IUCN SSC GOSG
GIRAFFE & OKAPI SPECIALIST GROUP

Giraffid

Newsletter of the IUCN SSC Giraffe & Okapi Specialist Group

Note from the Co-Chairs

Giraffe conservation efforts have never been as internationally prominent as they are today – exciting times! The Giraffe Conservation Foundation's launch of World Giraffe Day – 21 June 2014 resulted in the biggest single event for giraffe conservation in history, bringing together a network of like-minded enthusiasts from around the world to raise awareness and funds. This first annual event can only get bigger and better, and a great step towards a 'One Plan' approach for giraffe.

In this issue of **Giraffid** Paul Rose and Julian further explore the steps taken towards building a more collaborative approach between the *in situ* and *ex situ* communities, based initially on critical research and now undertaking targeted efforts to save giraffe. From studbook analysis to historical distributions of giraffe, and oxpeckers to flamingos, this issue is filled with interesting tales and stories, not to forget David Brown's piece on lion vs. giraffe!

Over the past six months the IUCN SSC Giraffe & Okapi Specialist Group have worked hard to undertake the first-ever IUCN Red List assessments of all giraffe (sub)species. Dedicated members have assisted in compiling giraffe numbers and distribution, communicated with governments, NGOs, private owners and individuals across the African continent to pull together this ground breaking conservation effort. Stay tuned for updates on the IUCN Red List status for all giraffe!

Congratulations go to Dr David Stanton, a joint student of Cardiff University's School of Biosciences and the Zoological Society of London's Institute of Zoology, for the successful defence in March of his PhD on 'Phylogeography, population genetics and conservation of the okapi (*Okapia johnstoni*)'. Having travelled by pirogue, motorbike and foot across large tracts of central Congo in less than luxurious conditions to collect a mere handful of dung samples for his project (thankfully he also had the support of a number of partners contributing to sample collection), this is very well-deserved! You can read more about the first paper stemming from his project, showing the okapi's ancient evolutionary origins and unexpected resilience in this issue.

Awareness of the challenges surrounding conservation in DRC, and of the okapi, has been raised via new channels. An award-winning feature-length documentary, 'Virunga', premiered in April, highlighting the threat from oil exploration to Virunga National Park – Africa's first park, first natural World Heritage Site and site of the original discovery of the okapi. In May the okapi kicked off the new series of 'Writers Talks' held at ZSL London Zoo, with author Louise Doughty reading a heart-wrenching piece on the enigma that is the okapi, and the perils it faces, with reference to the barbaric rebel attacks on the Okapi Wildlife Reserve headquarters in June 2012.

Julian Fennessy & Noëlle Kümpel
Co-Chairs IUCN SSC GOSG

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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
GIRAFFE CONSERVATION FOUNDATION

The first-ever World Giraffe Day – 21 June 2014

Julian Fennessy & Steph Fennessy, Giraffe Conservation Foundation

In 2014 the Giraffe Conservation Foundation (GCF) initiated an exciting new initiative and celebrated the first-ever World Giraffe Day (WGD) on 21 June 2014 – the longest day or night of the year, depending on your hemisphere. Initially just an idea, WGD soon developed its own momentum and the initiative was adopted by numerous zoos, schools, conservation organisations, companies and individuals around the world who organised events on or around the day – all in support of raising awareness and support for giraffe in the wild.

WGD 2014 was certainly the most important day ever for giraffe conservation in Africa and has drawn unprecedented attention to these longest-necked animals. Media coverage exceeded our wildest expectations reaching more than 1 million people globally on social media alone and stories in newspapers and on radio worldwide might have this to tens of millions. The enthusiasm of animal care professionals and giraffe lovers around the globe was amazing as everyone truly embraced this day and made it such a special event – and one we hope to now repeat annually.

True to the day's motto, many 'stuck their necks out for giraffe conservation'. GCF asked organisations that celebrated the day to have their logo included on the WGD website (www.worldgiraffeday.org) – check out the website or see page 4 for a list of all participating organisations that forwarded their logos (please contact us if your feel your logo is missing).

Zoos, schools and individual giraffe enthusiasts organised a wide range of events to raise awareness for the plight of giraffe in Africa, while at the same time raising critical funds to support the implementation of important conservation projects across the continent. Events ranged from colouring competitions to cake sales, quiz nights to silent auctions, garage sales to matching donation pledges, information stands to presentations, kids' entertainment to sticker and merchandise sales and many more. All zoos that organised events for the day reported great interest from all visitors. See the following page for a selection of images capturing WGD events from around the world.

While a host of organisations benefited from the day's event, GCF received donations amounting to approx. US$85,000 from over 80 organisations and individuals from Africa, Australia, Europe and North America that collected donations on the day. A special mention should be made of the Leiden Conservation Foundation that set a matching gift challenge for all donations up to a total of US$25,000 – a goal that was achieved thanks to all your help and support! GCF is excited to put all donations to good use. Some of the funding will be used to further develop GCF as an organisation and in doing so aid us support conservation activities where needed most – in the field by supporting specific project work across Africa, including Ethiopia, Namibia, Niger, Uganda, Zambia and many more (have a look at the 'Our Projects' section on the GCF website, to get a better idea of what this might entail), as well as key giraffe initiatives including community conservation and education programmes working with key conservation partners around the world.

Several zoos used this first WGD as an opportunity to update the giraffe conservation information in their giraffe exhibits and/or used the GCF conservation posters as temporary or even permanent displays. High-resolution versions of both conservation posters were requested from approx. 100 organisations around the world and the posters are now also available in English, French, German, Greek, Japanese and Spanish – thank you to all who assisted with translations. Furthermore, GCF's conservation guide booklet has been printed by several organisations for further distribution, including a number of tourism operators in Namibia, Kenya and Uganda, who now include the booklet into their tourism information packages, both in English and German.

All in all WGD 2014 was a major success for giraffe conservation and we do hope that you will all join us in preparing for 2015 and make it an even bigger and better event across the globe in aid of saving Africa's giraffe! If you have any exciting ideas for giraffe related events with conservation messages, e.g. 'Longnecks for Longnecks', 'Shots for Spots', 'Jugs for Giraffe' or 'Jog for Giraffe' (stay tuned on this last one for 2015!) please contact us. We hope to start sharing these and more ideas for WGD 2015 on the WGD website soon – as well as announce an amazing fundraising drive to sponsor a 'giraffe-walk' through the Namibian desert in aid of giraffe conservation and community education – stay tuned!

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Benefitting GIRAFFE
LONGNECKS FOR LONGNECKS
June 19, 2014
6:00 pm
Irish Times Pub & Restaurant
8869 Burlington Ave Brookfield
Presented by
True
False
SAFARI
Celebrating
WORLD GIRAFFE DAY
Happy Giraffe Day
World Giraffe Day - 6/21/2014
World Giraffe
Giraffentag
21.06.14

World Giraffe Day – 21 June 2014: Participating organisations that provided their logos for use on the WGD website (www.worldgiraffeday.org):

GiraffeSpotter.org – A citizen science online platform for giraffe observations

Steph Fennessy, Giraffe Conservation Foundation

The Giraffe Conservation Foundation (GCF) with the support of the Polytechnic of Namibia has commenced an exciting project to develop an online citizen science platform for giraffe.

GiraffeSpotter.org is an easy to use web-based application that allows you and everyone else to upload your photos of giraffe together with the location where the image(s) was taken and other valuable information e.g. herd size, sex and age class of the giraffe. With the help of **GiraffeSpotter.org** GCF will be able to improve its understanding of giraffe range, distribution, numbers and ultimately giraffe's conservation status across Africa, while at the same time engaging people and raising awareness for the plight of giraffe in the wild.

You might ask why we need to undertake this project. Surely we must know everything there is to know about giraffe in Africa? Well, no! Limited long-term and comprehensive research efforts have ever been undertaken on giraffe in Africa, something which is quite remarkable considering their iconic status as 'quintessential African' to everybody around the world. While giraffe are currently listed as 'Least Concern' on the IUCN Red List, their numbers are dropping rapidly. In the late 1990s it was estimated that there were approx. 140,000 giraffe living across their range in Africa, today we estimate that there are less than 80,000 giraffe remaining in the wild. Giraffe have already become extinct in seven African giraffe range states. And to make matters worse, this is happening largely unnoticed. Our limited knowledge regarding the current status of giraffe as a species and the currently recognised nine (sub)species poses a significant threat to their long-term survival in Africa.

It is about time that giraffe get into the spotlight – something we are hoping to support with **GiraffeSpotter.org**. **GiraffeSpotter.org** is allowing people to engage and support giraffe conservation in Africa directly through their action will hopefully help to draw attention to this iconic species' plight.

While there are similar websites around that allow people to record their wildlife observations, there is nothing to record giraffe sightings. When the idea for **GiraffeSpotter.org** was born, it seemed a pie-in-the-sky idea – the idea was simple enough, but how were we ever going to implement such a project?

GCF is the world's first and only charitable foundation dedicated solely to the conservation and management of giraffe in the wild. GCF was founded in 2009 by a small and dedicated group of trustees with a strong concern for giraffe and their conservation in Africa. GCF is a small organisation run mainly by volunteers who give their free time and expertise to forward the cause, working with passion to make a difference. But with limited financial resources and very limited IT skills, **GiraffeSpotter.org** was a great idea that was bound to remain just that – an idea.

However, this changed after GCF chatted to an old friend, Professor Dr. Heike Winschiers-Theofilus of the Polytechnic of Namibia, who immediately suggested that this would be a fantastic project for her final year Software Engineering students. Without further hesitation, Dr. Heike invited GCF to pitch their concept to a group of students who became similarly excited about this real-life opportunity of making a difference to conservation in Africa. Two student groups under the competent project leadership of Donovan Maasz and Michael Chamunorwa commenced with transforming **GiraffeSpotter.org** to a real-life application as one of their final year projects.

But what exactly is **GiraffeSpotter.org**? Simply put, it is a citizen science application, a tool for giraffe science and conservation. **GiraffeSpotter.org** harnesses the power of

'citizen scientists' – anyone, anywhere in Africa who sees a giraffe in the wild can upload a photo and help to improve our understanding of these large megafauna and in turn help to protect them. Anyone can join **GiraffeSpotter.org**. Whether you are a game guard, a tour guide, a farm owner or worker, a scientist, a giraffe enthusiast or a tourist on an African safari, you can upload your photos and observations of giraffe to **GiraffeSpotter.org**. Furthermore, you can help spread the word on the plight of giraffe. Scientists from GCF and giraffe experts from around the world will use your vital information to better understand giraffe distribution and numbers as well as subspecies range. Your information will be used to improve giraffe conservation in Africa.

However, **GiraffeSpotter.org** is not limited to be used in Africa – you can even upload your images from you latest zoo visit and share them with the world. Leave a comment and let us know how you enjoyed your time there.

GiraffeSpotter.org is more than just a website. It is a community of citizen scientists and conservationists with a common goal: to protect giraffe in their natural habitat and increase our knowledge of this tall mammal.

GiraffeSpotter.org is now online, so please make sure to visit www.giraffespotter.org to contribute your giraffe observations and support giraffe conservation in Africa.

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Rothschild's refuge

Andy Tutchings, Giraffe Conservation Foundation

If there are giraffe in the vicinity, there's a good chance you'll see them. But that doesn't mean there are plenty of them around. Numbers have plummeted in recent years, and the Giraffe Conservation Foundation wants to know why. Andy Tutchings and his colleagues recently investigated the status of Rothschild's giraffe in Uganda's largest national park.

Rothschild's giraffe once numbered in the tens of thousands and ranged freely across southern Sudan, northern Uganda and north-western Kenya. Now this giraffe subspecies holds the dubious honour of being one of the most endangered animals in the world. With an estimated 1 050 individuals remaining in the wild, in 2010 *Giraffa camelopardalis rothschildi* joined Niger's West African giraffe *G. c. peralta* in the Endangered category of the IUCN Red List and is considered a high conservation priority.

Although relatively well represented in captivity (there are about 450 of these giraffe in zoos around the globe), Rothschild's has been almost entirely eliminated from much of its former range. The populations surviving in Kenya, totalling 300 or so individuals, are isolated from one another in national parks, private reserves and other protected areas to which they have been translocated or, in some cases, reintroduced (see Africa Geographic July 2011, page 16). The only naturally occurring populations left are in Uganda's Murchison Falls National Park, which holds in the region of 750 individuals according to a 2012 estimate by the Uganda Wildlife Authority (UWA), and Kidepo National Park in the north-east, where a further 50 or so are holding on.

Unlike almost all other charismatic and iconic fauna in Africa, the giraffe has well and truly slipped under the conservation radar. Astonishingly, no research project undertaken on wild giraffe has ever run for longer than four years. So it is perhaps not surprising that the dramatic fall in their numbers – more than 40 per cent in the past 15 years – has gone almost unnoticed by the conservation and greater wildlife community.

Above: Inquisitive but unperturbed, darted Rothschild's giraffe look on as a ranger retrieves a fallen dart containing DNA material. This will be analysed at the Senckenberg Natural history Museum in Frankfurt, Germany, where the first genetic map for Africa's giraffe is being produced.

