Uganda – Field Notes

July/August 2017

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Introduction

We have once again returned to the savannahs of Murchison Falls National Park (NP) in Uganda to continue our fourth year of research on the population ecology and spatial ecology of the world's largest known population of Nubian (Rothschild's) giraffe. Welcomed by the thousands of tawny Ugandan kobs, the masses of bellowing buffalo and the large aggregations of giraffe that dot the delta area this time of year, we added to our growing datasets on population dynamics, spatial distribution and foraging ecology of this critical giraffe population. In addition to our ongoing conservation research programme, there were other very promising and substantial developments for giraffe conservation in the country, with the first-ever National Giraffe Conservation Strategy and Action Plan workshop held in June and the remarkable efforts of Operation Twiga II (https://giraffeconservation.org/2017/09/01/operation-twiga-2) to establish a viable satellite population of giraffe on the southern bank of Murchison Falls NP during August. With our deepening knowledge of the ecology of giraffe in these complicated systems and our continued engagement with Government and conservation managers, it is an auspicious moment for giraffe conservation in Uganda.

A female giraffe wades through a sea grasses in the savannahs of Murchison Falls NP.

Understanding the Ecology of Giraffe Population Dynamics

To maintain viable populations, it is imperative to identify the key ecological touchpoints that regulate, influence and limit population dynamics. The giraffe population in Murchison Falls NP is known to be the largest Nubian population in Uganda, and on the planet! As such, understanding the dynamics of this particular population is an important priority for the conservation of this endangered subspecies. Since July 2014, we have regularly conducted photographic surveys at three-month intervals to begin to elucidate the spatiotemporal dynamics of this populations across the seasons. The July/August 2017 field season represents the eleventh seasonal survey conducted in partnership with Dartmouth College and the Uganda Wildlife Authority (UWA). Over repeated survey efforts, we can begin to piece together the mechanisms driving some of the larger scale patterns of population and spatial ecology.

A group of giraffe ruminate in the open on the shores of the Albert Nile.

To begin to investigate the key drivers of giraffe population dynamics in Murchison Falls NP, we have implemented seasonal photographic surveys. Bouncing along the dirt tracks in our 'trusty' Land Cruiser, our research team drives fixed systematic routes through the entire expanse of the northern portion of the Park taking digital photographs of all giraffe that we encounter. Since the spot patterns are unique to each individual giraffe and do not change over time, we can use them as identifying characteristics which enable us to track changes in an individual's geographic coordinates, social dynamics or health condition. We employ the use of WildID, a specially designed pattern recognition computer program to assist in correctly matching spot patterns of newly photographed giraffe to a database of thousands of previously encountered individuals. In addition to collecting images, we also take note of the age class, sex class, the presence of skin disease lesions, any signs of illegal snare wounds and the geographic coordinates of each observation. Coupling these techniques with a suite of capture-mark-recapture models, we hope to gain a deeper understanding of the spatial and temporal dynamics of the giraffe population in Murchison Falls and better appreciate the ecological interactions that drive these dynamics.

The July/August 2017 field season was among the most prolific field seasons to date, with large aggregations of giraffe observed in the delta region of the park. Preliminary analyses of data suggest that we encountered **1037 unique individual giraffe**. The age class distribution was consistent with previous surveys, suggesting a population age structure consisting primarily of adults (Fig1). Additional preliminary analyses of data suggest that we recorded **82 new calves** that were not identified during any previous survey efforts.

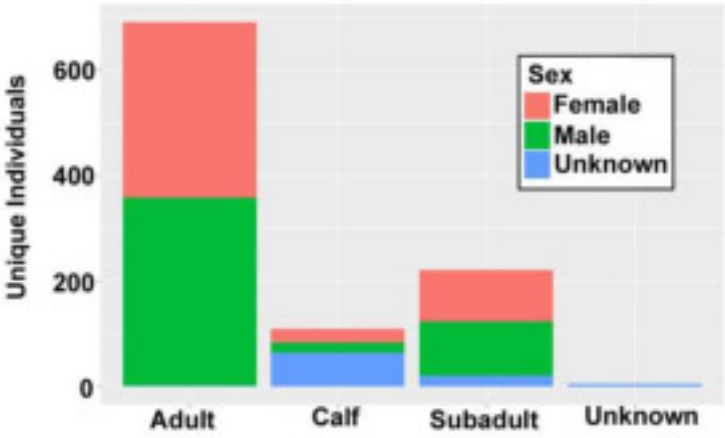


Fig 1: A summary of age class and sex of all unique observed giraffe during the July/August 2017 field season.

