between feeding behaviours shown by male and female giraffe ($Z= -0.229$, $P>0.05$). Giraffe showed a dietary preference for Acacia species in the overall composition with Acacia karroo as the main component. Significant difference was found in the consumption of Acacia seiberiana by males and females ($Z= -2.132$, $P=0.03$). Avoidance of high tannin containing species by pregnant giraffe was evident. The results in this study correspond with the pre-existing scientific literature in terms of behavioural time budgets and dietary composition. Scientific literature is enhanced by the contribution of data on the influence of tannin on pregnant giraffe preferences. The information gained from this study can be used for further research, in situ conservation and it provides a basis for zoos to improve management of captive populations to replicate wild behaviours and dietary requirements.

Giraffe Indaba III: Presentation Abstracts

Southern African Wildlife College, Hoedspruit, South Africa, 23 – 28 August 2015

Feeding ecology of the Thornicroft's giraffe in Zambia

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Across Africa, giraffes have been recorded feeding on variety of plant species, although generally a handful of species comprises a significant portion of the diet. Given that habitat characteristics and plant biodiversity varies across giraffe locations, one would expect variation in the feeding ecology of giraffes from different regions. Thornicroft's giraffe, *Giraffa camelopardalis thornicrofti*, are limited in distribution to the Luangwa Valley region, Zambia. Between 1973 and 2014, giraffes fed upon 93 identified species, about five times more than were recorded in the diet in the same population between 1963 and 1969. However, the most preferred plant species during the dry season were nearly identical during the two time periods. In the earlier study, 54% of the dry season diet was derived from four plant species, while 53% of the dry season diet during the second study came from six plant species. During both studies, the sausage tree, *Kigelia africana*, was the favoured dry season food item. In addition to comparing the feeding ecology between these two time periods, we also scrutinize the impact of location, season, sociality, sex, and age on dietary composition during the 41-year study. We conclude that an eclectic and variable diet should provide giraffes with a buffer against environmental disturbances, thereby offering some protection against habitat changes, but in many regions in Africa, anthropogenic landscape alterations appear to be too rapid and destructive for giraffe to compensate for by altering dietary preferences.

Examining the population ecology of Rothschild's giraffe in Murchison Falls National Park, Uganda

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Developing a detailed understanding of population dynamics is a critical component for examining how populations respond to changes in their environment over space and time. For endangered subspecies such as the Rothschild's giraffe (*Giraffa camelopardalis rothschildi*), this understanding of population level processes is an important tool for informing and assessing conservation strategy. We developed a comprehensive monitoring programme to examine population size, composition and distribution of the largest known wild population of Rothschild's giraffe in the closed system of Murchison Falls National Park, northwestern Uganda. In this ongoing study, we employ non-invasive photographic capture-recapture methods to assess the population status and examine demographic parameters. We conducted vehicle-based photographic surveys in which fixed routes were driven over the extent of the study area and photographs were taken of all encountered giraffes. Using WildID pattern recognition software, we created a database of all observed Rothschild's giraffe in Murchison Falls National Park. We used a robust survey design with three sampling occasions spaced at 4 month intervals over the past year to develop encounter histories for each giraffe observed during the survey periods. Robust design models for the survey period provided preliminary estimates of population size, survival and recruitment over multiple seasons. We also examined coarse patterns of space use from spatially explicit encounter histories. This first ever demographic study of giraffe in Uganda provides detailed population size estimates and insights into demographic processes with direct applications to assessing the population status and informing conservation strategy for this endangered subspecies.

Findings from the GPS fitted giraffe on spatial ecology and habitat use in the Kalahari

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The main research project was conducted in the Khamab Kalahari Nature Reserve (KKNR) in the North West Province of South Africa. KKNR is situated in a remote portion of the Kalahari savanna and is 95,537.56 ha in size with an average rainfall estimated at 333 mm. Vegetation types present are grassland, open thickets, dense thicket,

arboricide treated and un-treated areas, all resulting in the description of eleven plant communities. Spatial ecology determined with GPS collars fitted on giraffe formed the basis of this study. The first objective of the research project was to assess the habitat selection and spatial ecology of giraffe based on the effect of season, habitat resources (browse and water) and plant species composition. Also investigating diet selection of giraffe in relation to browse availability, and how daily activities (feeding and non-feeding) change during seasons. Results indicated how distribution patterns of giraffe were strongly influenced by environmental variables, provision of water and human impact on habitat persecutions. With the aid of the GPS collars it was established what the average daily distance travelled was and compared over seasons. Average distances travelled differ between seasons, with the lowest in autumn (5.05 km / day), and the highest in winter (5.75 km / day) with an average speed of 0.21 km / h. Giraffes in KKNR utilized an average home range of 206.0 km² (20 602 ha) to find sufficient forage to sustain their daily requirements. In the wet, hot season (summer) when food was abundant, giraffes frequented smaller areas (average 177 km²), while in the dry, cool season (winter) they extended their home range (average 245 km²) to fulfil their daily needs. Giraffes clearly favoured certain areas and avoided untreated bush thickened areas. Osteophagia as an activity of all giraffes was common during the winter (>500 recordings), indicating that the giraffes were in need of supplementary minerals during the dry season and how they were under nutritional stress.