The Giraffe Conservation Foundation (GCF) is working hard to address this situation and has instituted what it calls 'a new wave in giraffe research'. Given the precarious situation Rothschild's giraffe finds itself in and that no research had been undertaken on the subspecies in Uganda, the population there seemed a good place to start. Working closely with the UWA, the Uganda Wildlife Education Centre, the Uganda Conservation Foundation, Marasa Africa and the IUCN SSC Giraffe and Okapi Specialist Group, GCF recently launched its latest project in Murchison Falls National Park with the intention of developing a sustainable conservation policy that would ensure the long-term survival of giraffe.

It soon became clear just how critical the timing of this initiative is. Perhaps one of the greatest challenges facing the giraffe is that where it does survive, it can thrive and thus create the impression that there is no conservation problem. We concentrated our efforts in the western part of the park, near where the Victoria Nile and Albert Nile meet, and found Rothschild's giraffe in such abundance that we regularly saw 'herds' numbering in the 30s – even one of more than 100 individuals! With numbers such as these, 'How can there possibly be a problem?' was a response we heard all too often, not only from those who may have been expected to know better, but also from a lively Ugandan press contingent we briefed and many park visitors we met and talked to. We quickly agreed that raising awareness of the sub- species' predicament had to be a priority.

An alarming discovery was the number of giraffe we saw with wire-snare injuries. UWA vet Eric Enyel is doing a tremendous job of treating the wounded animals he and his staff find, but with the incidence of this form of poaching evidently increasing there was a general consensus that prevention is likely to be more effective than cure.

We also saw a substantial number of giraffe showing pronounced evidence of a skin disease. It's not clear how serious this may be, but it brought home to us how vulnerable the population would be to an epidemic. Sites within Uganda that would be suitable for translocation were thus included in our many discussions with partner organisations.

A third area of concern was the oil exploration that is currently under way – and increasing its footprint – in Murchison Falls National Park. It's too early to determine what impact this will have on all the wildlife in the sanctuary, giraffe included, but we will be monitoring it closely and have already begun a healthy dialogue with the company involved.

In accordance with the GCF philosophy of 'you can't save what you don't know about', the Rothschild's giraffe project will conduct the first scientific and baseline ecological assessment of the subspecies in the region. Key outputs will include a country-wide status report, a genetic profile and a habitat analysis of potential translocation sites, which in the long term are intended to sup- port the development of a national conservation strategy for giraffe in Uganda.

Are Rothschild's giraffe secure in their last stronghold? GCF is not alone in hoping so and will be joining forces with as many partners as possible to ensure that they will be.

Reprinted from Africa Geographic, November 2013.

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A historic overview of giraffe distribution in Namibia

Peter Cunningham, Environment & Wildlife Consulting Namibia

Introduction

Historic wildlife distribution in Namibia is often speculative with very little to benchmark this against. Early written records are limited to a handful of explorers/hunters/traders that focused mainly on personal trials, tribulations and anthropology while early academic papers are even more limited. References to wildlife encounters by early explorers are most often related to lion predating trek oxen or hunting elephant for ivory and ostrich for feathers, commodities in vogue at the time. However, references to other species incidentally observed can be used to deduce their distribution. This note focuses on giraffe, a megaherbivore, once more numerous and widely dispersed in Namibia than today and which probably together with other large herbivores such as elephant and black-rhino were responsible for opening up areas now dense with bush.

The first reference to giraffe from Namibia was made by Hendrik Hop who ventured along the lower Löwen River towards Keetmanshoop who on 22 December 1761 mentioned that he crossed a plain covered in *"large herds of wild animals, viz rhinoceri, giraffes, buffaloes, kudus, gemsboks, stags and aurorochs"* (Brown 2006). Other early writers who observed giraffe in the vicinity of the Orange River include Paterson (1790), le Vaillant (1796) and Lichtenstein (1812) (Shortridge 1934) although it is unclear where precisely these sightings were made although probably north of the Orange River (i.e. Namibia) as it is doubtful if giraffe range extended south of the Orange River (Bryden 1936).

According to Skinner and Chimimba (2005) giraffe formerly occurred in the northern and north-eastern parts of Namibia south to about 20° south on the Botswana border and westwards into the semi-desert areas of the Kaokoland in the north-west. In Namibia, Angolan giraffe (*Giraffa camelopardalis angolensis*) occur in scattered populations in the northern third of the country while the type locality of the Southern African/Cape giraffe (*G. c. giraffa* – now extinct in Namibia) was probably in the vicinity of Warmbad (southern Namibia), although the location was not originally cited (Griffin and Coetzee 2005).

Although this note relies heavily on anecdotal evidence and is not a comprehensive list of early Namibian explorers (and other publications), it can be viewed as a first step in attempting to identify the past distribution of giraffe in Namibia. The language and spelling of the explorers is used throughout.

Explorers and/or Publications: 1856 to 1958

Charles John Andersson (1856-1867) was a Swedish explorer, hunter and trader as well as an amateur naturalist and ornithologist who visited Namibia between 1850 and up to his death in 1867 (Table 1). James Chapman (1859) was an explorer, hunter, trader and photographer who visited Namibia between 1859 and 1864 (Table 2). Thure Gustav Een (1866), a sea captain, worked and travelled in Namibia between 1866 and 1871 (Table 3). Frederick Courteney Selous (1880) was probably one of the most famous hunters and explorers of the 19th Century, but only visited the Caprivi-Chobe River-area of Namibia during 1880 (Table 4). Eberhard Rosenblad (1894-1898) was an explorer who mostly travelled around with Axel Ericksson between 1894 and 1898, but does not make any reference to giraffe. Axel Wilhelm Eriksson (1865-1901) was a Swedish ornithologist, settler and trader who lived and travelled extensively throughout Namibia between 1866 up to his death in 1901, but did not make any reference to giraffe. Denys Reitz (1925) was a soldier, attorney, author and South African cabinet minister who visited northwest Namibia to explore this little known region during 1925 (Table 5). Captain Guy Chester Shortridge (1934) was a zoologist and later museum curator who collected mammals from Namibia between 1923 and 1924 (Table 6). Laurence George Green (1952) was a South African journalist and author (Table 7) while Rudi Bigalke (1958) was an academic and scientist – the first scientist employed in the Etosha National Park (Table 8).

Table 1. Charles John Andersson (1856 & 1858):

Year	Area	References to giraffe
1856		
	Waterberg (north & west)	"...giving chase to a troop of giraffe, we..."
	Waterberg (north – Omanbonde River area)	"Game was rather scarce, yet I managed to bag a few red bucks (pallahs) and koodoos. Tracks of giraffe, rhinoceros and elephants were by no means uncommon..."
	Grootfontein (south towards Omanbonde River)	"During the day, we saw vast troops of cameleopards..."
1858	Omaruru River area	"I was stalking some giraffe, and..."
		"I was riding leisurely along in advance of the wagon, hoping to fall in with some game, when, while passing through a thick brake, I espied a giraffe."
		"...a sharp day's march, in the course of which I killed a couple of gemsboks, and saw, for the first time, a fair sprinkling of game, such as giraffe, gemsboks, zebras, springboks, etc."
		"At the fountain Ombolo (situated on the Omaruru River), which I reached on the third day, I found the country pretty well stocked with giraffe, zebras, gnus, koodoos, etc., and I had some very decent shooting. One morning I bagged a fine stag koodoo and two giraffe."
	Omuramba-Omatako area (south of Grootfontein)	"...and having come unperceived upon a herd of camelopards, I succeeded, after a short walk, in bringing down a good-sized bull."

Table 2. James Chapman (1859):

Year	Area	References to giraffe
1859	Otjimbingwe	"The country was much more interesting in every respect, enlivened by giraffe, springbuck, gnus, zebras, klipspringers, ostriches and pous."
	Gobabis area (7 days east of Gobabis – rocky terrain as opposed to sand east & south)	"Elands and giraffe are plentiful there, and elephants are occasionally to be found..."
		"Enjoyed an exciting chase after giraffe by the way, and reached Otjimbengwe on 14th October."

Table 3. Thure Gustav Een (1866-1867)**:**

Year	Area	References to giraffe
1866	Lower Swakop River area	"When Andersson and Galton undertook their first journey into Damaraland, they found rhinoceros and giraffe in plenty at the Swakop River, but now that it is fairly common for the natives to be supplied with guns, they have quite disappeared from these areas."
	Omuramba Omatako area (north of Omatako Mt.)	"Now for the first time I saw herds of wild animals, antelope of several kinds such as wildebeest, hartebeest, gemsbok, and springbok in herds of hundreds. Giraffe and zebra also occurred, although they were not as numerous."
1867	Throughout trip	"I was again back in Otjimbingwe by the middle of May [1867]. During this

		journey much game had been killed, such as several kinds of antelope, and giraffe."

Table 4. Frederick Courteney Selous (1880):

Year	Area	References to giraffe
1880	Chobe River area	"Next day (September 6) we again kept on along the edge of the marsh, and saw much game – giraffe, elands, koodoos, impalas, blue wildebeest, tsessebes, wild pigs, and out in the marsh numberless lechwes."
		"...and reached camp again a little before sundown, just in time to see three tall, graceful giraffe issue from the forest a little distance beyond..."

Table 5. Denys Reitz (1925):

Year	Area	References to giraffe
1925	Khairos (Etosha National Park)	"Again we passed elephant and I saw a few giraffe, while there were many gemsbok in the long open glades or 'marambas' as they are called."
	Khairos (5-6 days north to Otyitundua) area	"The country improved as we went. The trees were taller, the grass more plentiful and to elephant and giraffe and oryx were now added herds of zebra and koodoo and springbok."
	Otjitndua to Ubombo	We travelled in two days to Ubombo, across picturesque game-covered plains, with quantities of gemsbok, zebra and giraffe, and more elephant."

Table 6. Shortridge (1934):

Year	Area	References to giraffe
1934	Kaokoveld (northwest)	"The number of Kaokoveld giraffe has been estimated at about 200 head, which may be approximately correct. They occur mainly in the east-central and eastern portions of that territory – from about Fransfontein (latitude 20 approx.) in the south, to some ten miles south of Ombathu in the north. According to native information, giraffe do not extend west of the Zesfontein-Kaoko-Otavi Line, nor along the valley of the lower Kunene."
		"In the Kaukauveld giraffe chiefly inhabit brak-pan country, and have been seen between Dusche and Tsau-anadum." (Wilhelm)
		"Giraffe (or indications of giraffe) were observed close to Kamanjab, Otjitemba, Qoabendus, Ombombo, Otjitunda, ten miles south of Koako-Otavi, and between Otjipongo and Ombathu."
	Outjo area	"A few giraffe wander fairly frequently from the southern Kaokoveld into the north of Outjo District – to within less than ten miles of Outjo Town."
	Etosha Pan area	"Farther east, a few periodically visit the western and south-western parts of the Namutoni Game Reserve."
		"Giraffe occur to the south and south-west of the Etosha pan." (Nelson)
	Ovamboland	"Small parties of giraffe trek through western Ovamboland fairly regularly, but, perhaps owing to the Owambo hunters, they seem seldom to remain long."
		"The occasional visitations to eastern Ovamboland may be from southern Angola."
		"Giraffe are found sparingly in the extreme eastern and western portions of Ovamboland." (Hahn)

Grootfontein District (northeast)	"Giraffe have a wider, far more scattered, range in this region than in the Kaokoveld. On this account, even a rough estimate of the numbers that inhabit Grootfontein District is speculative. It is doubtful, however, if the whole of the north-east carries more giraffe than the Kaokoveld. In the south, giraffe range within 50 miles of Grootfontein Town; a family party of three was twice seen near Fockshof; troops of from three to five (or oftener fresh spoor) were observed along many parts of the Omuramba-Omatako –
Omuramba-Omatako	most commonly between Numkaub and Ssannukannu. Giraffe are said seldom to wander south of the line Neitsas-Guntsas, and are not found in the south-west – between Grootfontein Town and Namutoni. In the south-east – towards the Bechuanaland Border – they are reported to range sparsely as far south as latitude 22, and, according to native information, may sometimes be seen on the sand-plains far east of the Waterberg. Giraffe are not common in the Grootfontein sand-veld; only a few small parties were occasionally seen. There are none in the south-west –
Waterberg area	although natives assert that they existed there formerly." "In the Kungveld they were only met with in the west – along Omuramba-Omatako (around Leopard's Kopje, etc.). (Wilhelm)
Caprivi (now Zambezi, east of the Okavango River)	"A giraffe was observed on the east side of the Okavango near Bagane (a few miles below the Popa Falls), quite near the river in almost swampy country." "In the central Caprivi – between the Okavango and the Chobe – giraffe are fairly plentiful; in the eastern Caprivi they are present on the northern border, but there are not many there today." (Balme) "They are not uncommon in the Hukweveld." (Wilhelm) "Giraffe occur in the Caprivi, and in the eastern parts of Nagamiland around Mababe." (Neale) "In the country between the Chobe and the Zambezi the giraffe is found in the neighbourhood of Linyanti; but it is not nearly so numerous there (in the eastern Caprivi) as on the other side of the former river. Immediately north of the Zambezi it is unknown." (Selous)

N.B.: Balme, Hahn, Neale, Nelson, Selous, Wilhelm – references included in Shortridge (1934)

Table 7. Lawrence Green (1952):

Year	Area	References to giraffe
1952	Kaokoveld area	"At least a thousand giraffe enrich the Kaokoveld landscape." "Down the lower Hoarusib, among the stunted ebony trees, giraffe are really common. An official told me that a troop of a hundred giraffe once ran ahead of his motor-lorry down the mountain pass to Sanitatas water-hole." "Early hunters took heavy toll of the giraffe in South West Africa, for hide was then in demand for long whip-lashes. Not even their protective colouring could save them. In the Kaokovled the giraffe has found sanctuary."
	Outjo District	"Telephone and telegraph wires in parts of the Outjo district have had to be raised to prevent collisions. In the past giraffe have become hopelessly tangled and chocked to death."