Consistent with all previous surveys, the observed sex ratio among all the unique documented individuals across all recognised age classes was approximately 1 male: 1 female. Determining the sex of calves is sometimes challenging under field conditions, given the lack of development of apparent secondary sexual characteristics, so many of the observed calves were of undetermined sex.

During the two rounds of the July/August 2017, we encountered **147 different herds of giraffe** throughout the Park. Giraffe sightings ranged in size from 1 to 115 individuals (Fig 2). Herd sizes ranged considerably, with a mean herd size being 11.16 giraffe (standard deviation = 16.03).

In addition to recording the spatial coordinates, age class and sex of each observed giraffe, we also monitored the presence and spatial distribution of skin disease lesions and wire snare wounds. In Murchison Falls NP, giraffe skin disease (GSD) is a poorly understood affliction that visibly manifsts itself through crusty lesions often on the neck and upper torso. Preliminary etiological studies suggest that lesions may be traced to parasitic filarial worm agents, but it is unclear what effect, if any, these lesions may have on giraffe fitness. Using dedicated capture-mark-recapture models associated with the long-term population database, we hope to better understand the potential effects of this skin disease on population dynamics and the environmental correlates spatially linked to its distribution.

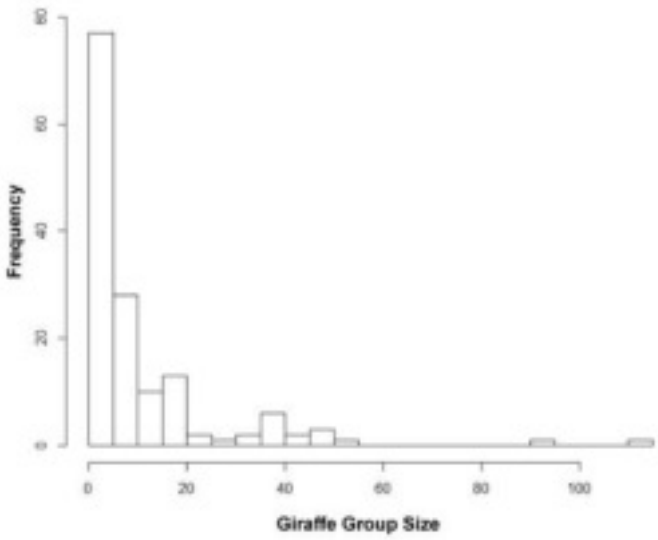


Fig 2: A histogram of giraffe group sizes during the July/August 2017 field season.

A female giraffe with a large skin disease lesion on her neck.

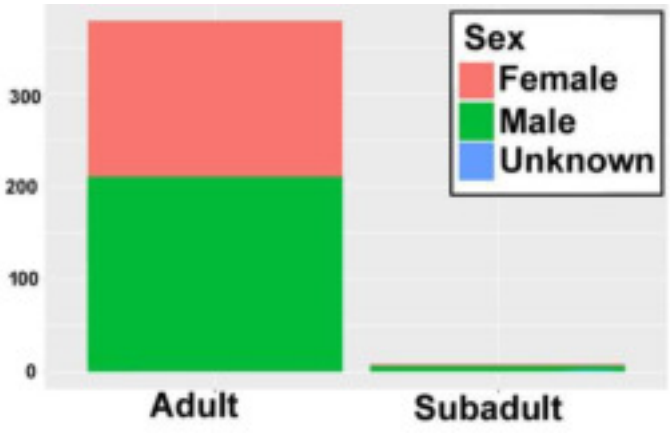


Fig 3: The age and sex classes composition of all uniquely identified giraffe with skin disease lesions.

Preliminary analyses of survey data suggest that we identified **386 unique giraffe** (37.2% of all surveyed giraffe) with visible signs of GSD. The majority of all visible signs of skin disease were observed on adult giraffe, with incidences reported relatively evenly across the sexes (Fig 3).