It's a war out there! Saving Africa's forgotten giants

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Giraffe numbers have dropped rapidly across the African continent over the past decade and a half - and the world has taken little notice. Even recognised conservationists are surprised when they hear that there are more than 6 times the number of African elephant than giraffe. Giraffe Conservation Foundation's recent efforts to better understand and conserve giraffe in the war stricken areas of Democratic Republic of Congo and Ethiopia, and the recovery of Uganda's forgotten Kidepo Valley National Park following the historical insurgence of the Lord's Resistance Army, will all be highlighted. Whilst giraffe numbers have plummeted, it's never too late.

Getting the giraffe conservation message out there – the GCF journey

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Since its establishment in 2009, GCF has been working hard to promote awareness, education and conservation of giraffe on the local, regional and international conservation agenda. As a small, and until recently, volunteer-run, conservation NGO, we started exploring an entirely new field: conservation marketing. This presentation will provide a critical review of how GCF effectively (or not) talks and shares giraffe conservation. GCF's approach has been one of learning through trial and error – learning from mistakes and building on successes, and many times using a lot of gut feel based on things we like. The future of giraffe conservation and management is premised on getting the correct messages out there, and the tools and mechanisms GCF has and continues to use provide an important basis from which the organisation and others can hopefully benefit.

Long term giraffe population study in Pilanesberg National Park

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In 2011 Copenhagen Zoo established a research facility in Pilanesberg National Park and hired a full time "research facility manager" (former ranger in the park) to take care of daily business. The research facility has a guest house with separate rooms for 3 researchers and laboratory, office space and meeting room next to the park management. The purpose of the facility is to create a platform for the research activities that will take place in the park, either by Copenhagen Zoo itself or by other parties. Focus has so far been on rhino population dynamics, but we now plan for a long term study on Giraffe population dynamics, including behavioural studies, genetic and demographic studies, in order to better understand the group structure of giraffes and its dependence on relatedness. Pilanesberg NP is a fenced park of 550 km^2 and has a giraffe population of about 180 animals. Close to 140 have so far been individually identified based on neck and body pattern, and it is planned to complete the individual register of existing and future giraffes and to identify their relationship by using DNA analyses. Based on these baseline data we will then

conduct a long term population dynamics study to see how population structures change over time and how these changes relate to kin. The project will be conducted by Copenhagen Zoo in close cooperation with the park management and local universities. In the presentation the plan for the studies as well as results of already conducted pilot studies will be presented.

Introduced giraffes outside their comfort zone?

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With the current growing game ranch industry in South Africa, the occurrence of wildlife in South Africa is no longer dictated by the animal's historical distribution or ecological function alone, but rather their economic value. This has led to the introduction of giraffes to areas of different habitats and of various sizes without consideration of the animal's well-being or the impact they have on the environment. Fitted GPS collars provide insight on the spatial ecology as well as habitat utilisation of giraffes which will contribute to the understanding of their needs and management principles. Observations on feeding behaviour, specifically plant selection, are indicative of the adaptability of giraffes in sub-optimal conditions particularly during critical periods when animals, especially browsers, experience nutritional stress. In order to elucidate on the influence of region on introduced giraffes to the Free State Province, spatial ecology and feeding behaviour of these animals are compared between two provincial nature reserves of different habitats and sizes. Although the majority of the fenced reserves are available for feeding, only certain areas are utilised on a constant basis which indicate distinct habitat preferences of these normally nomadic animals. By restricting giraffes to certain core areas, force them to over utilise such areas and contribute in depleting woody species, normally favoured by giraffe. However, preliminary results indicate that giraffes have the ability to adjust their diet during harsh winter months. This is done by utilising specific plant species during different seasons according to availability in order to elevate nutritional stress and improve body condition. By comparing the feeding behaviour and spatial ecology of giraffes between different environments, insight on the ability of giraffes, to adapt under dissimilar plant communities, can be an effective management tool in the conservation of giraffe.

An update on the okapi's conservation status and progress towards the okapi conservation strategy

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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 (GOSG). Elusive and endemic to the inaccessible and often insecure rainforests of the Democratic Republic of Congo (DRC), the okapi has long been underfunded and understudied, with until recently no coherent strategy in place for its conservation. As part of a range-wide okapi conservation project instigated in 2010 by ZSL and the Institut Congolese pour la Conservation de la Nature (ICCN), partners and stakeholders from across the okapi's range came together at a workshop in Kisangani in 2013 to (1) review the okapi's status – including all known field survey data and new information provided by a parallel okapi genetics PhD project, (2) carry out an IUCN Red List assessment – which resulted in the okapi's being relisted as 'Endangered', and (3) develop the first-ever conservation strategy for the species, through a participatory, multi-stakeholder process. This presentation will provide an update on the okapi's conservation status and progress towards the okapi conservation strategy, including a review of the current security situation, protection and management on the ground, current and planned field surveys and recent discussions regarding okapi monitoring. It will also outline the efforts of the GOSG to contribute to raising public awareness about and interest in okapi though the establishment of a new GOSG website, and to provide conservationists and scientists with up-to-date, open-access information on okapi via bibliographic and survey databases.