Table 8. Rudi Bigalke (1958):

Year	Area	References to giraffe
1958	Tsumeb/Grootfontein/Outjo/Gobabis areas	"On farming land, giraffe were recorded from the Tsumeb (64% of the farms), Grootfontein (17%) and Outjo (25%) districts..."
	Caprivi	"...and from the last farms in Tsumeb and Grootfontein districts northwards to the Okavango river and eastwards into the Caprivi."
	Etosha area	"...and Game Reserve II..."
	Ovamboland	"In Ovamboland the species is said to occur towards the borders."
	Gobabis area	"...and from one farm in the eastern part of the Gobabis district."
	Kaokoveld	"The species is widespread and numerous throughout the Kaokoveld, except in the coastal desert,.."

Discussion

When Andersson travelled from Walvis Bay to Otjimbingwe in 1856, he encountered giraffe in the lower reaches of the Swakop River, ten years later – 1866 – Een states that they had been extirpated. Giraffe, although not common throughout central-northern Namibia (as deduced from the references consulted) were nevertheless regularly encountered and hunted for food.

The presence of giraffe south of Windhoek towards the Orange River is difficult to determine as none of the references consulted covered these areas, although not expected to be as common due to marginal habitat; less open surface water and more open areas making it easier to pursue and hunt them.

The role giraffe had in regulating bush thickening (encroachment) in Namibia is not expected to be as significant as elephant and black-rhino albeit difficult to determine. However, the aim of this note is not to determine the causes of bush thickening[1], but rather to provide a historic overview of references to giraffe made by early explorers (and other authors) encountered up to ~150 years ago. The presence of giraffe from approximately 23° south, northwards throughout much of central-northern Namibia, indicates that sufficient fodder (mainly browse) was available to maintain such large browsers (including elephant and black-rhino) and that central-northern Namibia was not an open grassland with sparsely distributed trees as popularly believed.

[1] References to historic bush thickening in Namibia are presented elsewhere (Cunningham In press).

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Going to new length: A 'One Plan Approach' for giraffe

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Giraffe conservation collaborations between the wild and captive worlds have been less of a 'One Plan Approach' and more of an 'Unplanned Approach' to date. Whilst the *in situ* and *ex situ* giraffe worlds have been working together on projects and often looking towards the same ultimate goal, it has not necessarily been undertaken in a formalised way. The time is right to help nurture this approach and the Giraffe Conservation Foundation (GCF) is taking the lead to engage EAZA (and AZA) colleagues as a first step.

In May 2014, EAZA held its biennial conservation forum in Leipzig, Germany, and a month later hosted a combined TAG Chair meeting in Alphen aan den Rijn, Netherlands. GCF's Dr Julian Fennessy spoke about the future of giraffe in the wild and those held in captive collections – with the input of Paul Rose – at both meetings, with the aim of establishing closer links between *in situ* and *ex situ* worlds. This information, from two seemingly world-apart areas of giraffe biology, were brought together to sow the seeds within delegates' minds on the feasibility of a more integrated approach to managing and conserving and the giraffe into the future.

The giraffe is often termed Africa's forgotten megafauna and despite being one of the more charismatic of herbivores, its numbers are declining in the wild. The management of captive giraffe, and especially the good management of endangered subspecies, such as the Rothschild's giraffe (*Giraffa camelopardalis rothschildi*), enables a strong conservation link to be built between field workers and zoo-based staff, scientists and conservation biologists. The zoo world recognises the conservation potential held in the captive population of Rothschild's giraffe and therefore greater collaboration between the zoo world and the wild world can bring benefits in securing a future for this well-loved, but poorly understood creature.

A key aspect of a giraffe 'One Plan Approach' is the way in which links can be established between those in zoos and those out in the wild. The current captive giraffe population is relatively substantial. And the large audiences that zoos reach has a multitude of conservation, education, financial and advocacy benefits for those attempting long-term conservation strategies for the giraffe. The sliding scale of management suggested by the IUCN's 'One Plan' initiative that promotes an integrated conservation planning for specific species would be of great benefit to both captive and wild giraffe.

Captive giraffe are great ambassadors for their wild cousins. Genetic purity and well-managed breeding herds enable the 'Ark Paradigm' of the modern zoo to be fulfilled. It has been shown with other large ungulates that reintroduction of populations extirpated from native rangelands is possible, and ultimately successful, by using captive- bred stock. Protection of the giraffe's habitat, work with local communities and engagement with those that live alongside wild giraffe herds enable long-term preservation of the ecosystem that the giraffe needs. Explanation of the threats to giraffe as well as raising

awareness of the steep decline in the overall number of this animal left across Africa is a role that zoos, by using their giraffe, can really get involved in.

Research cross-overs

Research findings from wild giraffe can be translated into a more evidence- based system of animal management for those in zoos. Information gained on activity patterns and behavioural rhythms can enable improvements to animal wellbeing and ultimately the establishment of baseline positive welfare conditions within the zoos. Nutrition and dietary presentation of captive giraffe remain an issue. Recent developments in the use of browse, forage and species-specific concentrate feeds have helped reduce the occurrence of several nutritionally linked pathologies but giraffe can still suffer when fed inappropriately. Surveys of wild diet selection, alongside data on time spent eating and alterations in browse choice with season, can continue to inform how food for zoo giraffe is manufactured, prepared and presented.

Conservation is ultimately all about people, and the will that people have to work together to preserve species into the future. The giraffe is one of the world's most widely kept zoo animals and an instantly recognisable species to many. As of June 2014, ISIS (the International Species Information System) states that there are 328 zoos worldwide holding 1,654 animals.

Current IUCN Red List estimates for wild giraffe numbers (inclusive of all subspecies) are outdated but a decreasing population trend according to GCF is continuing with an approximate total population of fewer than 80,000 individuals. Breaking this down by subspecies, however, shows an even less healthy picture, with the West African giraffe (*G. c. peralta*) estimated at <400 and Rothschild's giraffe at <1,100 individuals. Others such as the Nubian giraffe (*G. c. camelopardalis*) could number fewer than both of these, while the Kordofan giraffe (*G. c. antiquorum*) numbers <1,900 individuals. The relatively substantial captive population for certain subspecies – and some are postulating that they may even be distinct species – therefore has a vital role to play in ensuring that those visiting giraffe in zoos are aware of the plight of their free-living counterparts.

The genetic diversity of giraffe in EEP herds and in SSP herds can be managed with the long-term future goal of potential reintroduction to range states and augmentation of existing wild herds (after the neutralisation and removal of current threats to these populations). This has been undertaken with other threatened populations of large mammals such as gorillas, Amur leopard, scimitar-horned and Arabian oryx, and Przewalski's horse. Movement and translocation of giraffe between areas in Africa already takes place, although sometimes with poor scientific basis as to whether the range state or region was originally 'home' to that subspecies. It is therefore feasible to intervene within managed giraffe populations to ensure the long-term viability of these herds. This is needed before it is too late for meaningful action to have a positive impact, and something which, together, we must do before numbers continue to dwindle.

Finally, with herds in captivity being subject to similar movements for genetic health and to ensure future breeding potential remains high, information on behavioural and social components of fitness (sociality, bonds between individuals, dispersal ages and movements of males and females, and preferred associations) that have been measured or observed in wild giraffe can be used to guide future decisions applied to exchanges of captive giraffe between institutions participating in managed breeding initiatives.

Collaboration

Both the wild giraffe and the captive giraffe population would subsequently benefit from a 'One Plan Approach' and the increased collaboration and expertise that this brings. The endorsed support of the EAZA EEP towards the GCF as the key giraffe conservation partner was encouraging and a real interest to form a collaborative relationship with the IUCN SSC Giraffe & Okapi Specialist Group.

One of the big first steps towards the collaboration was 'World Giraffe Day' (WGD) on 21 June – a new and exciting initiative from GCF to celebrate the longest-necked animal on the longest day or night (depending on geography!) of the year. Not only is WGD a worldwide celebration of giraffe, but it seeks to be an annual event to raise awareness and support, shedding light on the challenges giraffe face in the wild. Zoos, schools, NGOs, governments, institutions and conservation organisations around the world hosted events on and around 21 June 2014 to raise awareness about the issues that giraffe are facing. Such events give people a chance to show their support for efforts to ensure a future for the giraffe. The

timing of WGD was 'spot-on' as the international giraffe community came together to celebrate this amazing animal. Significant resources were raised in the first year to help conserve giraffe in the wild and with GCF leading the way, next year's plans are already underway!

Sharing ideas, information and experiences is critical and although more dialogue and more conversation is needed, it is hoped to be able to build a more secure and more robust conservation action plan for this most enigmatic of ungulates. The future of giraffe is in our hands and together we can help save it before it's too late!

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Enrichment methods used for *Giraffa camelopardalis* and *Gazella dama mhorr* at the East Midland Zoological Society, Twycross Zoo

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Introduction

To provide a more stimulating captive environment and to illicit species-specific behaviours, a review of the enrichment techniques used for two browsing ruminants, (the giraffe *(Giraffa camelopardalis)* and the Mhorr gazelle *(Gazella dama mhorr)*, held at Twycross Zoo was undertaken. It is well known that the majority of giraffe in captivity will develop some form of abnormal behaviour (EAZA, 2006) and hence enrichment protocols are vital in keeping animals occupied and stress-free.

Giraffe

Twycross Zoo maintains three giraffe; two adult females and one subadult male. The giraffe are kept in a large paddock that is predominantly gravelled except for a small hardstand. The paddock also contains three browse poles. Attached to the paddock is an indoor heated house that comprises of three stalls with automatic drinkers, high-level forage racks and elevated feed buckets.

The giraffe's diet is formed from a mixture of cereals and concentrate pellets (given twice a day) plus lucerne (available *ad libitum*). Browse is provided throughout the day depending on availability and keeper time commitments. The giraffe have access to their paddock from 8am until early evening (5.30pm in summer) unless confined due to inclement weather conditions. Twycross is correct in following husbandry procedures whereby giraffe are kept inside if the outside temperature is below 5^{o}C (Roffe, 2006).

Giraffe are classed as Low Risk by the IUCN (Antelope Specialist Group, 1996) as they are not currently threatened as an entire species in the wild; however particular subspecies are of conservation concern (Hassanin *et al.* 2007). The giraffe held at Twycross are not individuals of pure subspecies pedigree (Roffe, 2006).

Mhorr Gazelle

The zoo houses a small bachelor herd of three adult male Mhorr gazelle. The gazelle's housing comprises of a small unheated house, gravel holding area and a large grass paddock. Two fence panels have been erected in the paddock to dissipate any aggression between the animals.

The gazelle are not on complete view to the public, only visible from the zoo's miniature railway and they have 24hour access to their enclosure unless of exceptional circumstances. The gazelle's diet comprises of a concentrate ration and cereals, plus chopped vegetables and fruit. Feeding is spread between five bowls to minimise competition for food. The gazelle have access to lucerne forage inside their house.

Mhorr gazelle are a subspecies of the Dama gazelle *(Gazella dama dama),* occurring in dry savannahs and desert grasslands of Africa (Newby *at al.,* 2005). Dama gazelle are classified as Critically Endangered by the IUCN (Newby *et al.,* 2005) and as such, a viable captive population is essential to their continued survival. Similarly, Mhorr gazelle are extinct in the wild and are currently part of a reintroduction programme, ongoing since 1971 (Pickard *et al.,* 2003).

Table 1: Tree Species used for Browse at Twycross Zoo

Browse Species	**Giraffe**	**Mhorr Gazelle**
White willow *(Salix alba)*	*	*
Oak *Quercus robber*	*	
Ash *(Fraxinus excelsior)*	*	
Sweet chestnut *(Castanea sativa)*	*	
Horse chestnut *(Aesculus hippocastanum)*	*	*
Field maple *(Acer plantanoides)*	*	
Lime *(Tilia spp.)*	*	
Hawthorn *(Crategus oxycanthoides)*	*	*
Beech *(Fagus slyvaticata)*	*	
Cherry *(Prunus spp.)*	*	
Damson *(Prunus insitia)*	*	
Poplar *(Populus nigra)*	*	
Blackthorn *(Prunus spinosa)*	*	
Silver birch *(Betula pendula)*	*	
Birch *(Betula verrucosa)*	*	
Hazel (*Corylus avellana)*	*	

Methods

The period of continual enrichment (of varying procedures) took place over a five week period in August and September 2006. The main aims of the project were to encourage the performance of natural foraging and social behaviours that would form a large proportion of each species wild behavioural time budgets. Each species possesses specific anatomical or behavioural adaptations to its respective habitat and the enrichment methods that were designed attempted to maximise the use of these traits by the captive individuals. It was also the desire to develop original enrichment ideas that engaged more than one set of behaviours and aroused different senses in each species. In this fashion, the animal would be occupied for a maximum period of time. It was not possible to collect any behavioural data on the observations with and without enrichment, but causal observations by the author's showed a pronounced change in the behaviours of all four species during the enrichment period.