The spatial distribution of giraffe observations was consistent with previous wet season surveys, with a large proportion of observations in the delta and Wankwar areas of the Park. Observations associated with GSD lesions were more prevalent in the western portion of Park, with the highest density of skin disease lesions occurring in the delta area (Fig 4).

Illegal snaring for bushmeat has been identified by Park officials as a significant threat for wildlife in Murchison Falls NP. Given the reported high prevalence of the wire snare traps and the potential risk that they pose to giraffe populations, we actively monitor all giraffe for signs of wire snare encounters so as to better inform the UWA veterinary response units. Giraffe

that encounter wire snares often bear scars and swollen joints on the lower legs associated with the wire snares and subsequent infections. During the July/August 2017 surveys, we observed **31 unique individual giraffe** with visible signs of snare wounds (representing approximately 3% of all observed individuals). We also noted one individual young adult male giraffe with a wire snare still attached to the leg. After observing this individual, the UWA veterinary response unit was notified and the giraffe was subsequently immobilized, medically treated and successfully released. We also unfortunately observed the butchered carcass of a recently poached giraffe with a cable snare still attached to what remained of the leg bone; a gruesome testament the effective nature of these simple traps (photo).

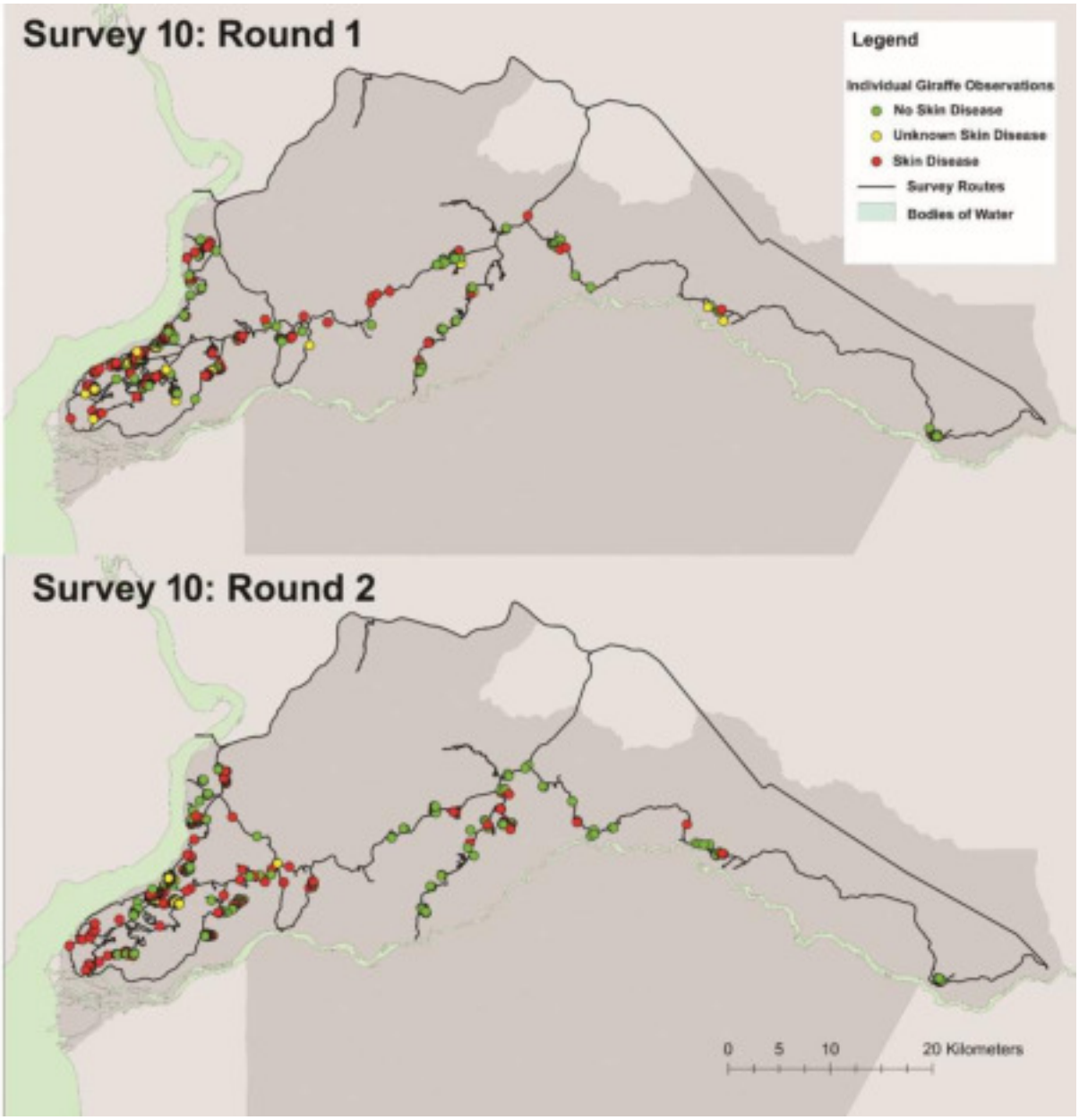


Fig 4: The locations of all giraffe sightings during both rounds of the July/August 2017 surveys. Each point represents a unique giraffe and is colour coded to indicate GSD status.