Potential use of the stochastic population simulation software programme "Vortex" in giraffe conservation planning

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The population simulation software programme *Vortex* is particularly suited to explore the effects of complex and interacting factors influencing survival, and demographic and genetic status of small wild and/or captive

populations of threatened vertebrate species. *Vortex* begins by either creating individuals to form the starting population and/or importing individuals from a pedigree database and then stepping through life cycle events (e.g., births, deaths, dispersal, catastrophic events) which are based on designated probabilities. It allows simultaneous simulation of the effects of deterministic forces (such as anthropogenic threats) and demographic, environmental, and genetic stochastic events (such as random and environmental variation in reproductive and mortality rates, catastrophes, inbreeding etc.). Depending on the amount and reliability of quantitative data available on the natural history of the species and the threats acting on the population and its environment, *Vortex* can be used for different purposes. Potential uses include, predicting the effect of particular human caused threats or particular management scenarios on the population, testing thresholds for threat effects, prioritising data collection on threats, likely relative changes in demographic performance in the face of different threats or management options, investigating the likely viability in the absence of human caused threats, identifying priorities for research in basic natural history parameters and demonstrating the general risk inherent to small populations to people without population management knowledge. All of these different uses are not only valuable on their own, but given the right circumstances, particularly when they are integrated into a species conservation planning process or workshop. This presentation will explain the basic workings and uses of *Vortex* and will demonstrate through examples how Vortex can be used as an integral part of species conservation planning. For example, during the CBSG facilitated Population and Habitat Viability Assessment workshop conducted for the last population of West-African giraffes (*Giraffa camelopardalis peralta*) in Niger in 2008, Vortex was used to test the viability of the population under four different circumstances: status quo, continued habitat loss, mitigation of the effects of potential catastrophes with highest severity and creating a metapopulation (report available from http://www.cbsg.org/document-repository). Vortex is freely available from: http://www.vortex10.org/Vortex10.aspx.

The okapi ex situ - in situ partnership – a long term mutually beneficial relationship

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The okapi ex situ programme became one of the earliest cooperative breeding programmes in zoos, when in 1977 an international studbook and okapi breeding consortium was formed within which okapis were exchanged to create a healthy world population. There are currently 172 okapis in zoos in North America, Europe, South Africa, the Middle East and Japan. While there had been ties to a transit station in the DRC since 1948, these were largely focused on improving the welfare and transfer success of wild caught okapi. In 1987 the Okapi Conservation Project (OCP) was started in a formal partnership between White Oak Conservation Centre/Gilman International Conservation and what is now the Institut Congolais pour la Conservation de la Nature (ICCN) (in 2014 the umbrella non-profit organisation for the OCP became Wildlife Conservation Global, operated out of the Jacksonville Zoo and Gardens). The OCP aims to conserve the okapi in the wild, while preserving the biological and cultural dynamics of the Ituri forest, through supporting ICCN rangers, improving protection of wildlife and habitats, assisting and educating communities in sustainable resource conservation and promoting alternative agricultural practices. From the start of the OCP, the ex situ okapi community contributes to this now common aim of conservation. The role and goals for the ex situ okapi population within the overall conservation strategy are jointly determined, the zoos maintain a sustainable, globally managed ex situ okapi population and use this to raise a considerable proportion of the yearly budget for the OCP and to raise awareness for the okapi, the Ituri forest and the Congo River Basin. Joint research activities took place on population genetics, nutrition, health and reproduction, behaviour etc. We believe some of the key elements to success to have been long term commitment, personal contacts, low personnel turn over and carefully planned succession, a true partner relationship rather

than a donor-recipient relationship, joint decision making, transparency and regular communication and information exchange. Since the formation of the Giraffe and Okapi Specialist Group, the ex situ community and OCP are now part of this wider network of conservation partners, working within the framework of the Okapi Conservation Strategy.

Update on giraffe reproduction physiology

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Giraffes are a popular zoo attraction, yet few visitors realize that there are at least six genetically distinct (sub)species of giraffes, of which two are already classified endangered due to habitat loss and fragmentation. Each of these endangered giraffe populations count less than a thousand individuals in the wild. Therefore, the role of zoological facilities for the conservation breeding of giraffes is increasingly important. For successful reproductive management of our captive population, knowledge on the reproduction physiology is inevitable. Giraffe exhibit the longest pregnancy of all ruminants, but this appears to have nothing to do with body mass. The much smaller relative, the okapi (*Okapia johnstoni*), has approximately the same gestation length. In contrast to the great variety of Cervidae and Bovidae, with whom giraffids share a common ancestor, there are only two giraffe species left today, restricted to the sub-saharan regions of Africa. It has been suggested that the long gestation periods of giraffids could have represented a competitive disadvantage that led, over time, to the ecologic displacement of the large variety of extinct giraffid species by bovid-type species. In fact, the average interbirth interval of wild giraffes is 540-720 days, and only 50% of calves survive the first year. In captivity, giraffes breed generally fairly easy, so that zoos are currently applying contraceptive measures to certain individuals. Nevertheless poses research into assisted reproduction technology (ART) an interesting field. In future, it may become a tool for breeding programs to overcome genetic bottlenecks in certain (sub)species, avoid hybrid breeding and to solve the problems associated with live animal transfers. Semen collection has been successful with and without full immobilization, using transrectal massage or electro ejaculation. Obtaining ejaculates is a prerequisite for artificial insemination (AI) programs or in-vitro fertilization (IVF). To be able to correctly time AI or embryo recovery, it is important to exactly know the estrus cycle. By transrectal ultrasound and serum and fecal hormone analysis, we were able to determine the ovarian activity and predict ovulation during the 14-15 days cycle. At the African Lion Safari in Canada, a female calf was born after fresh semen AI in 2014 and this year, the first frozen-semen giraffe pregnancy was established. To give an overview on the current knowledge of giraffe breeding, we summarize the relevant research on the female giraffe reproduction physiology and management, supplemented with results from our ongoing studies on ART.