Provision of Browse

The consumption of browse is essential for the maintenance of health, correct digestive function and overall body condition of browsing species (Forthman, 1998). Despite not being a new way of enriching zoo ungulates, browse is not normally given in large enough to be of major benefit to the animal (EAZA, 2006), particularly at unfavourable times of the year. Time constraints and keeper commitments can be the major drawback of browse collection in the zoo and the constant rotation of stripped for new branches means browse provisioning needs to be a continual process throughout the day. Table one shows the species of tree used for browse at Twycross Zoo.

Of all browsing species at the zoo, the giraffe were provided with the largest amount of browse per day. It was noticed that the giraffe tended to pace, perform some oral stereotypies and pull at weeds growing in their enclosure when browse was absent (Roffe, 2006; Jermy, 2006). To combat such effects of boredom, the giraffe were provided with other stimuli that gave interest throughout the day.

This included providing bundles of cherry branches for the giraffe to strip the bark from as well as increasing amounts of mature hawthorn branches (that contained thicker bark and larger thorns) which made the giraffe work harder for the leaves; hence these browse bundles tended to last from morning into the afternoon compared to willow browse that was stripped entirely within twenty minutes.

The giraffe were provided with browse inside their house during the night. This has been a new addition to the management procedure of the animals (Jermy, 2006) but has had a marked effect on the behaviour of the animals when they are shut in (Roffe, 2006). The giraffe showed a preference for willow and cherry branches and readily consumed these species before moving on to other browse. Unfortunately, willow and cherry provide the least amount of enrichment (per unit of time) as the leaves and bark are stripped very quickly. When oak was given, only those branches free from acorns were used for enrichment.

Browse Pole

Mhorr gazelle feed on *Acacia* scrub in the wild (Abaigar *et al.,* 1997); in order to encourage natural browsing behaviour in the gazelle they were provided with a tall pole where browse was hung (see plate 1). A length of 'bungee' rope was used to hang browse inside the gazelle's house, providing a challenging feeding station to keep the animal's occupied (see plate 2). Mhorr gazelle will feed bipedally (Thuesen, 2007) and hence these two devices allow the animals to express foraging behaviours akin to those used in the wild.

Plate 1: Browse pole constructed for Mhorr gazelle at Twycross Zoo (Roffe, 2006).

Discussion

Cassinello *et al.* (2000) studied four groups of all-male dama gazelle and noted that there was a significant relationship between enclosure size and level of aggression. Observations of the gazelle at Twycross noted a strict social hierarchy between individuals and the smallest individual being subject to the highest level of aggressive responses (Roffe, 2006). Dissipation of aggression in the gazelle is achieved by the placement of lattice fence panels at strategic points throughout the paddock. 'Planting' of browse around the enclosure helped to reduce dominance-related aggression over particular resources, whilst also providing extra cover for the animals.

Plate 2: Browse suspended on a 'bungee' rope in indoor housing for Mhorr gazelle at Twycross Zoo (Roffe, 2007).

The giraffe were provided with enrichment according to the following schedule (for Spring / Summer months):

Despite browse being seen as an important form of enrichment for giraffe, it is believed that this should be an integral part of their diet as opposed to an irregular part of their husbandry regime (Forthman, 1998). On average, 15 bundles of branches were given to the giraffe each day, at consecutive intervals to allow for as much stimulation as possible. Stripped branches were not always replaced when fresh where hung up, as the giraffe would continue to remove the bark from all browse provided; prolonging the effectiveness of the enrichment.

As stated by Bloomsmith *et al.,* (1991) there are five main methods of providing environmental enrichment for captive animals, via nutritional, sensory, physical, occupational and social stimulatory tools. The idea behind this project was in use methods of enrichment that covered more than one of these categories, to enhance the animal's experience as much as possible. The notable

Table 2: Weekly Enrichment Rota for Three Adult Giraffe at Twycross Zoo

	08:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
Mon	3B	3B	FB	3B		3B	3B		3B	
Tues	3B	3B	FT	3B	O	3B	3B	FT	3B	
Weds	3B	3B		3B	N	3B	3B	FB	3B	
Thurs	3B	3B	FB	3B	O	3B	3B	FB	3B	FT
Fri	3B	3B		3B	N	3B	3B	FT	3B	
Sat	3B	3B	FB	3B	O	3B	3B	FB	3B	
Sun	3B	3B	FB	3B	N	3B	3B	FB	3B	FT

Key for Table: B = Bundle of Browse; FB = Feeder Ball; FT = Feeder Tube; N = Nettles; O = Onions

case in point being the use of stinging nettles *(Urtica dioica)* as enrichment for the giraffe; providing the animals with nutrition as well as sensory stimuli and also occupying their time when placed inside a browse ball (see plate 3).

Plate 3: Browse ball containing stinging nettles used for giraffe enrichment at Twycross Zoo (Rose, 2006).

As mentioned in previous papers, enrichment for captive ungulates has a strong nutritional theme. According to Joseph (2004), hoof stock should have their feed split into at least two meals per day to increase foraging times; this would seem to be a minimum guideline as in the wild species, spend the majority of their day engaged in foraging behaviours (up to 53% of a giraffe's time budget is spent on feeding (EAZA, 2006)) hence more than two feeds per day will be needed to fully occupy the animal's time.

Recommendations

The standard of care given to both species at the zoo is exemplary and the high standard of welfare is reflected in the low levels of stereotypic behaviours displayed. The recommendations for improved husbandry resulting from this project suggest that:

- More variety of furnishing in the gazelle exhibit to improve the appearance and functional value of the enclosure. Forthman (1998) states that visual barriers and more cover as being excellent forms of occupational and sensory enrichment for ungulates and owing to the highly territorial nature of this species, increased furnishings would improve the overall condition of the animals.
- As this species occurs in arid areas with minimal vegetation (Luesen, 2007), sections of the grass paddock could be changed into a sanded or gravelled areas to simulate a more naturalistic environment.
- To prolong feeding time of the giraffe when given there prepared ration, high-fibre, low sugar 'chaff' was added to bulk out each meal. It has been documented by Baxter & Plowman (2001) that the use of chaff can increase gut retention time and increase rumination behaviours in giraffe, thus satiating the animals for longer.
- The use of stinging nettles, onions and garlic (mixed in with lucerne) as sensory and nutritional enrichment for the giraffe should be encouraged, as the animals were kept stimulated between browse provisioning. However, to prevent rumen disruption, onions were not given more than three times a week.

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Clawing their way to the top: Lion vs. giraffe!

David Brown

Sometimes the lions win… and sometimes they don't.

A male giraffe contentedly strips leaves from an Acacia tree on the Serengeti plains. He wraps his long, flexible tongue around the sharp thorns of the tree branch and plucks it clean, leaf-by-leaf. He has superb eyesight and hearing and these senses are mounted on the tallest watchtower in the animal kingdom. This time though, he does not see or hear danger slinking towards him. A lion creeps towards the giraffe from the rear. The giraffe does not see the golden cat in the tall yellow grass, nor does it hear or smell it until it is too late to run. The lion launches itself at the giraffe, attacking the giraffe's hindquarters with its massive paws and grasping it with its claws. A struggle ensues as the giraffe bucks and shakes, kicking at the lion with its sharp hooves. The giraffe manages to break the hold of the lion's paws and run away to safety – for now.

Lions are the main predators of giraffe. They attack both giraffe calves and adults. More than half of giraffe calves never reach adulthood and lion predation may be the leading cause of death. Lions hunt subadult and adult giraffe also, although people rarely see these attacks. George Schaller, a famous biologist, observed only 10 lion attacks on giraffe in his three-year long study of lions in the Serengeti. If lion attacks on giraffe are rarely witnessed, then how can scientists learn about how often they happen and how successful they are?

Megan Strauss studies the ecology and behaviour of giraffe in the Serengeti ecosystem in Tanzania. She has photographed hundreds of individual giraffe. She noticed some interesting scars on the bodies of the giraffe in her study population and wondered what caused them. The answers surprised her: "When I examined the scars through my binoculars and zoomed in on digital photographs, it was clear that these scars were caused by lions. I did some reading and discovered that marine biologists use predation scars observed on living whales and dolphins to learn about their predators, so I thought this would be an exciting new method to apply to giraffe."

The first question that Megan faced was how to tell that the claw marks she observed on the giraffe were really from lions. Megan explains how she did this: "Lions, like other felids, rely on powerful forelimbs and retractable claws to grab hold of prey. Whereas hyenas, which prey on young giraffe, grab hold of prey with their strong teeth and jaws, leaving puncture wounds. As a lion drags its claws along the skin of its prey, it leaves a pretty distinctive set of parallel incisions. (Imagine dragging your fingernails through mud.)"

Scientists can learn several things about how lions attack giraffe based on the claw marks that lions inflict during failed hunts. Most of the lion claw marks are found on the hindquarters of giraffe, confirming that lions attack giraffe from behind. This makes sense because giraffe have thick skin on their neck and fronts that is difficult for lions to penetrate. There are more claw marks on giraffe in more densely wooded areas of the Serengeti than in open grassland areas. This may be because it easier for giraffe to see lions in open areas than in woodlands where the lions can better hide. No claw marks were found of giraffe

calves. When lions attack giraffe calves they probably always succeed with their hunt. When giraffe were found with missing tails or there were always claw marks on their tail stumps, hind legs or rumps. Even if the lion didn't successfully hunt giraffe with amputated tails, they can make their lives miserable because it may make it difficult for the giraffe to swat away biting tsetse flies or knock Acacia thorns out of its skin.

A lion attack on a giraffe is obviously dangerous for the giraffe, but can it be dangerous for the lion too? "Yes!" says Megan Strauss: "An attacked giraffe kicks vigorously with its forelegs and hind legs and poses a serious threat to a lion. Adult giraffe have severely injured and even killed lions with well-placed kicks. Attacking a giraffe is risky business for a lion." There are recorded incidents of giraffe decapitating lions with their kicks. One successful lion kill of a giraffe was observed where the lion brought its prey down on top of itself and was crushed to death!

Lions and giraffe have been locked in combat for millions of years and hopefully will continue their drama in the future with efforts to preserve them and their ecosystems. There is still much to learn about how lions hunt giraffe. The "autographs" that lions leave on giraffe with their claw marks are one tool that scientists can use.

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New project: Giraffe within the Free State Nature Reserve

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This project will investigate the diet selection, habitat preferences and spatial ecology of reintroduced giraffe (*Giraffa camelopardalis*) in selected protected areas of the Free State Province.

Aims and objectives of the research

The aims and objectives of the research are as follows:

- To study spatial patterns and movement over seasons by assessing the current seasonal and annual ranges of giraffe in each reserve,
- To study the habitat preferences of the giraffe, by looking at diet selection from movement patterns and social behaviour of the giraffe,
- To establish the age structure, reproductive and survival rates of the giraffe population,
- To provide appropriate data to the management and other interested parties to aid in future decision making,
- To assess the adaptation and distribution of the population after relocation and Compile a vegetation utilization map of the area the giraffe utilise,
- To use appropriate browse quantification techniques and to quantify the browse production of woody plants within the specified area, and
- To evaluate the impact on vegetation specifically the impact of the giraffe on Acacia species and other food plants.

Procedure

All research will be conducted in collaboration with the management officials. All research results will be distributed to all collaborating partners. The procedures of this study can be broken down into four sections:

Vegetation assessment

The plant species that are available to animals to feed on as well as the relative availability has to be determined in order to show dietary preferences, whether plants are selected or if they are eaten because of their availability.

To determine this, a quadrate or field transect method will be used. This will be done for each plant community present in the study area. The availability of a detailed vegetation map would be very valuable to the study;

therefore time and resources will be required to compile such a vegetation map. All the major vegetation units will be determined after compiling a vegetation map of the study area indicating the vegetation units, using geographic information systems (GIS). The woody vegetation within each identified vegetation unit will be quantified.

The dimensions of all rooted, live trees will be measured The Evapotranspiration Tree Equivalents (ETTE) (Smit 1989a) and leaf dry mass estimates of the plants will be calculated using the BECVOL-model (Biomass Estimates from Canopy Volume) In addition to the total leaf DM ha-1, stratified estimates of the leaf DM ha-1 below 1.5 m, 2.0 m and 5.0 m, respectively, will also be calculated. It is known that large individuals are able to reach higher than these mean heights, e.g. 2.5 m and 5.5 m for kudu and giraffe respectively, while breaking of branches may enable some browsers to utilise browse at even higher stratums.