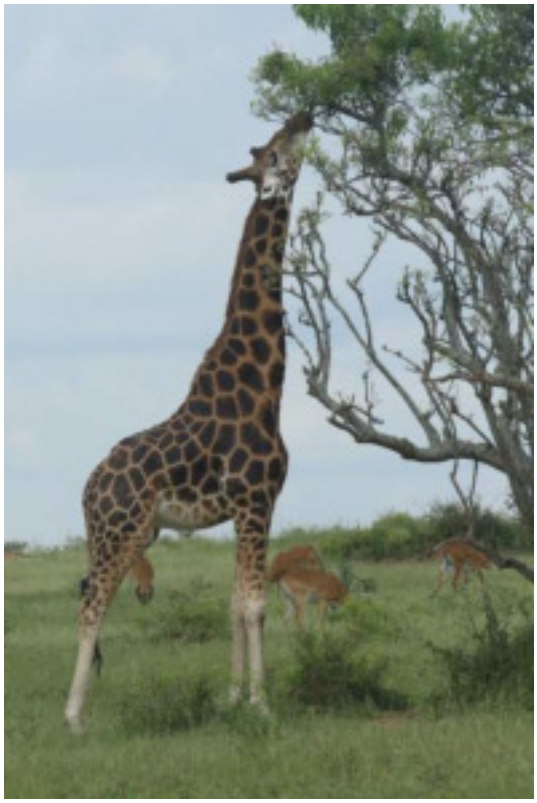
A young male giraffe with a snare still attached to his leg. The veterinary response unit was notified and this giraffe was successfully treated.

During our surveys, we encountered a giraffe carcass with a wire snare still attached to the leg.

By carefully evaluating the mechanisms of giraffe population dynamics across space and time, we aim to better understand the key resources and aspects of the ecology that make this Park such an ideal place for giraffe. Armed with this knowledge, so that we might be able to apply the lessons learned here to other systems.

Understanding Giraffe Foraging Behaviours in a Spatially Heterogeneous Landscape

Giraffe are supremely adapted to browsing. With an 18-inch tongue and impressively prehensile lips, giraffe spend the majority of their days expertly, selectively stripping woody vegetation of their most nutritious shoots and leaves. In the woodland/grassland mosaics of Murchison Falls NP's savannahs, with limited browsing competition it might seem as though there is an unending supply of suitable giraffe forage. From the perspective of a giraffe, however, all woody plants may not be created equal. Giraffe navigate a complicated nutritional and phytochemical landscape to acquire the necessary nutritional sustenance from their photosynthetic quarry. As such, from a simple microeconomics perspective, giraffe should theoretically seek to maximise their intake rate of some critical nutritional metric whilst operating under the constraints imposed by plant mechanical and chemical defences.



A male giraffe forages on a well-browsed tree.