Hand-rearing & growth development of giraffe calves

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Hand-rearing is often relevant for the preservation of endangered species. Maternal rejection of giraffe calves born in captivity is a well-known problem. Of many successfully hand-reared calves, only a few have been described in literature with a variation in milk formulas and feeding schemes. The authors aim to give an overview on used formulas and describe the hand-rearing process and growth development of a male Rothschild giraffe (*Giraffa camelopardalis rothschildi*) raised at Bellewaerde Park Belgium. Initially bovine colostrum was provided for two days, followed by plain Holstein Friesian milk increasing in volume and supplemented with 10% of colostrum until four months of age and decreasing in frequency until weaning at 250 days. Fresh water, hay, browse and concentrates were offered from the first week on. Growth development was evaluated by measurements of weight, height and withers and compared to growth rates of other hand-reared calves as no data of calves reared in the wild are available. An average daily growth of 779 g from birth until the last measurement at 286 days was obtained. During the first 4 months the calf gained 72 cm in height, whereof 40%

situated in the neck. The formula proved to be effective and since every animal in the wild is of value, the results might be of interest for orphanages of free roaming giraffes. Growth measurements enable to follow up the calf's health and might be useful to estimate the age of calves in the wild.

Giraffe social networks

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Social network analysis has recently emerged as an excellent tool for studying animal populations and has been used to model and describe the social organisation of several species. The application of social network analysis to animal societies is quickly transforming our understanding of animal sociality; its use has highlighted previously unknown, fine-scale social organisation in primates and cetaceans, and has informed us of how individuals within a population fulfil varying roles according to specific individual traits. The application of social network analysis to giraffe social organisation has recently highlighted non-random patterns of association, with long-term female-female associations and a clear social structure. Many interesting aspects of giraffe sociality have been highlighted, however several questions still remain. With giraffe population figures declining across Africa, there has never been a more important time to fully understand the species' social structure, since any conservation plan must fully account for the social structure and behaviour of that species if it is to be successful. In this presentation I discuss the results of a long-term study of the social networks of two populations of wild Rothschild's giraffe *Giraffa camelopardalis rothschildi* in Kenya. I present the overall social networks observed in each study area, and examine the effects of predation, population demographics and habitat on giraffe social networks.

Regional variation, prevalence, and severity of Giraffe Skin Disease: A review of an emerging disease affecting giraffe populations

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Giraffe populations have declined by >40% in the last 15 years and emerging infectious diseases are of particular concern for giraffe because of the species' perilous conservation status. Giraffes are susceptible to a number of skin diseases including sarcoptic mange, ear disease, and lumpy skin disease. While the etiological agents of these diseases have been studied, we know very little about an emerging infectious skin disease for giraffe which exhibits both spatial and temporal variation across the range of the different giraffe populations and has broadly been referred to as Giraffe Skin Disease. The disease(s) manifest(s) as chronic and severe scabs, wrinkled skin, encrustations and dry or oozing blood that can affect either the limbs or the upper regions of giraffe. The etiological agent of GSD is unknown and there is very little information on the impact of GSD on giraffe fitness. Given the lack of information, a comprehensive literature review is warranted. We seek to report on the spatial configuration of GSD, assess the prevalence and severity of GSD, and outline the spatial variation in the manifestation of GSD across Africa. We used peer-reviewed publications, unpublished reports, personal communication, anecdotal information and an online survey to i) produce an extensive database of GSD incidences across Africa, ii) map the incidence and prevalence of GSD, iii) assess the impacts of GSD and iv) provide recommendations for the management of the disease.

An update on the conservation status of the okapi (*Okapia johnstoni*) in the Maiko-Tayna region of Eastern Democratic Republic of Congo

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The Maiko-Tayna region of the eastern Democratic Republic of Congo consists of approximately 30,000 km^2 of intact, roadless and largely uninhabited lowland and sub-montane rainforest and represents the south eastern limit of okapi distribution. Historically known to support important populations of this species the region also encompasses three protected areas (Maiko National Park, and the Tayna and Kisimba-Ikoba Nature Reserves) and four developing community conservation associations. These areas offer significant potential for the conservation of this endangered giraffid. However, the Maiko -Tayna region remains among the most politically unstable areas in sub-Saharan Africa. The long term presence of anti-government militias, widespread and unregulated mining operations and a growing commercial bushmeat trade present serious challenges to conservation efforts in the region. We present an update on the status of the region's protected areas, data on the distribution and relative abundance of okapi collected from reconnaissance surveys and ranger patrols between 2013 -2015 and recommendations for the improved protection of okapi and other flagship species throughout the region.

Foraging ecologies of giraffe (*Giraffa camelopardalis reticulata*) and camels (*Camelus dromedarius*) in northern Kenya: effects of habitat structure and possibilities for competition? Developing applied, participatory, socio-ecological research on human-livestock-giraffe interactions.

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The foraging ecologies of reticulated giraffe (*Giraffa camelopardalis reticulata*) and domestic camels (*Camelus dromedarius*) were examined in the Laikipia District of Kenya, where these species have recently become sympatric. Camels increased popularity in the region has led to concerns about their environmental impacts and possible competition with wild giraffe for resources. We gathered foraging data on both species using 2-min group scans that recorded feeding heights and plant food preferences. Transects sampled the vegetation in areas where foraging observations were recorded. Giraffe females feed at lower elevations than males, while female camels feed below both sexes of giraffe. There was very little observed overlap in food preferences between the species. However, habitat type has an effect on foraging ecologies of both giraffe sexes, but habitat did not influence camel foraging. Camel herder husbandry techniques also influence camel foraging dynamics. These findings have important implications in achieving the twin objectives of wildlife conservation and pastoralist livestock production in northern Kenya. We are building on these results and methods, and are developing applied, participatory, socio-ecological conservation research on human-livestock-giraffe interactions. The pilot project includes quantitative surveys of attitudes, perceptions, beliefs, behaviours and traditional ecological knowledge (TEKS) of pastoralists toward giraffe, collaring livestock to map livestock resource and spatial overlap with giraffe, and the effectiveness of citizen science giraffe research.