From the leaf dry mass per hectare measurements an estimate of the browsing capacity of each site will be calculated using the Browse Quantification Technique is to determine the relative importance of the different vegetation types within the study area to the giraffe. Furthermore, by determining the utilisation of selected key browse species, important information will be provided for proper management programs within the area, if needed.

Field observations

This will entail following a herd of giraffe or a singleton from sunrise to sunset with the assistance of a motor vehicle. Continuous and scan observations will be made specifically for the feeding behaviour but also any other behaviour shown, this will be performed with the use of binoculars. The scan observations will be performed every 5 minutes and will consist of noting the activity of each member in the herd at that specific point in time. The continuous observation will be done alongside the scan observations and will focus on a single individual. In this case the activity and duration of that activity (by means of a stop watch) will be noted and due to the fact that the main focus is on feeding the plant species will be noted, the part of the plant be consumed and the height at which the animal is feeding (using the animals posture for the different categories) and thus a complete view will be obtained of how often and to what extent each plant species is utilized. The plant community/communities in which the animals are present will be noted and movement between GPS position will be recorded daily.

For both the scan and continuous observation the sex and age will be determined. To keep record of an individual the pattern on the side of the neck will be used as a identification marker, photographs will be taken to keep as references. This will be done for a maximum of twelve months and for a maximum of 10 days a month. If conditions allow a number of 24 hour studies will also be undertaken in order to determine their night activity which will be performed using night vision equipment as well as spot lights.

Camera traps

Camera traps will be placed at areas where they are found to be most active. A minimum of 10 camera traps will be used and will be set up through-out the study area in order to obtain data on their movements as well as the plant communities utilized. These cameras will be set to medium sensitivity and the area in front on the camera cleared. The height, direction and angle of the camera can only be determined after the preliminary visit. This is the first time this technique is used on giraffes to track movement.

Tracking of individuals by Satellite GPS collars The scientists acting in conjunction with each reserve and appropriate stakeholders will initiate and undertake tracking of 1-3 giraffe females within each reserve using GPS collars. Private funding has been obtained for the collaring operation and it is expected that those contributing (up to 6 individuals) will be present at the collaring including a film crew that will make a documentary on the status of giraffe in Africa for educational purposes.

Using the GPS collar data, destructive areas and the frequencies thereof will be identified. Once this information has been collected then a strategy of how best to approach the giraffe potential can be addressed in certain areas. It may also be that some areas are predisposed to giraffe incursion and destruction. Once the characteristics of the area can be defined, it may be possible to come up with preventative strategies.

Satellite collars provide extremely accurate data and represent the best technology available. Both scientific institutions and the public sector have shown great interest in satellite tracking, which leads to new ground for scientific research.

What is to be achieved with this study?

On a specific scale this study will aim to determine whether the giraffe in the Free State Nature Reserves are able to selectively choose certain species or does it simply eat available plants to meet its daily energy requirement. It will also aim to determine preferred plant communities, what part of the plants are eaten on certain species, the differences between the sexes as well as age classes in diet composition and level of feeding. It also aims to determine if there is significant movement between plant communities and possible explanations.

On a higher scale it aims to look for difference between small and large size reserves. Also if there is a significant difference in the behaviour between giraffe present in the different province's (biomes) or how differently structured plant communities affect feeding behaviour. It will also determine the competition of resource between males and females, and if feeding is done on different levels in order to avoid competition. Then possible movement patterns will be tested.

At the top scale the idea of this study is to form the groundwork (or a so called preliminary test) for an on-going national giraffe research project using this specific study as a master's project.

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Giraffe Conservation Status Report – Country Profile: Kingdom of Swaziland

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

Sub-region: Southern Africa

General statistics

Size of country: 17,360 km²

Size of protected areas / percentage protected area coverage: 5%

(Sub)species

South African (or Cape) giraffe *(Giraffa camelopardalis giraffa)*

Conservation Status

IUCN Red List (IUCN 2012):

Giraffa camelopardalis (as a species) – least concern

Giraffa camelopardalis giraffa – not assessed

In the Kingdom of Swaziland:

Giraffe in the Kingdom of Swaziland (referred to as 'Swaziland' in this report) are classified as royal game under the Second Schedule of the Game (Amendment) Act of 1991, an Act to amend the Game Act of 1953 and to provide for matters incidental thereto. A valid permit issued under the provisions of section 16 of the Game Act is required to hunt or attempt to hunt, or be in possession of a trophy of any royal game.

Issues/threats

The environment of Swaziland is rapidly changing as a result of population growth, industrialisation, urbanisation and increasing agricultural demands (SEAP 2012; USAID 2007; BSAP 2001). Many of these changes are negatively affecting the natural environment and the wildlife it contains (USAID 2007). Major threats to wildlife include habitat degradation, fragmentation and loss due to the conversion of natural land to other forms of land use (BSAP 2001; M. Reilly pers. comm.).

The clearing of natural vegetation for the cultivation of sugarcane has been the main land use conversion and subsequent cause of habitat loss affecting the savanna ecosystem in Swaziland (USAID 2007; BSAP 2001; M. Reilly pers. comm.). This clearing has continued unabated despite limited water availability (BSAP 2001). Other irrigated agriculture that has resulted in the clearing of large tracks of land, and subsequent destruction of habitat, include monocultures such as pineapple and

citrus, as well as large-scale timber plantations (Menne & Carrere 2007; USAID 2007).

Human settlement and increased anthropogenic activity is further exacerbating habitat loss in Swaziland (USAID 2007; BSAP 2001; M. Reilly pers. comm.). Wildlife resources have been decimated on Swazi National Land and, as a result, very few large mammals still survive there (BSAP 2001; Monadjem 1998). The presence and distribution of most large mammals in the country is therefore limited to national parks and reserves as well as privately owned ranches (Monadjem 1998). Giraffe in Swaziland are found only within the boundaries of these protected areas (M. Reilly pers. comm.).

People living in poverty are concerned with their immediate survival rather than possible environmental concerns looming ahead (USAID 2007). The growing human population is expanding into protected areas and unsustainable harvesting of woody vegetation for timber, fuel wood and building materials as well as bushmeat are occurring at increasingly higher rates (USAID 2007; BSAP 2001). There is insufficient government interest and support in developing parks and nature reserves, which leads to insufficient human and financial resources being made available for their promotion and management (SEAP 2012; BSAP 2001). Due to insufficient socio-economic incentives, neighbouring communities often do not support parks and reserves (SEAP 2012; BSAP 2001). Incidental targeted as well as non-targeted illegal hunting of giraffe occurs within these protected areas (SEAP 2012; M. Reilly pers. comm.). Giraffe are used as bushmeat, while certain parts of the body are also used for traditional muti[1] (M. Reilly pers. comm.). Inadequate size of protected areas provides further challenges as large areas are needed for large mammals like giraffe to thrive (USAID 2007). Protected areas can no longer guarantee shelter from increasing human effects.

There is further concern that recent efforts by certain human rights activists to curtail Swaziland's zero tolerance approach to illegal hunting is encouraging criminal activity in protected areas (Saving Rhinos 2011; M. Reilly pers. comm.). The initiative to protect suspects who have broken the law, as well as sponsored civil litigation against game reserves, may encourage the increase of illegal hunting (Saving Rhinos 2011). Although the act of illegal hunting is liable to prosecution, some NGOs are citing law enforcement actions as human rights abuses, thus reducing the will of private sector and parks staff from conducting effective anti-poaching (M. Reilly pers. comm.).

If the private sector cannot retain the ability to effectively protect their wildlife assets, game ranging might decline as private land owners might shift to other, more competing agricultural forms of land use (M. Reilly pers. comm.). This could reduce the range and number of wildlife such as giraffe considerably (M. Reilly pers. comm.).

Where public roads and train rails pass through wildlife areas, as in the case of Hilane Royal National Park, giraffe mortalities have occurred due to collisions (M. Reilly pers. comm.). An increase of such traffic therefore fragments habitat and increases the risk for wildlife mortalities (M. Reilly pers. comm.).

Estimate population abundance and trends

Historic

Although most large herbivores in Swaziland were hunted to extinction by the early 20th century (Reilly 1985), uncertainty remains regarding the historical presence of giraffe in the country (Monadjem 1998; Goodman & Tomkinson 1987; East 1999). Goodman & Tomkinson (1987) suggested that giraffe probably did not occur in Swaziland in recent historical times. According to East (1999), giraffe may have formerly occurred in northern Swaziland, to the north of the Komati River. It is furthermore believed that giraffe historically occurred in the lowveld savanna region in the eastern parts of the country (M. Reilly pers. comm.). Any indigenous populations that might have existed have however gone extinct (East 1999). The impacts of rinderpest on giraffe populations in Swaziland are unknown, but many believe that it played a significant role in causing their early extinction in the country. Anecdotal information suggests that giraffe may have gone extinct in Swaziland during the rinderpest outbreak of 1896 (M. Reilly pers. comm.).

Swaziland remained without giraffe until 1965, when one male and one female South African giraffe (*G. c. giraffa*) were introduced to Mlilwane Wildlife Sanctuary (M. Reilly pers. comm.). These animals were translocated from the Hoedspruit area in the South African lowveld (M. Reilly pers. comm.). Some giraffe were later translocated from

[1] Muti is a term for traditional medicine used in Southern Africa.

this founder population to Hlane Royal National Park in Swaziland.

Six giraffe from Namibia were introduced to Hlane Royal National Park in the 1970s (East 1999). Although taxonomic confusion has surrounded the (sub)species occurrence of giraffe in Namibia, evidence provided by Fennessy (2004), Brown *et al.* (2007) and Brenneman *et al.* (2003) indicated that giraffe in Namibia can be subsumed into *G.c. angolensis* (commonly known as Angolan giraffe) and not *G. c. giraffa*, as historically classified (Fennessy 2008). According to East (1999), these Angolan giraffe introduced to Swaziland never bred. However, Ted Riley (pers. comm.) indicated that the giraffe from Namibia did in fact breed with the South African giraffe, but that minimal genetic diversity exists as tick related diseases caused the death of all originally introduced giraffe from Namibian, as well as their offspring.

Recent

Since the first re-introduction, further giraffe were introduced to Hlane Royal National Park and Mkhaya Game Reserve, as well as to other privately owned properties, including Mhlosinga and Mbuluzi Nature Reserves , mainly from what are now known as the Limpopo, Mpumalanga and Kwa-Zula Natal Provinces of South Africa (East 1999; M. Reilly pers. comm.).

With the evolvement of private ownership of game and game ranching in Swaziland, the private sector has invested heavily in giraffe and their numbers and range increased steadily over recent years (M. Reilly pers. comm.). Apart from the imports into Swaziland, a number of the re-established populations have provided giraffe for further re-location within the country (M. Reilly pers. comm.).

By the new millennium, six giraffe populations occurring in protected areas throughout Swaziland amounted to an estimated total number of 80 giraffe (T. Reilly pers. comm.). Of these, approximately 10 individuals occurred in Mbuluzi Game Reserve, 13 in Mhlosinga Nature Reserve, 12 in Mkhaya Game Reserve, 25 in Hlane Royal National Park, 12 on Nisela Ranch and one in Mlilwane Wildlife Sanctuary. No giraffe were found outside of these protected areas (T. Reilly pers. comm.).

Current

At present, it is estimated that there are a total of 209 giraffe in Swaziland (M. Reilly pers. comm.). An estimated 75 giraffe occur in two proclaimed protected areas that are managed by Big Game Parks: ground censuses of 2012 indicate a population of approximately 30 individuals in Hlane Royal National Park, while Mkhaya Game Reserve is home to an estimated 45 giraffe (M. Reilly pers. comm.). Although giraffe formerly occurred in the Mlilwane Wildlife Sanctuary, they no longer exist there as it does not provide an ideal habitat for giraffe.

Further giraffe populations occur on non-proclaimed private establishments. Ground censuses of these establishments indicate giraffe populations of approximately 40 individuals in Mbuluzi Game Reserve, 11 in Mhlosinga Nature Reserve, 25 on Nisela Ranch, 25 at Oberland, 20 at Inyoni Yami Swaziland Irrigation Scheme (IYSIS), three at Panata River lodge and six at Canterbury estates (M. Reilly pers. comm.). Three giraffe were translocated from South Africa's Kwa-Zula Natal Province and introduced to the Royal Jozini Private Estate in 2011, which now hosts four individuals (J. Brown pers. comm.).

While some government managed parks in Swaziland show suitable habitat, there are no giraffe in any of these parks. There have also been no attempts to re-introduce giraffe, despite several government subventions in the past 40 years (M. Reilly pers. comm.).

In summary, current giraffe numbers for Swaziland are estimated at <210 giraffe, occurring in two proclaimed protected areas and on non-proclaimed private establishments.