To begin to understand how giraffe make these decisions in a spatiotemporally complicated foraging landscapes, we employ the relatively low-tech, tried-and-true method of the individual behavioural focal follow. This technique basically consists of locating a suitable giraffe at sunrise and following it over the span of the next 10-12 hours, recording the location, type, quantity and sequence of every plant item consumed. Although this technique is rather simple in

concept, giraffe are remarkably mobile and require careful attention when foraging in dense vegetation to ensure proper taxonomic identification of each food item. Further complicating the matter is the fact that plant species are not uniformly distributed across the landscape; as a giraffe moves across a savannah, the foraging decision space also changes since the different plant species are often heterogeneously scattered across different woodland types. To begin to cast light on these foraging patterns, we also conduct vegetation surveys at each single foraging location. In this way, in addition to understanding what giraffe are choosing to eat, we can also better understand what giraffe are choosing *not* to eat. This simple measurement will enable us to track shifting resource selection across spatial scales as a function of previous consumption.

During the July/August 2017, we conducted eight continuous full day focal follow observations, resulting in approximately 80 hours of observations. Over the span of these observation periods, giraffe exhibited a wide range of daily plant intake (Fig 5). Although giraffe were observed to have consumed over twenty different species over the span of the observation periods, the majority of diet consisted primarily of five dominant species of woody vegetation: *Harrisonia abyssinica, Acacia (Vacellia) sieberiana, Acacia (Senegalia) senegal, Crateva adansonii* and *Combretum sp.*

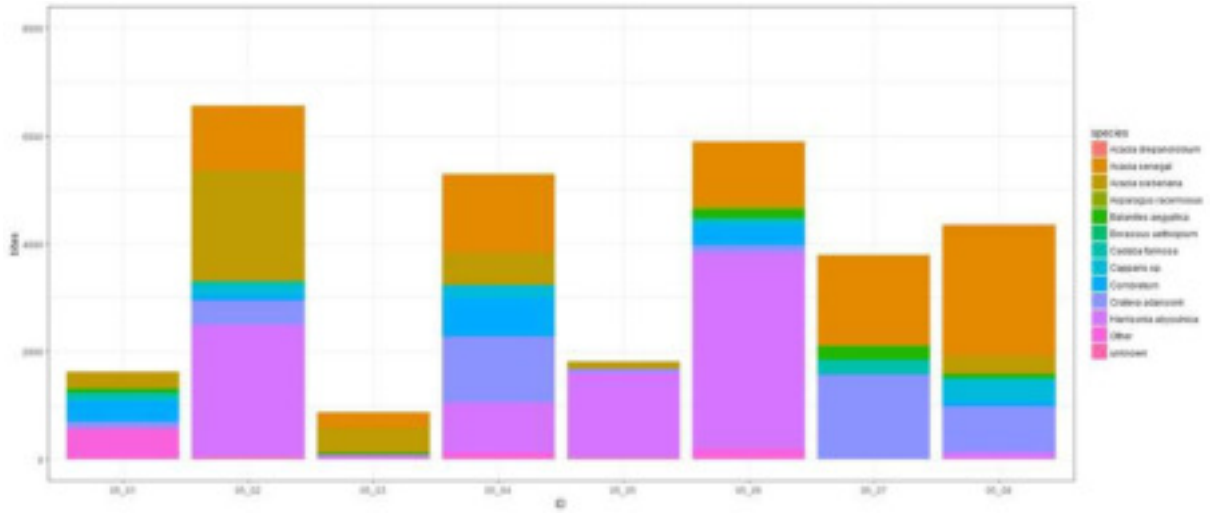


Fig. 5: Stacked bar graphs representing the daily intake of each species consumed. Each column on the x axis represents a unique day of giraffe observations and the y axis represents the number of bites taken of each tree species.

In addition to the overall quantity of plant items consumed, the sequence in which they were consumed might be an important consideration in explaining giraffe foraging decisions and the resulting spatial patterns. To demonstrate the potential effects of spatial variation in plant communities on giraffe foraging behaviour, we used simple vegetation surveys to quantify plant communities throughout the range of each foraging giraffe (Fig 6).