The diet and ecology of introduced giraffe in subtropical thicket vegetation within the Little Karoo region of South Africa

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The existing controversy surrounding the benefits and risks of introducing giraffes outside their natural ranges have led to contradicting conclusions on the impact these megaherbivores have on the environment within the scientific, agricultural and land management communities.

Thus, appropriate management is crucial and can only be done with the implementation of appropriate policies formulated with the support of quantifiable research. Research would give us an understanding of the behaviour of these introduced species within the receiving ecosystems, and how to mitigate possible impacts these species have on the environment, as well as how the environment influences the species. Little research has been conducted on the introduction of giraffe into Thicket biome areas within the Little Karoo region of South Africa. This study attempts to understand and discuss the diet and feeding ecology of these giraffes. The feeding habits of giraffe are currently being observed on two private game reserves within the Oudtshoorn and De rust areas located in the Little Karoo. Direct observations were conducted on all individuals in the herd. Diet selection was recorded every five minutes from sunrise to sunset including the level of feeding and specific location. In total, 16 different plant species have been consumed, consisting of five tree and eleven shrub species. *Pappea capensis* and *Euclea undulata* formed the majority of the diet of all giraffes including both sexes and each age category. The height of the majority of the forage species found within the Thicket biome are shorter than four metres, thus, the level of the giraffe feeding was observed to be mostly at shoulder height (level 3) and below (level 2). Preliminary results indicate that these introduced giraffes have adapted to take advantage of forage resources available in ecosystems outside their natural ranges. The low levels of feeding display niche overlaps with other browsers present on the farms, resulting in increased competition (interspecific competition in addition to intraspecific competition) for food when it becomes limited. These arguments show the need for long term ecological monitoring of introduced giraffes, as well as appropriate management options to avoid the displacement and degradation of indigenous fauna and flora within the Little Karoo, and possible mortalities amongst the giraffe populations.

World Giraffe Day: An overview of the first two years of WGD

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The first annual World Giraffe Day was held in June of 2014 and was a resounding success with well over 100 zoos, corporations, businesses, etc. celebrating giraffe and raising awareness of the plight of giraffe in Africa. The events were held worldwide and reached untold numbers of people. Somewhat unanticipated fund raising efforts began small but eventually totalled over US$85,000 being donated to Giraffe Conservation Foundation. We anticipate the second annual World Giraffe Day in 2015 to be even more successful with more participants and a fund raising goal of US$100,000 for Operation Twiga/GCF. World Giraffe Day has become a success not only for getting the word out about the largely silent giraffe crisis but in raising much needed funds for giraffe conservation.

Giraffe species conservation in Uganda

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The population of giraffe in Uganda is recovering, especially in Murchison Falls National Park (NP). Ongoing conservation efforts around this species should continue as this highlights the success of the Uganda Wildlife Authority and its activities. The recent translocation of 15 giraffe to Lake Mburo NP will enhance species diversity in the Park and at the same time boost population expansion of the endangered Rothschild's giraffe in the extensive acacia woodland of Lake Mburo NP. In collaboration with the Giraffe Conservation Foundation (GCF) and Uganda Wildlife Education Center (UWEC), the Rothschild's Giraffe Project was established to provide a comprehensive scientific review of the Rothschild's giraffe in the wild in Uganda. The project is assessing the ecology, behaviour and distribution of the Rothschild's giraffe and investigating the effects that the remaining populations are having on their environment. All data will be used to initiate and develop an effective national conservation strategy for the Rothschild's giraffe and will help support giraffe conservation initiatives in Uganda.

Giraffes (*G. c. tippelskirchi*) calving strategy in Miombo woodland in western Tanzania

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It is said that a calf is more vulnerable compared to an adult. This vulnerability has given rise to a unique calving strategy developing among ungulates. An adult giraffe is rarely attacked by a predator; however the calf is known to be preyed upon resulting in an almost fifty percent

mortality rate in the first year of life. Therefore the calving strategy plays an important role to ensure the survival of the young giraffes first year of life. Most studies about the giraffes calving strategy have been conducted in Acacia woodland. However the giraffes habitat is not only the Acacia, but also the Miombo woodland, and it is known that mammals change their behaviour depending on different environments. This study focused on giraffes calving strategy living in the Miombo woodland of the Katavi National Park in western Tanzania, to see if there were any difference in the results to that of the Acacia woodland. Relationship between females became strong after giving birth; suggesting females tend to form nursery groups to keep better watch over their young. In the Miombo woodland a mother leaving her calf for more than 30 minutes was rare. There was also a tendency for a mother to leave her calf more often if it was in the company of another calf, no matter the giraffe group size. Our results differed from that gathered in the Acacia woodland regarding duration of mother's traveling time. In the Acacia woodland, it was reported that the mother left her calf for 1-4 hours at a time. We suggest that the difference might be the result of the vegetation i.e. if there was enough food available at a short distance and if there were long grass and dense shrubs which provide predator ambush opportunities. Since our results focused on only three females, additional work is needed such as long term research based on individual identification of giraffes. This will assist in learning more about how social relationships and calving strategy vary with socio-ecological conditions.