Future Conservation Management

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

- Any future introductions should only be the same (sub)species as previously re-introduced – *G. c. giraffa;*
- Development of National Giraffe Strategy for Swaziland; and
- Support to dedicated giraffe conservation, habitat protection, anti-poaching, education and awareness initiatives (government, NGO and academic)

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Pioneering genetic study of Congo's elusive okapi shows ancient evolutionary origin and unexpected resilience

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Download the full story here: http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0101081;jsessionid=A21437222D6B8749CF511BEA32C38167%E2%80%99

Following the successful defence of his PhD thesis, 'Phylogeography, population genetics and conservation of the okapi (*Okapia johnstoni*)', in March, the first of a series of papers stemming from David Stanton's okapi genetics project was published in July in PLoS ONE. Dave was a joint student of Cardiff University's School of Biosciences and the Zoological Society of London's Institute of Zoology and his project has been running in parallel to and as a contribution to the range-wide okapi conservation project led by the ZSL and ICCN (the Congolese conservation authority), with the invaluable support of a number of partners in DRC and internationally, including the Royal Zoological Society of Antwerp, the Lukuru Foundation, the Okapi Conservation Project and the Wildlife Conservation Society.

In the past 20 years the wild okapi's numbers are thought to have halved. Prior to the study, little was known about the enigmatic animal, endemic to the rainforests of central and north-eastern Democratic Republic of Congo (DRC) in Central Africa. Only known to the Western world since 1901, the elusive okapi is nearly impossible to observe in the wild because of its shy nature and the remoteness of the rainforests it inhabits; a trait that has helped it avoid getting caught in the cross-fire of Congo's long-running civil conflict.

However, ongoing threat from armed conflict, habitat fragmentation, human encroachment and poaching has rendered the species 'Endangered', according to a 2013 assessment led by ZSL, IUCN and ICCN for the IUCN Red List of Threatened Species (see 'Okapi officially classified as 'Endangered' on the IUCN Red List', Giraffid Vol. 7(2) 2013:2). A better understanding of okapi genetics can in theory help steer future conservation management of the species and, ultimately, help improve its chances of survival.

Using genetic techniques similar to those employed by crime scene forensics, the team has been able to unravel the mystery behind its evolutionary origins and genetic structure. Findings were drawn from the analysis of okapi faeces collected from the rainforest, skin samples from museums, clippings of dried skin and artefacts found in villages across its range in DRC. The research showed that okapi are both genetically distinct and diverse – not what you might expect from an endangered animal at low numbers.

Higher genetic diversity means that the okapi are equipped with the necessary genes capable of withstanding changes to their environment. Beyond that they are also more likely to survive to produce offspring bearing their own resilient genetic traits. Consequently, the population is likely to continue for more generations because of the success of these individuals.

This rich and distinct genetic variation is likely to be a result of periods of forest fragmentation and expansion in the Congo Basin in the ancient past. The data show that okapi have survived through historic changes in climate, and therefore indicate that the species may be more resilient to future changes.

There is a concern however, that much of this genetic diversity will be lost in the near future, due to rapidly declining and increasing fragmented populations in the wild, making efforts to conserve the species, facilitated by the IUCN SSC Giraffe and Okapi Specialist Group, critical. Specifically, this means ensuring the integrity and security of the protected areas where okapi are found – which includes flagship World Heritage Sites like Virunga National Park and the Okapi Wildlife Reserve.

This new information will prove indispensable for future conservation management of okapi and, ultimately, its

survival. The research also provides a unique perspective to better understand the diversity of wildlife in the forests of Central Africa, including information on how these forests are likely to have changed throughout ancient history. This can be used to help conserve other animals in the Congo Basin; an area which is poorly known and where funding for conservation work is extremely limited.

Funded primarily by the Natural Environment Research Council, the project was conducted by Cardiff University and ZSL under a NERC CASE studentship, and the authors gratefully acknowledge the support of partners on the ground, in particular ICCN and its rangers who collected samples or assisted with the surveys.

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Studbook analysis on birth sex-bias, predictors for sex of the offspring and survival in three captive giraffe (*Giraffa camelopardalis*) populations

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Introduction

Managing animal populations in zoological institutions through captive breeding programs is a sophisticated process and has to be carried out carefully. There are different limitations to take into account, such as a limited space for the population or strict legislation (Hosey *et al*., 2013). To manage populations carefully, tracking information on reproductive parameters is necessary to foresee where the population is heading and possibly adapt management to certain changes (Faust and Thompson, 2000). This may include birth sex ratio and survival. Both inbreeding (Saragusty *et al*., 2012) and ageing (e.g. Eskenazi *et al*., 2003) are known to decrease sperm quality, subsequently affecting the ratio of X- and Y-chromosome-bearing spermatozoa and indirectly the birth sex ratio (Orsztynowicz *et al*., 2013). Birth sex ratio is also known to be influenced by both parents' condition (Trivers and Willard, 1973). Survival is not only influenced by inbreeding (Mar *et al*., 2012) but also by other parental traits, such as experience (Ibáñez *et al*., 2012) and age of the mother (Côté and Festa-Bianchet, 2001). A lower survival and sex-biased reproduction can compromise population growth that is necessary to reach the target numbers (N_e) for a sustainable population. This may therefore also jeopardize the continued survival of the captive population. This study focused on the birth sex-bias and survival of the captive giraffe (*Giraffa camelopardalis*) populations of the Zoo and Aquarium Association (Australasian region), European Association of Zoos and Aquaria (European region) and Association of Zoos and Aquariums (North American region) and the relations with population parameters obtained from studbook data. The aim can be formulated as follows: to assess for the three captive regional *G. camelopardalis* populations (ZAA, EAZA and AZA) whether there is a sex-biased reproduction, to investigate if there are predictors for sex of the offspring at birth using studbook data and to investigate the survival and the relations with studbook data.

Methods

The research population of *G. camelopardalis* is divided over three regional studbooks: Australasian region: 321 individuals (84 living and 237 historical), European region: 3622 individuals (752 living and 2870 historical) and the North American region: 2847 individuals (610 living and 2237 historical). Data was obtained on individual level – on sex, inbreeding coefficient of both individual and

parents, age of both the individual and of the parents (at time of birth) in days, the birth type of the parents, the experience of both parents, institution of birth, year of birth, number of generation and if the individual is alive at the moment of analysis – using SPARKS (ISIS software) and PMx (Ballou *et al*., 2011). SPSS 20.0 (IBM software) was used for analysis. Binomial test was used for analysing birth sex ratio. Chi Square Goodness of Fit test was used to analyse the biased reproduction years in the populations' history. Only years with a minimum of three births were included. If proportion males born was >= 0.51, =< 0.49 or 0.5 it was classified as male-, female- and no-bias respectively. It was assumed that biased years occur with a probability of 41.67%, 41.67% and 16.67% respectively (as explained by Faust and Thompson, 2000). Binary Logistic Regression was used to analyse predictors for sex of the offspring at birth. Factors with P > 0.25 were excluded from further analysis. Cox Regression was used to analyse the factors affecting survival. Factors with P > 0.25 were excluded from further analysis. The output provides the predictive value for the chance on survival and is formulated with a 95% confidence interval. For every analysis, outcomes were interpreted as significant when P =< 0.05, tests were conducted two-tailed if applicable. Mean numbers are formulated with ± standard errors (SE).

Results

Birth sex-bias

No birth sex-bias was observed in three regional populations, singly or combined. A female-bias was observed in the European and North American population when analysing only from reproduction age (Europe: p < 0.001; North America: p < 0.001). The Australasian population showed significantly more male-biased than female-biased or no-bias years (28, 11 and 9 years respectively).

Predictors for sex of the offspring

No predictors for sex of the offspring were found for the three regional population separately. When combining the populations (N = 4728), the birth type of the dam was a significant predictor (W = 4.663, df = 1, p = 0.031), where captive born females have a 1.177 times (95% CI 1.015 – 1.364) higher chance on producing male offspring than wild born females have. Age of the dam at time of birth was included in the model (p = 0.085) and statistically controlled for.

Survival

In the combined population (N = 3443), the following factors affect survival (statistically controlling for the institution of birth):

- Survival decreases 3.797 times (95%CI 2.875 – 5.015) with every percent increase in the inbreeding coefficient of offspring (*F*) (W = 88.366, df = 1, p < 0.001);
- Survival decreases 1.470 times (95%CI 1.009 - 2.141) with every percentage increase in the inbreeding coefficient of the dam (F_{dam}) (W = 4.025, df = 1, p = 0.045);
- Offspring of experienced sires have a 1.304 times (95%CI 1.054 – 1.612) lower survival than offspring of non-experienced sires has ($Experience_{sire}$) (W = 5.978, df = 1, p = 0.014);
- Survival increases 1.00004 times (95%CI 1.00002 - 1.00006) with every next day in the age of the dam at time of birth (Age_{dam}) (W = 18.723, df = 1, p < 0.001);
- Survival increases 1.130 times (95%CI 1.086 - 1.176) with every next generation (*Generation*) (W = 36.374, df = 1, p < 0.001);
- Survival increases 1.013 times (95%CI 1.011 - 1.016) with every next year the individual is born (*Year*) (W = 108.020, df = 1, p < 0.001);
- Males have 1.646 times (95%CI 1.537 – 1.762) lower survival compared to females (*Sex*) (W = 203.416, df = 1, p < 0.001).

In the Australasian population (N = 201), the following factors affect survival (statistically controlling for institution of birth and the generation):

- Survival increases 1.027 times (95%CI 1.010 - 1.043) with every next year the individual is born (*Year*) (W = 9.789, df = 1, p = 0.002);
- Offspring of experienced sires have a 2.835 times (95%CI 1.226 – 6.558) lower survival than offspring of non-experienced sires has ($Experience_{sire}$) (W = 5.882, df = 1, p = 0.015);
- Survival decreases 3.167 times (95%CI 1.197 – 8.381) with every percent increase in inbreeding coefficient (*F*) (W = 5.392, df = 1, p = 0.020);
- Males have a 1.671 times (95%CI 1.242 – 2.249) lower survival compared to females (*Sex*) (W = 11.469, df = 1, p = 0.001).

In the European population (N = 1626), the following factors affect survival (statistically controlling for the birth type of the sire):

- Survival increases 1.013 times (95%CI 1.010 – 1.017) with every next year the individual is born (*Year*) (W = 69.192, df = 1, p < 0.001);
- Offspring of experienced dams have a 1.342 times (95%CI 1.088 - 1.653) higher survival than offspring of non-experienced dams have ($Experience_{dam}$) (W = 7.594, df = 1, p < 0.001);
- Survival decreases 2.955 times (95%CI 2.011 – 4.342) with every percent increase in inbreeding coefficient (*F*) (W = 30.441, df = 1, p < 0.001);
- Survival increases 1.00005 times (95%CI 1.00002 - 1.00008) with every next day in the age of the dam at time of birth (Age_{dam}) (W = 11.142, df = 1, p = 0.001);
- Survival increases 1.100 times (95%CI 1.040 – 1.164) with every next generation (*Generation*) (W = 10.988, df = 1, p = 0.001);
- Males have a 1.635 times (95%CI 1.481 – 1.806) lower survival compared to females (*Sex*) (W = 94.365, df = 1, p < 0.001).

In the North American population (N = 1615), the following factors affect survival (statistically controlling for age of the dam at time of birth, age of the sire at time of birth, institution of birth and the experience of the sire):

- Survival increases 1.015 times (95%CI 1.010 – 1.019) every next year the offspring is born (*Year*) (W = 37.679, df = 1, p < 0.001);
- Survival increases 1.160 times (95%CI 1.083 – 1.242) with every next generation (*Generation*) (W = 18.128, df = 1, p < 0.001);
- Survival decreases 5.627 times (95%CI 3.544 – 8.935) with every percent increase in inbreeding coefficient (*F*) (W = 53.617, df = 1, p < 0.001);
- Males have a 1.657 times (95%CI 1.499 – 1.832) lower survival compared to females (*Sex*) (W = 97.301, df = 1, p < 0.001).

Discussion

Birth sex-bias

Bercovitch *et al*. (2004) also found no birth sex-bias in *G. Camelopardalis*, as was found in the present study. The European and North American populations were female-biased from reproduction age. There were significantly more male-biased reproduction years in the Australasian population. This is important for the management of the species where population-wide decisions (e.g. forming of bachelor groups, transfers of individuals, etcetera) are often based on the previous year (Faust and Thompson, 2000).

Predictors for sex of the offspring

The Trivers-Willard hypothesis (Trivers and Willard, 1973) states that females in a good condition tend to produce more male offspring. Male offspring requires more energy and males in good condition have a higher reproductive success than males in a poor condition. Females in a poor condition tend to produce more female offspring, since female offspring require less energy. Reproductive success fluctuates less under different conditions for females than it does for males, thus females in poor condition have a higher reproductive success than males in a poor condition. It is therefore very likely that females can adjust the sex of their offspring towards the favoured sex (Trivers and Willard, 1973). As was found in the present study, captive born mothers produce significantly more male offspring compared to wild born mothers. Most zoo animals are in a better condition than their conspecifics in the wild explaining the a higher number of male offspring born to captive born mothers under the Trivers-Willard hypothesis.