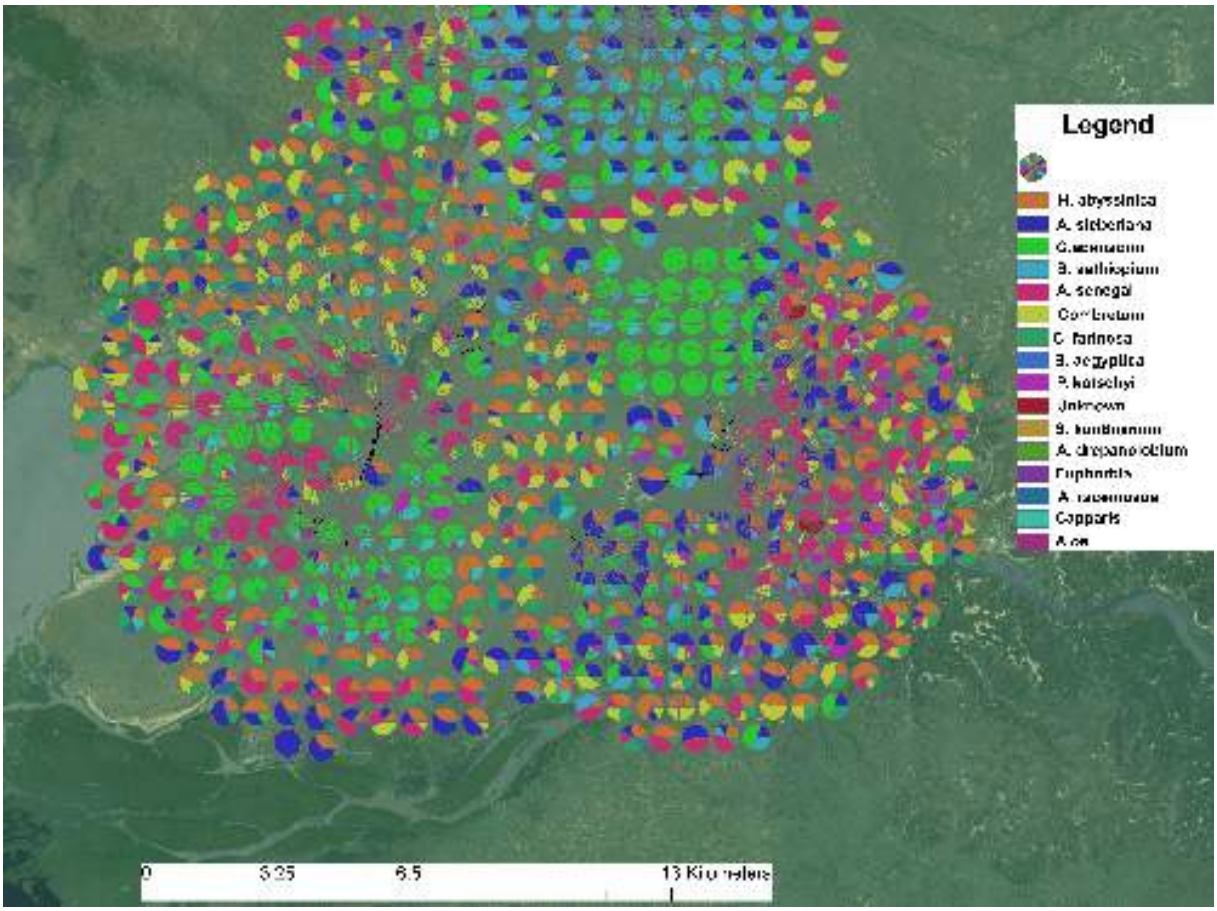


Fig 6: A map demonstrating the spatial heterogeneity of plant communities along the foraging paths of giraffe. Each pie chart represents the species composition around each giraffe foraging station.

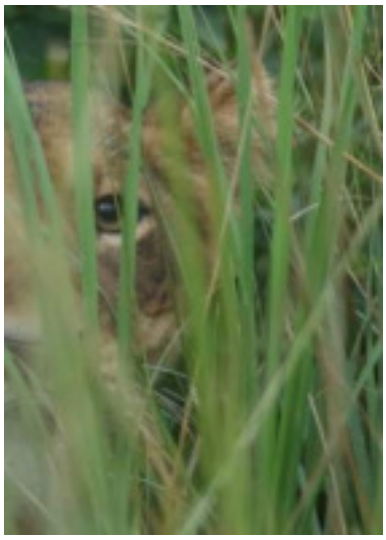
By comparing the observed intake, the available plants and shifting resource selection across space/time and comparing them to predicted behaviours under alternative optimal intake models, we hope to better understand which resources are key to giraffe foraging, and how their spatial configuration on the landscape might influence individual behaviours. By casting a light on the key resources that giraffe use and manner in which they use them, we hope to gain deeper insights into the key ecological interactions that and use this knowledge to craft better conservation strategy for these iconic species.