Conservation genetics of the okapi

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The okapi (*Okapia johnstoni*) is an endangered, evolutionarily distinct giraffid, endemic to the Democratic Republic of Congo (DRC). The okapi is a flagship species for the DRC, a country that contains some of the greatest biodiversity in the world. The okapi is currently under major threat from habitat fragmentation, human encroachment and poaching, yet to date, very little is known about the species in the wild, and no genetic study in the wild or captivity has ever been carried out. We use genetics to aid conservation efforts of okapi, a species that, due to its elusive nature, is highly challenging to study using alternative methods. We use non-invasive genetics to confirm that okapi occur on the southwest side of the Congo River, in localized distributions west of the Lomami River, and develop a simple molecular diagnostic tool for identifying okapi dung. Elsewhere in the range, okapi show high levels of mitochondrial DNA diversity, likely to be representative of climatic changes and associated changes in forest extent/type. We show that okapi appear to be mostly solitary, demonstrate male-biased dispersal, and are genetically polygamous or promiscuous, and are also likely to be socially polygamous or promiscuous. Okapi have similar levels of nuclear genetic variation in the wild, founder and captive okapi populations, however, mitochondrial genetic diversity within captive okapi is considerably reduced compared to the wild. In addition, both nuclear and mitochondrial alleles present in captivity poorly represent the allelic diversity present in the wild. These results constitute the first genetic study of wild and captive okapi populations, and provides important conservation information for this emblematic species.

Epididymal semen collection as a procedure for gamete cryopreservation in endangered giraffe species

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In domestic species is the use of artificial reproductive techniques for the preservation of high value genetics and genetic diversity already routinely implemented. One of these techniques is the collection of epididymal semen after sudden deaths, irreparable conditions (fractures) or disability to reproduce (castration). By using this technique, semen from genetic and/or commercial high valuable males has been used successfully to breed healthy and genetic important offspring. To prevent unnecessary loss of genetic material this technique could be of high importance in threatened or almost distinct wild species. This case is about a 11 year old hybrid Rothschild giraffe that lives in Pairi Daiza Zoo Belgium and

was part of a giraffe bachelor group of 6. Due to expanding of the group with pure bred female Rothschild giraffes in the nearby future, the fertile old hybrid male needed to be castrated. Only for research purposes, we tried to collect epididymal semen after castration. In the anesthetized giraffe, local anesthesia (10 ml) with procaine hydrochloride 4% was administered in both, testicles and spermatic cord and standard surgery protocols for castration were used. Both testicles were stored and transported in a styrofoam box at 5°C and 6h post castration, semen was collected from the testicles by dissection, retrograde flushing and by floating technique. Epididymal semen analysis was done by using the Hamilton-Thorne CASA system (CEROS V12.3). In total 2297.5 x 10^{6} sperm cells could be collected and diluted in a total volume of 35 mL. Total motility of the epididymal semen was 55 % (STR: 70%, Vap Cutoff: 30.0 µm/s). For conventional freezing BotuCrio® diluter was used. Semen was divided in 0.5 ml straws and stored in Liquid nitrogen tanks. Post-thaw (PT) motility was 21%. Morphology after eosin-nigrosin staining of cooled semen showed 92% living sperm cells (90% PT), 78% normal morphology (15% PT), 4% head defects (13% PT), 6% tail defects (60 PT), 8% proximal protoplasmic droplets (6% PT) and 4% distal protoplasmic droplets (6% PT). Cryobanking of valuable threatened giraffe genes might be necessary to contribute to long term species survival. The use of frozen epididymal semen from wild giraffes for ART in captive ones can contribute to genetic diversity as well. Procedures are field friendly and cost effective.

Status of giraffes in Ethiopia – identifying threats and formulating conservation strategies

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In Ethiopia, giraffes are among the poorly studied and least known wildlife taxa. Research dedicated to giraffes in Ethiopia is not available. Most of the data and available knowledge are based on anecdotal reports, opportunistic observations, and management reports. According to the country profile report compiled by Giraffe Conservation Foundation (GCF), in the early 1970's the total number of giraffes in Ethiopia was estimated between 1000 – 2000 individuals. This number is substantially reduced to only 270 individuals currently. Giraffes were widely distributed in western, southern and southeastern parts of the country. They were reported from Gambella, Mago and Omo National Parks, Yabello Sanctuary, in the Borena region and southern Ogaden. The author conducted reconnaissance survey of giraffes in the Mago National Park in 2013. According to information obtained from the park mangers and scouts, giraffes have been totally absent from the Park for several years. The main cause of their decimation has been illegal hunting by the local tribes who are attracted mainly for the tail strings which are used to produce traditional necklaces. Giraffes are also killed for their meat. Two subspecies of giraffes are known to occur in Ethiopia. The Nubian giraffe (*Giraffa camelopardalis camelopardalis*) occurs in Gambella National Park. It is also found in South Sudan while exterminated from Eritrea. The population estimate for this subspecies in Ethiopia is less than 150 individuals. The reticulated giraffe (*G. c. reticulata*) is the second subspecies occurring in Ethiopia. It is suspected to be distributed in the Borena and Ogaden regions of Southern and Eastern parts of Ethiopia with an estimated population of less than 100 individuals. The populations in Omo National Park and Tama Wildlife Reserve used to be considered as reticulated giraffe. However, it was proposed recently that the small populations in the two areas might be the Rothschild's (*G. c. rothschildi*) subspecies. Detailed taxonomic study awaits to verify this. Recently, the author, in collaboration with GCF, initiated and conducted field studies to understand the status of giraffes and their conservation needs. This presentation addresses efforts made, conservation gaps and future actions.