Survival

Combining the three regional populations, the following factors had an effect on the survival of the offspring: the inbreeding coefficient of both offspring and mother, the age of the mother at time of birth, the generation and the year the offspring was born. As expected, it was observed that increasing inbreeding reduces survival, in all three captive populations separately and combined. Other studies also found relationships between the inbreeding coefficient and survival in several species. Redus (2010) observed a significantly reduced survival in offspring of inbred Addra gazelles (*Nanger dama ruficollis*) compared to offspring of non-inbred individuals. Reduced survival was also found in inbred dorcas gazelle (*Gazella dorcas neglecta*), Cuvier's gazelle (*Gazella cuvieri*) and Mhorr gazelle (*Gazella dama mhorr*) over the whole life span (Cassinello, 2005). In the present study, it was also found that higher levels of dam inbreeding reduces survival of the offspring. Since inbreeding reduces the fitness of the individual (Madsen *et al*., 1996) the ability to invest

properly in the offspring may therefore be compromised in mothers with higher inbreeding levels. In the present study, survival increases when the mother was older at the time of birth, this was also found by Cameron *et al*. (2000). Côte and Festa-Bianchet (2001) provides as explanation that older mothers are often more experienced and can provide the offspring with better maternal care without this necessarily requiring more energy, therefore improving survival chances of the offspring. It was also found in the combined population that the chance of survival increases with every year later the offspring was born. Husbandry of zoo animals has significantly improved over the last few decades (Hosey *et al*., 2013). With better knowledge and experience of keeping exotic animals in captive situations, zoos provide them with better care and hence increases animal welfare (Kleiman *et al*., 2010). It is therefore very likely that the reproductive success also increases with every next year in the present study. In the combined population and in the three regional populations separately, males have a more than one and a half time lower survival chance compared to females. Ibáñez *et al*. (2012) state that offspring survival among sexually dimorphic ungulate species is higher in females than in males, presumably because males require more nutritional intake for growth (Clutton-Brock *et al*., 1985). Cassinello (2005) also found a lower survival in male *G. d. neglecta*, *G. cuvieri* and *G. d. mhorr* than in females. Bercovitch *et al*. (2004) state that sexual dimorphism in *G. camelopardalis* starts at an age of 1-2 years with adult male body mass reaching on average 154% of adult female body mass.

The results of this study indicate a single significant predictor for sex of the offspring at birth, but there are still many factors unexplored. Further investigation could give more solid outcomes on predictors for sex of the offspring at birth. Having knowledge on predictors for sex of the offspring at birth could be highly beneficial for the captive management of this species.

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Etat des lieux succin de girafes du Parc National de la Garamba (*Giraffa camelopardalis congoensis*)

Aimé Balimbaki Liama & Jeff Mapilanga, Institut Congolais pour la Conservation de la Nature (ICCN)

Introduction

Pour une mise à jour de l'information nous adressons, ci-dessous, l'état des lieux succin de girafes du Parc National de la Garamba (PNG) *(Giraffa camelopardalis congoensis*). Les éléments contenus dans ce mini rapport sont basés sur les observations de suivis sur terrain et quelques commentaires scientifiques. Ainsi, outre, l'introduction et les recommandations, 6 points sont présentés dans ce mini rapport à savoir : nombre, statut actuel face aux menaces, sexe ratio et individus en troupeau, distribution des Girafes dans le parc, actions et mesures stratégiques et enfin viabilité du noyau des girafes au PNG.

1. Nombre : Les survols effectués en fin février, en mars et en début avril 2014 ont dénombré 41 individus. Le plus grand troupeau observé a indiqué 19 individus.

2. Statut actuel face aux menaces : Les girafes du PNG sont généralement menacées par des braconniers étrangers, armés des fusils automatiques, en provenance notamment du Sud-Soudan, pour le commerce de la viande de brousse. Marginalement, on peut également évoquer la prédation par les lions. Néanmoins, le contexte sécuritaire actuel relativement amélioré dans la région semble réduire cette menace sur les Girafes ; depuis le début de cette année, aucune girafe n'est encore tuée.

3. Sexe ratio et individus en troupeau : Selon Amube[1], en 2007, le sexe ratio des Girafes du PNG était de 1 :1,2 et la proportion d'individus adultes, sub-adultes et les juvéniles était 15:04. La taille du groupe variait entre 2 à 18 individus. Actuellement, le sexe ration obtenu du plus grand troupeau est de 1 : 1,6 et la proportion des adultes et des juvéniles est de 5 :1.

4. Distribution des Girafes dans le parc : La population de girafes est concentrée dans la partie sud du parc, entre les rivières Garamba et Dungu et est subdivisée en trois groupes. Le groupe le plus nombreux est situé sud-est du parc tandis que le deuxième groupe est localisé au sud-ouest du parc et la zone autour de la station de Gangala Na Bodio. Le dernier groupe est identifié au nord du Domaine de Chasse de Gangala Na Bodio, entre la route Faradje-Dungu et le rivière Dungu (Cfr. Figure 1).

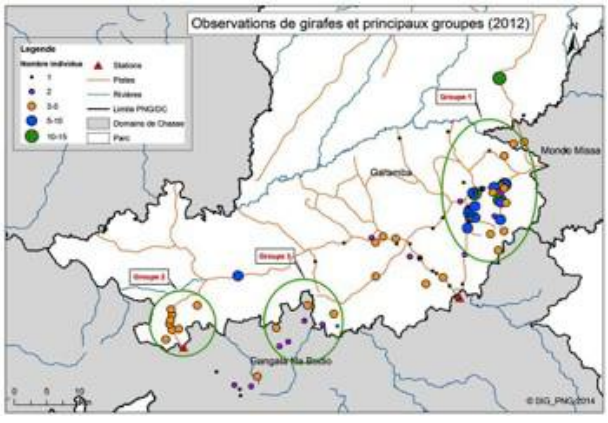

Figure 1: Carte de la distribution de girafes dans le complexe PNG

5. Actions et mesures stratégiques : Bien avant 2013, nous avons entrepris de suivre les Girafes au moyen des colliers télémétriques comme nous le faisons par ailleurs avec les éléphants et les lions actuellement. Malheureusement, la forme particulière de la Girafe n'a pas favorisé le bon fonctionnement de ces colliers et donc

[1] Amube, 2007. The Garamba subspecies of giraffe in the Democratic Republic of Congo, Note scientifique, PNG. 4 p.

cette approche s'est avérée inappropriée. Néanmoins, à court, à moyen et à long terme, nous envisageons ce qui suit:

- recensement spécifique de girafes;
- identification de chaque individu de girafe à l'aide d'une fiche appropriée et de même pour les différents groupes;
- visites d'échanges dans les aires protégées qui conservent la Girafe en vue de s'inspirer des expériences des autres dans le cadre du suivi rapproché de cette espèce;
- élaboration et mise en œuvre d'une stratégie spécifique de la conservation des girafes.

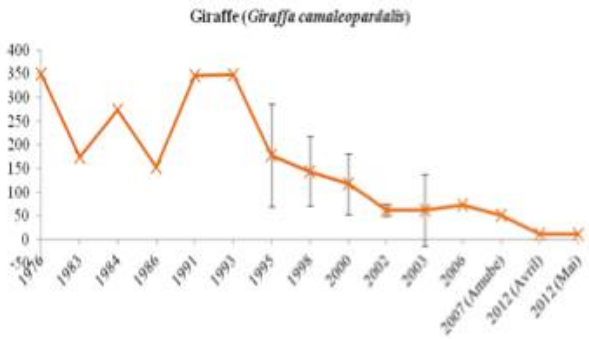

Figure 2: Evolution de la population des girafes de 1976 à 2012

6. Viabilité du noyau des girafes au PNG : La population des girafes du PNG ne fait que diminuer au fil des années.

La viabilité de cette espèce emblématique du PNG est devenue très hypothétique. Il suffit par exemple, d'une épidémie, de l'accentuation de trouble politico militaire dans la région ou d'augmentation dramatique de braconnage pour ne plus parler de girafes au PNG. Les mesures courageuses de protection doivent être prises sans attendre. Heureusement, les opportunités de la viabilité de cette espèce sont encore là:

- le sexe ratio est pratiquement équilibré (1 :1,6 avec 5 adultes contres 1 juvénile et 41 individus au total, répartis dans 3 sites différents. La possibilité de consanguinité est relativement éloignée);
- l'habitat naturel idéal des Girafes existe encore au parc notamment la savane herbeuse entrecoupée de savane boisée;
- le braconnage local sur cette espèce est moins important, étant donnée l'existence d'une croyance au sein de la population riveraine qui laisse penser que la consommation de la viande de la Girafe est la base de la lèpre ; et même si le brassage des peuples dans la région change relativement cette conception et malgré que la queue de la Girafe constitue un signe distinctif des chefs de clans;
- la tendance à la baisse de la principale menace (braconnage) sur cette espèce animale est observée depuis fin 2013;
- possibilités techniques de mettre en œuvre une stratégie spécifique de surveillance et de reproduction de girafes au moyen de clôtures appropriées par exemple.

Figure 3: Photo d'un des troupeaux de girafes dans

Recommandations

Il est nécessaire que les actions à entreprendre soient conduites à tous les échelons. De cette façon, on peut espérer renouveler la population des Girafes comme jadis. Ainsi ci desous quelques recommandations straetiques :

- Renforcer le contrôle au niveau deLA frontière avec le Sud-Soudan (provenance principale du braconnage des girafes);
- Renforce la collaboration avec le Parc National de Lantoto, au sud soudan en vue de la surveillance transfrontalière;
- Intensifie les patrouilles dans les secteurs de préférence des girafes;
- Augmenter les moyen financiers conséquents pour des actions:
  - Appui au suivi et monitoring par des recherches approfondies sur la génétique moléculaire en corrélation avec les autre sous espèces et la distribution saisonnière des populations;
  - Recherche sur les possibilités de reproduction en captivité.

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How many giraffe are there in Namibia?

Andri Marais & Steph Fennessy, Giraffe Conservation Foundation

The Giraffe Conservation Foundation (GCF) has commenced an exciting project to undertake the first-ever county-wide assessment of the conservation status of giraffe (Angolan giraffe – *Giraffa camelopardalis angolensis*) in Namibia. Financially supported by NedBank's Go Green Fund, Blank Park Zoo, Leiden Conservation Foundation and GCF, this project aims to collate all historical and currently available census and anecdotal data on numbers, distribution and translocation records of, as well as threats to, giraffe throughout Namibia in order to gain a greater understanding of their numbers and their conservation status in the country.

You might ask why we need to undertake this project. Surely we must know everything there is to know about giraffe in Namibia? Well, no. Limited long-term and no country-wide research efforts have ever been undertaken on giraffe populations in Namibia, something which is quite remarkable considering their tourism and social status. While giraffe are currently common both inside and outside protected areas in Namibia and the country's giraffe population appears to be one of only few growing giraffe populations on the continent, numbers are essentially unknown as no accurate or standardised estimate of population numbers has ever been undertaken. Additional to this, recent preliminary findings indicate that those giraffe naturally occurring in north-east Namibia maybe genetically totally different to those in the rest of the country – stay tuned for more information! Unfortunately, this lack of knowledge is not only true for Namibia' giraffe but for giraffe all across the African continent. Our limited knowledge regarding the current status of giraffe as a species and the currently recognised nine (sub)species poses a significant threat to their long-term survival in Africa.

The project will greatly enhance our knowledge of giraffe status and distribution in Namibia and will provide the necessary base for possible future giraffe research and conservation management to be conducted in the country. A greater understanding of the perceived 'healthy' giraffe population can also potentially assist with establishing a framework for the management of other giraffe populations in Africa, using Namibia as a true success story, especially considering the mix of public-private-communal land management practices. This study will also provide an invaluable framework for a possible National Giraffe Conservation Strategy for Namibia if the Ministry of Environment & Tourism sees the value. Furthermore, the data will inform the first-ever IUCN Red List assessment of the Angolan giraffe which is currently being undertaken and is critical for the international conservation of this (sub)species.

Collection and collation of data on giraffe numbers in Namibia is not an easy task as giraffe occur throughout the country and there are many private farms that host just a few giraffe or even larger populations. We are therefore dependent on a collaborative network of partners, including fellow scientists, citizen scientists, landowners, tourism and hunting industry, wildlife vets, governmental organisations and NGOs to help with this work. We would like to encourage all of you to participate in this important project, particularly if you are a private landowner and/or a manager of a property with giraffe. Please take a moment to complete the attached questionnaire and help us with our study. You can request the questionnaire in Excel to complete electronically or send us the completed sheet as a scanned or even hard copy. If you do not have the time, we would be happy to call and chat with you.

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Tall Tales

Notes from Kenya: A grieving giraffe?

We saw something very strange on obs this past week. One morning, we found our hyenas running in and out of the thicket around a tall female giraffe. Then we realized that she was standing over a juvenile giraffe that was lying on the ground. We couldn't tell what was wrong with the juvenile, but it was clearly dying. It was sprawled out on its side and every once in a while it would twitch its head and kick its legs out uselessly. We couldn't see anything visibly wrong with it but we assumed it must have broken something critical or gotten sick. The hyenas circled excitedly at first, but the mother giraffe kept standing over the juvenile, sometimes running at the hyenas until they backed off. Ripkin, one of our youngest subadults, kept sitting down in the bushes next to the juvenile, watching it hungrily.

We stayed for a long time until it became clear that the giraffe wasn't going anywhere. So we left, planning to come back that evening just in case she was still there.