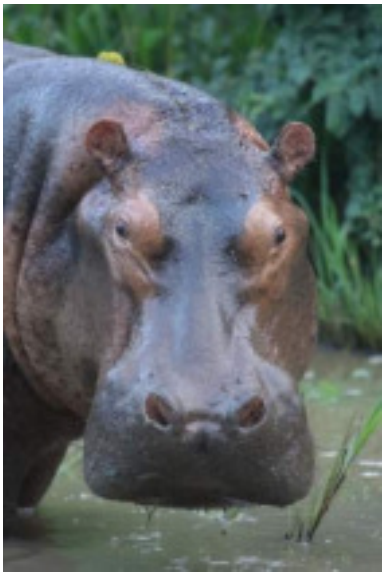
National Giraffe Conservation Strategy and Action Plan: National Stakeholder Consultation Workshop

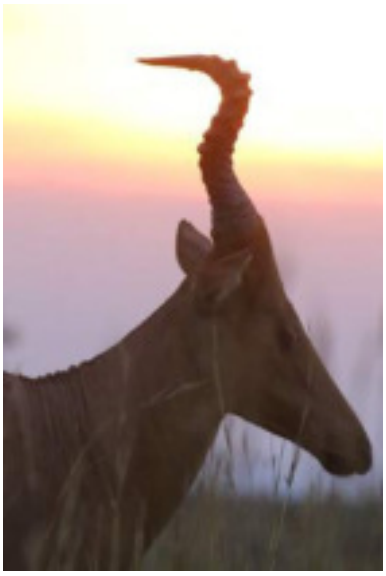
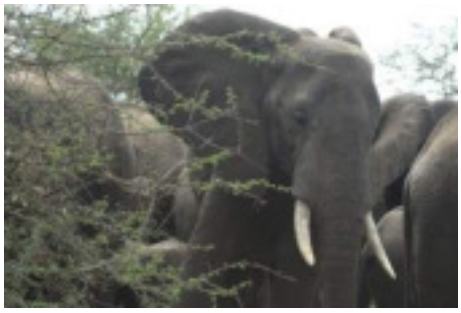
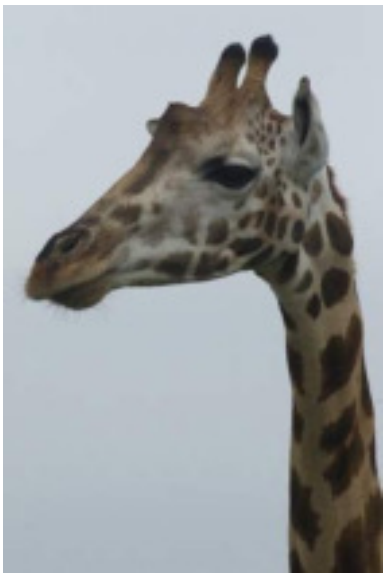
In early June 2017, key stakeholders for giraffe conservation in Uganda convened on the shores of Lake Victoria in Entebbe for a workshop designed to kick-start the first ever National Giraffe Conservation Strategy and Action Plan for Uganda. Jointly facilitated by the Uganda Wildlife Authority and the Giraffe Conservation Foundation, and funded by Chester Zoo, Cheyenne Mountain Zoo, Cleveland Metroparks Zoo, Columbus Zoo, GCF-USA, Hogle Zoo, NABU International and Wood-Tiger Foundation, this workshop sought to consult with local stakeholders and international experts to craft a comprehensive policy document to guide giraffe conservation activities in Uganda for the next ten years. Over the span of several days, the stakeholders, ranging from conservation managers, government officials, NGOs, academic institutions and zoos, identified key threats to giraffe in Uganda and proposed actionable solutions to address these conservation priorities. By the end of the workshop, an official document outlining the proceedings of the workshop and proposing a course forward was drafted. The document is currently under review for endorsement by the Ugandan Ministry, and once signed off will serve as the guiding document for giraffe conservation in Uganda for the next decade.

The attendees of the National Giraffe Conservation Strategy and Action Plan Workshop.

Stakeholders work together to identify key threats to giraffe in Uganda.






Acknowledgements