Giraffe Indaba III: Poster Abstracts

Southern African Wildlife College, Hoedspruit, South Africa, 23 – 28 August 2015

Connecting people to wildlife and wild places: Utilizing defining moments and species awareness days to promote giraffe conservation initiatives

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At Cheyenne Mountain Zoo (CMZ), our culture promotes a program called defining moments. This program allows any zoo staff member to set time aside and create a special moment for a zoo guest. By participating in this program, the giraffe keepers are creating connections between our giraffe herd and zoo guests, which in turn inspires those individuals to take action in protecting wild giraffe. Along with defining moments, we also participated in the first ever World Giraffe Day (WGD), where the entire day guests had those special moments with our giraffe, furthering their desire to protect them in the wild. Five tables were set up to raise awareness and educate our guests about the plight of giraffe, giraffe conservation initiatives, and our herd. Many guests that participated in WGD realized the impact they could play in conserving these amazing animals and wanted to become more involved in giraffe conservation. At CMZ we pride ourselves on connecting our guests to our animal ambassadors on a daily basis to become partners in conservation.

Fission-fusion dynamics and long-term sociability of Angolan giraffes

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The social organisation of giraffes has been identified as a critical area of research needed to contribute to the conservation of wild giraffes. Recent studies have shown that giraffe herd structure is influenced by non-ecological factors including kinship, age, gender, social preferences and range overlap. However, few studies have large long-term datasets with which to examine the temporal dynamics of this fission-fusion social system. Further, many populations of giraffes are declining thus long-term studies on these populations may not provide an accurate assessment of a natural giraffe social organisation. Our project will draw upon a dataset of over 800 individually identified Angolan giraffes (*Giraffa camelopardalis angolensis*) in the Etosha National Park, Namibia, that have been the subject of study for a number of periods since 2004. With the addition of two more field seasons of data collection, April- November 2015 and 2016, we will have one of the largest datasets on the social behaviour of wild giraffes from a population that is considered to be stable in size. Using this dataset we aim to conduct an investigation into the long-term dynamics of the fission-fusion social system of the Etosha Giraffe population. We will determine whether all males change colour similarly as they age and examine how an individual male's age and coat colour relate to its sociability. We will also investigate factors that contribute to individuals' decisions to stay or change groups at moments of group flux. We hypothesize that waterholes play an important role as meeting points for socialising and group flux events, thus will record and compare group dynamics and individuals' social choices at and away from waterholes. Through this work we hope to contribute to conservation efforts by increasing basic knowledge of the social dynamics of groups and how the social environment of individuals in a stable population of giraffes changes through time.

Training zoo giraffe for hoofcare has medical, behavioural, and conservation benefits

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There are an estimated 2,200 giraffe in human care worldwide. For zoo giraffe, chronic lameness is one of their most significant health problems, sometimes resulting in welfare concerns or even euthanasia. Using operant training, the Cheyenne Mountain Zoo team trained 18 giraffe for front foot hoof care in an effort to better understand and manage causes of lameness. Medical benefits included earlier medical interventions and more targeted treatments, resulting in the clinical

resolution of several cases of chronic lameness. Behavioural health benefits included that giraffe voluntarily participated in their own health care, resulting in fewer forced, stressful situations and increased resilience to new situations. By improving both medical and behavioural health for these giraffe, zoo guests have better animal interactions than they would with unhealthy animals. This helps make guests more receptive to conservation messaging and to donating to giraffe conservation. According to the World Association of Zoos and Aquariums (WAZA), there are over 700,000,000 visitors to zoos annually. If giraffe health in zoos can be managed better with the help of trained medical behaviours, zoos have huge potential to message and fundraise for wild giraffe conservation

Africa's giraffe – poster series

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In 1998 the total number of giraffe in Africa was estimated by IUCN at greater than 140,000 individuals. In 2013, best estimates by the GCF have the Africa-wide population at less than 80,000 individuals – encompassing all (sub)species. This is an alarming trend, which continues to go largely unnoticed by the wider public, including by well-versed conservationists. In order to share accurate and up-to-date giraffe conservation messages, GCF has and continues to develop a poster series on Africa's giraffe. To date, this series comprises three dedicated giraffe conservation posters on general giraffe conservation issues, their conservation status and distribution and the different (sub)species, as well as a simple spot pattern (sub)species poster to engage and inform people around the globe.

Restoring the integrity of the Okapi Wildlife Reserve in Democratic Republic of Congo

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The Okapi Wildlife Reserve is a World Heritage site located in north-eastern Democratic Republic of Congo (DRC), listed for its endemic species (e.g. okapi), important populations of large mammals (e.g. elephants, chimpanzee, buffalo, etc.) and specific, characteristic habitats. Since 1998, the reserve has been listed as a World Heritage site 'in danger', and in June 2012 suffered a devastating rebel attack on its headquarters, killing 7 people and all 14 captive okapi held there and looting and destroying buildings, operational equipment and other basic infrastructure. This reduced the ability of ICCN to adequately protect the reserve, resulting in increased levels of poaching and thousands of illegal gold miners setting up camps across the reserve. Thanks to emergency and ongoing funding from donors and the efforts of the Congolese army, ICCN and its partners in the Okapi Wildlife Reserve – the Okapi Conservation Project (OCP), the Wildlife Conservation Society (WCS) and the German Agency for International Cooperation (KfW) – ICCN has been able to start to rebuild infrastructure and increase patrols again. Alongside a public awareness campaign and strong political support from the Governor of the Province, joint patrols by ICCN and the army have led to the closure of more than 30 camps and the removal of more than 10,000 miners from the reserve. New rangers are being trained and the increased capacity of ICCN will provide for greater coverage and more frequent patrols. It is hoped that all these activities will restore the previously high level of protection to the irreplaceable wildlife of the reserve – a stronghold for the okapi.