That night, we made our way back, mostly expecting not to see anything since it had been so long. Instead, as we drove up, we saw the mother giraffe's head sticking out above the bushes. She was still there guarding her calf, which was still alive, but unable to stand or move much at all. There were lots of hyenas in the bushes, waiting for her to leave. They were just resting patiently, waiting. The giraffe, on the other hand, looked very stressed. She had strings of saliva hanging from her mouth and kept walking away from the juvenile as if she was about to leave, and then running back as though she'd changed her mind. We were surprised that she was still standing guard, especially since her calf was clearly not going to make it, and she was unable to eat much herself while she guarded it.

The next night when we returned, the mother giraffe was still there, but the juvenile was dead and partially eaten. The hyenas were still mostly keeping their distance but something, probably hyenas or a lion, had managed to eat out some of the internal organs. The mother giraffe either hadn't comprehended that her calf was dead, or didn't care, because she continued to keep guard over its body, chasing away any hyena that inched too close. However, after two days of vigilance, she was clearly getting tired; it was taking her longer to run back to the carcass every time she swayed away. Every once in a while she would go just far enough that a few of the hyenas would crawl up and start feeding, but then she would run back and chase them away again. We couldn't understand why she was still expending so much energy and risking starvation for a calf that was clearly dead. We guessed that it might be a grieving response similar to what scientists have observed with elephants, and it makes me wonder whether and how the hyenas might be grieving for their lost clan members after the poisoning event.

By the next morning, there were no signs that there had ever been a giraffe in that clearing at all—not even a bloodstain was left. All we found were two hyenas, Alice and Kyoto, sniffing hopefully at the ground.

Michigan State University students in the Holekamp Lab blog about their experiences in Kenya, research on spotted hyenas and adventures in the field. Posted by Phoebe Parker-Shames.

Press release – Jacksonville Zoo and Gardens

Jacksonville Zoo and Gardens is pleased to announce a tactical move to hire John Lukas, president of the Okapi Conservation Project, as the Zoo's Conservation Manager. John will lead Jacksonville Zoo and Gardens staff in developing a strategic conservation program to help advance the Zoo's current partnerships as well as forge new alliances for the benefit of wildlife and wild places. Jacksonville Zoo and Gardens supports Lukas' active and substantial involvement in managing the Okapi

Conservation Project in the Democratic Republic of Congo and leadership roles with partner organizations such as the International Rhino Foundation and the Wildlife Conservation Network.

Throughout his life, Lukas attended St. Anselm's College in 1971and Northeastern University's Graduate School of Biology where he received his Master's Degree in vertebrate zoology. He has worked during his zoological career at the Stoneham Park Zoo and Franklin Park Zoo in Boston, followed by one year in British Columbia developing educational programs for the Okanagan Game Farm and then as resident curator for the New York Zoological Society's Rare Animal Survival Center.

After getting to know paper magnate Howard Gilman during a safari to Africa in 1980, he consulted on expanding the conservation programs at White Oak and became the Center's first director in 1982. During his 30 years at White Oak Conservation Center, Lukas steered the development into a base of conservation efforts for over 25 threatened and endangered species that are part of breeding, research, training and re-introduction programs involving biologists, researchers and students from around the world.

John's holistic approach to wildlife conservation is espoused by his involvement in field conservation programs around the world. He serves as director of the Okapi Conservation Project in the rainforest of the Democratic Republic of Congo which protects the wild population of okapi through the support of wildlife rangers and assisting local communities to become better stewards of their natural resources. Lukas is a founding member and vice-president of the Wildlife Conservation Network, which provides operating funds and technical support for entrepreneurial conservationists working on the front lines of wildlife field programs, and is also a founding member and president of the International Rhino Foundation, which operates and funds in situ protection and research studies for all five species of rhinos. Additionally, John is a director of the Conservation Action Trust, an organization based in Kenya that provides aerial support to conservation projects in East and Central Africa, and serves as a trustee of the Cheetah Conservation Fund, which supports a very successful program in Namibia to preserve cheetah habitat and educate local residents on successfully coexisting with cheetah.

John Lukas has proven his value to the zoological and conservation communities and Jacksonville Zoo and Gardens is honored to welcome you to our team.

Game capture in Wankie (Hwange), Zimbabwe

We recently came across a few images that were taking by the late cameraman Des Bartlett and his wife Jen, who then worked for Armand Denis, a Belgian-born documentary filmmaker. The images were taking during the filming of a documentary on game capture in Wankie (Hwange) National Park in Zimbabwe in the early 1960s. The documentary is well worth watching if you ever get the chance. Thanks to Jen Bartlett for allowing us to share these images and providing the following commentary:

"I'm pretty sure the giraffe capture photos were taken between 4th and 12th April, 1962. The location was Ngamo Pan in what was then Wankie N.P., and the people involved were the park warden Bruce Austen (he drove the Land Rover), Harry Cantle (shorter stocky man wearing floppy hat who usually sat beside Bruce), Jordy Jordaan (he's the big man putting the blanket over the giraffe's head), Tim Braybrook, and Ron Thompson. They were a great group of guys and very efficient at capturing various species of game - their system of using a harness for leading a giraffe to the boma was a first. Using drugs for darting wasn't an option back then. Ngamo Pan was a unique situation - we camped out of sight amongst trees behind the windmill, with a lookout up the windmill to watch for game approaching across the open plain. When a target animal appeared the team swung into action. As was normal back then, I don't have names for any of the Africans! Any credit line should read Jen & Des Bartlett."
Jen Bartlett

Niger's giraffe population on the rise again

The small number of surviving giraffes in western Africa is on the rise again, after 366 were counted in southwest Niger in 2012, up from 311 the previous year, official figures published recently showed. The latest figure includes 177 males and 189 females, said Niger's ASGN department for the environment and preservation of giraffes.

ASGN, which cooperates closely with a zoo in the northwestern French town of Doue La Fontaine, finances projects to raise awareness among local populations that the world's tallest living terrestrial animal and largest ruminant should be better protected.

Giraffe numbers were down to a mere 50 just 15 years ago when a protected habitat was established in scrubland around Koure, about a one-hour drive from the capital Niamey. In 2006, studies found that population was the last of the peralta giraffe variety which is threatened by extinction due to an advancing desert and farming, environmentalists say.

Their shrinking habitat pushes them to migrate hundreds of kilometres (miles) from their usual grounds, as far as neighbouring Nigeria, making them an easier prey for poachers.

This article was reprinted from http://www.globalpost.com/dispatch/news/afp/140107/nigers-giraffe-population-the-rise-again

Elites of Pompeii dined on giraffe leg and flamingo

Archaeologists have found that the people of the ancient city of Pompeii may have eaten a varied diet, with the rich enjoying delicacies such as flamingos and the poor scrounging for soup or gruel. Steven Ellis from University of Cincinnati and his team of archaeologists have spent more than a decade at two city blocks within a non-elite district in the Roman city of Pompeii, which was buried under a volcano in 79 AD.

The excavations are uncovering the earlier use of buildings that would have dated back to the 6th century. "The material from the drains revealed a range and quantity of materials to suggest a rather clear socio-economic distinction between the activities and consumption habits of each property, which were otherwise indistinguishable hospitality businesses," Ellis said.

Findings revealed foods that would have been inexpensive and widely available, such as grains, fruits, nuts, olives, lentils, local fish and chicken eggs, as well as minimal cuts of more expensive meat and salted fish from Spain. Waste from neighboring drains would also turn up less of a variety of foods, revealing a socioeconomic distinction between neighbors. A drain from a central property revealed a richer variety of foods as well as imports from outside Italy, such as shellfish, sea urchin and even delicacies including the butchered leg joint of a giraffe.

The researcher said that the bone represents the height of exotic food is underscored by the fact that this is thought to be the only giraffe bone ever recorded from an archaeological excavation in Roman Italy. How part of the animal, butchered, came to be a kitchen scrap in a seemingly standard Pompeian restaurant not only speaks to long-distance trade in exotic and wild animals, but also something of the richness, variety and range of a non-elite diet. Deposits also included exotic and imported spices, some from as far away as Indonesia.

Ellis added that one of the deposits dates as far back as the 4th century, which he said is a particularly valuable discovery, since few other ritual deposits survived from that early stage in the development of Pompeii. The study will be presented at the joint annual meeting of the Archaeological Institute of America (AIA) and American Philological Association (APA) in Chicago.

When most people think about ancient middle and lower class eating habits, exotic foods such as imported fish might not come to mind. But the common Pompeian ate this, and much more. (Photo: CarolynConnor, CC BY 2.0)

This article was reprinted from http://www.business-standard.com/article/news-ani/elites-of-pompeii-dined-on-giraffe-leg-and-flamingo-114010500184_1.html

The curious case of the giraffe and the oxpecker

As you all ready know Snapshot Serengeti's thousands of camera-trap images are part of an ongoing study into predator interactions by Ali. There are few projects that use camera-traps as extensively as Snapshot Serengeti and of course Ali has her hands full analysing the bits relevant to her. The cameras work around the clock recording details of daily and nightly life in the Serengeti and do not discern between the stuff Ali does and doesn't want. That's why, Ali's sanity aside, they are such perfect tools. Those same cameras providing Ali's data could also be the basis of a future ecologist's research.

One of the most striking asides for me is the case of the giraffe and the oxpeckers.

Oxpeckers are small birds that feed on ticks and other parasites that they glean from the bodies of large mammals. Most usually they are seen riding along on large mammals such as buffalo, wildebeest and giraffe whilst they search their hosts for ticks or open wounds. This in itself is not an unusual occurrence and most of you

will have hit the bird /other button with these guys. Much more unusual are the shots of giraffe at night time with these birds using them as roosting spots. There are two species of oxpecker, the red-billed (*Buphagus erythrorhynchus*) and the yellow-billed (*Buphagus africanus*) both of which are found in the Serengeti.

According to research carried out by M. Stutterheim and K. Panagis that looked at the roosting habits of both species the red-billed oxpecker roosts in trees but the yellow-billed was often found roosting on their preferred host species. Apparently red-billed oxpeckers feed on a wide range of host species where as yellow-billed oxpeckers are much more picky preferring buffalo and giraffe. It is thought that the habit of roosting at night on their favourite host species is an adaptation to save the birds time looking for the right animal the following day. Given that buffalo and giraffe are prone to walking large distances this is probably very sensible.

From most of the images we have of oxpeckers on giraffe at night it is hard to tell which species they are but there are one or two where you can see the tell-tell yellow bill confirming that they are indeed yellow-billed oxpeckers. The images also show that the birds seem to prefer settling between the hind legs of the giraffe. This must be a nice warm spot in winter and keeps them safe from any nocturnal predators.

Perhaps the behaviour is not so unusual after all but rather little documented. Getting photographic evidence of birds at night on mobile roosts is obviously not easy. Looks like our camera-traps have excelled themselves again.

This article was reprinted from http://blog.snapshotserengeti.org/2014/01/17/the-curious-case-of-the-giraffe-and-the-oxpecker/

Recently published research

Oosthuizen MC, Allsopp BA, Troskie M, Collins NE & Penzhorn BL. 2009. Identification of novel Babesia and Theileria species in South African giraffe (*Giraffa camelopardalis*, Linnaeus, 1758) and roan antelope (*Hippotragus equinus*, Desmarest 1804). Vet Parasitol. 163: 39-46.

Blood specimens were received from five cases in which young adult giraffe, from different geographic origins in South Africa, showed sudden onset of disease and subsequently died. Additional specimens from two translocated giraffe, as well as one specimen from a roan antelope, were also included in the study. Blood slides from some of these animals showed the presence of piroplasms. DNA was extracted; the V4 hypervariable region of the 18S rRNA gene amplified and analyzed using the Reverse Line Blot (RLB) hybridization assay. PCR products failed to hybridize with any of the Babesia or Theileria species-specific probes, and only hybridized with the Babesia/Theileria genus-specific probe suggesting the presence of a novel species or variant of a species. Full-length 18S rDNA was amplified, cloned and the recombinants were sequenced. 18S rRNA gene sequence similarity analysis revealed the presence of novel piroplasm species in both healthy giraffe and a roan antelope and clinically sick or dead giraffe. Phylogenetic analysis grouped five of these organisms in the Babesia sensu stricto clade and three in the Theileria sensu stricto clade. Although parasites were observed in blood smears, there is no direct evidence that piroplasmosis caused the death of five giraffe, although it certainly seems to be likely.

Giraffe Conservation Foundation
&
IUCN SSC Giraffe & Okapi Specialist Group

First announcement

Giraffe Indaba III

Sticking our Necks out for Giraffe Conservation in Africa

When? *Sunday 23 August – Friday 28 August 2015*

Where? *Southern African Wildlife College, Hoedspruit, South Africa (bordering Kruger National Park)*

Preliminary programme:

- Scientific and conservation presentations and posters
- Workshop sessions on key giraffe conservation and management themes
- Game walk and drive in Kruger National Park
- IUCN SSC Giraffe & Okapi Specialist Group (GOSG) meeting prior to Indaba III (21-23 August 2015)

For further information visit the GCF website: www.giraffeconservation.org or contact indaba@giraffeconservation.org

GCF is dedicated to securing a future for all giraffe populations and (sub)species in the wild.