Giraffe Social Networks: the effect of sex and age class

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Social network analysis has recently emerged as an excellent tool for studying animal populations and has been used to model and describe the social organisation of several species. The application of social network analysis to animal societies is quickly transforming our understanding of animal sociality; its use has highlighted previously unknown, fine-scale social organisation in primates and cetaceans, and has informed us of how individuals within a population fulfil varying roles according to specific individual traits.

This poster presents the results of a long-term study of social relationships in two wild populations of Rothschild's giraffe *Giraffa camelopardalis rothschildi* in Kenya. It

describes the role of sex and age class in the social organisation of giraffes

Food supply and poaching limit giraffe abundance in the Serengeti

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The giraffe has shown a substantial decline in numbers across Africa since the 1990s. In Serengeti National Park, Tanzania, giraffes reached densities of 1.5–2.6 individuals km^2 in the 1970s coincident with a pulse of Acacia tree recruitment. However, despite continued increases in woody cover between the 1980s and the 2000s, we observed a decrease in giraffe recruitment and survival rates and a drop in density to 0.3–0.4 giraffes km^{-2} in 2008–10. We investigated how four extrinsic factors may have contributed to these declines: food supply, predation, parasites, and poaching, which have all been previously shown to limit Serengeti ungulate populations. Lower recruitment likely resulted from a reduction in diet quality, owing to the replacement of preferred trees with unpalatable species, while decreased adult survival resulted from illegal harvesting, which appears to have had a greater impact on giraffe populations bordering the western and northern Serengeti. The Serengeti giraffe population will likely persist at low-to-moderate densities until palatable tree species regain their former abundance. Leslie matrix models suggest that park managers should meanwhile redouble their efforts to reduce poaching, thereby improving adult survival.

Ultrasound imaging of intra uterine fetal growth and development in captive firaffes (*Giraffa camelopardalis rothschildi*)

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The gestation period for the giraffe is 448-460 days or 15 months on average, which is quite long compared to other ungulates. Giraffes are polyestrous. Although giraffes manage to get good reproduction rates and spent most of their lifetime pregnant, determination of pregnancy to ensure proper surveillance, management and dietary adaptations would be of advantage. Mostly determination of pregnancy in the giraffe is routinely done by measurement of fecal progesterone. Progesterone levels will be risen in case of determined pregnancy but the method can give false positive results. This method is fairly reliable. In this study we tried to determine the exact stage of pregnancy by using ultrasound imaging. The aim was to set up a reference for measurements of fetal structures as well as for uterine structures. For this we used rectal and transabdominal ultrasound images, during early-, mid- and late-term pregnancy. One Rothschild Giraffe, aged 7 years, 600 kg weight, pregnant for her first calf, was examined by trans rectal and transabdominal ultrasound (Esaote® Pie Medical Class C, linear probe (5-10 MHz) and sectorial probe (2.5-3.5 MHz) during two consecutive pregnancies from 1 month to end of term. Ultrasound measurements of caruncles at level of uterine corpus, diameter of kidney, diameter of stomach, inter-rib space, fetal heart rate frequency, quality of the fetal fluid and measurement of the fetal eye were determined as well as a scoring system for udder size. Although, in a trained animal transrectal and-abdominal ultrasound is feasible, more data need to be collected to set references for fetal development.

Grouping and social preferences in male giraffes

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Population structure is influenced by the interaction between individuals as well as between individuals and

their environment. Therefore, living in a group is usually a trade-off between antipredator and reproductive benefits and intragroup competition for resources. In this regard, a fission-fusion system can help animals to respond to changing conditions by temporarily adjusting group size. Recent research has been shown that giraffes live in a highly flexible social environment showing both preferred and avoided relationships on individual level. To investigate grouping and male social preferences, a giraffe population of about 90 individuals were monitored six days a week from dawn to dusk for 10 months at Pongola Game Reserve, South Africa. Giraffes were individually identified by their unique pelage pattern and bulls were assigned to age classes based on body size, musculature of the neck, shape of skull and ossicones. Group composition was recorded at the beginning of each encounter and when changes occur during observation. SOCPROG 2.4 was used for determining relationships between individuals with focus on male social preferences. Medium group size of the study population is 7.7 individuals (range: 1 – 27 animals) and the modal herd size is 3 giraffes. In over 80% of the sightings mixed sex groups were encountered and the determined social differentiation index (1.10) indicates a well differentiated society, with presumably females driving the process. However, giraffe bulls are also well connected to each other (index 0.58) despite an expected overall more solitary lifestyle. The majority of the monitored adult bulls are highly associated with at least three other males, and are frequently seen together in a multi-male/multi-female group. However, older bulls are also frequently seen alone with females, whereas young adult bulls were rarely seen alone with cows. Adult males are also often seen in association with specific females, however subadult males seem not to have this strong connection with females. In conclusion, adult bulls show social preferences on individual level, but the degree of social differentiation within a male giraffe society seems to vary depending on the overall age structure of the population.