

# *Conservation Leadership Programme: Final Report*

CLP ID: 01275916

Project Title:

Wildlife Inventory of Two National Parks in Southeastern Angola

Host country:

Angola, Southeastern Angola, July to October 2016

Institutions:

Kavango-Zambezi Transfrontier Conservation Area (KAZA-TFCA), Panthera, the Angola National Institute of Biodiversity and Conservation Areas (INBAC) and the University of Namibia

Overall aim:

To provide the Angolan statutory wildlife institutions with robust data on wildlife richness and distribution in southeast Angola.

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This is an extract from a larger report compiled by a wider team and attached: Funston P, Henschel P, Petracca L, MacLennan S, Whitesell C, Fabiano E, and Castro I (2017). The distribution and status of lions and other large carnivores in Luengue-Luiana and Mavinga National Parks, Angola. KAZA TFCA Secretariat (KAZA), Gaborone, Botswana.

## **Project Partners & Collaborators**

Angola National Institute of Biodiversity and Conservation Areas (INBAC) – provided the necessary research permits and facilitated the acquisition of work permits for team members residing in Namibia.

Panthera – secured additional funding to complement the \$12500 secured from CLP, provided field equipment, camera traps, guided data analysis and report compilation

Kavango-Zambezi Transfrontier Conservation Area (KAZA-TFCA) – facilitated the application of political support from the Angolan Government in particular the Angolan Ministry of Environment.

University of Namibia – provided leave that allowed the project leader to participate in the field and other in-kind support.

## Contents

Summary.....	1
Project members .....	2
Aim and objectives.....	3
Changes to original project plan .....	3
Methodology .....	4
<i>Data collection and analysis</i> .....	4
Outputs and Results.....	5
<i>Objective 1 Species inventory</i> .....	5
<i>Objective 2 Threat to wildlife</i> .....	10
<i>Objective 3 Recommendations</i> .....	12
Communication and Application of results .....	12
Monitoring and Evaluation .....	13
Achievements and Impacts.....	13
Capacity Development and Leadership capabilities.....	14
Conclusion .....	14
<i>Problems encountered and lessons learnt</i> .....	15
<i>In the future</i> .....	15
Financial Report.....	16
Appendices .....	17

## Summary

Angola emerged from a prolonged civil unrest over 15 years ago. This unrest is reported to have negatively impacted wildlife both demographically and spatially. Furthermore, it prevented the training of Angola nationals in various aspects related to wildlife management. This project aimed at reducing these issues by surveying the Luengue-Luiana and Mavinga National Parks in southeastern Angola. Through camera trapping surveys we compiled an inventory of wildlife within these parks, collected spatial data on potential threats, formulated recommendations for an improved management and protection of wildlife in these parks and exposed park staff to the use of camera trapping for wildlife monitoring. From a total of 37,032 independent captures, captured over a 3-months period, 51 mammal species were identified ranging from small mammals such as various species of mongooses to mega herbivores such as the elephant. The spatial distribution of wildlife was lower in areas highly populated with humans. Threats noted included include illegal harvesting of wildlife and logging. Poverty was pervasive. Park personnel were successfully exposed to the use of camera trapping for monitoring wildlife. Overall, there is a need to explore alternative livelihoods and reinforce anti-poaching, to allow the wildlife to increase in number.

## Project members

**Ezequiel Fabiano:** holds a PhD in Zoology and have field experience in the application of camera trapping for monitoring wildlife; currently I am a lecturer at the Department of Wildlife and Management and Ecotourism, University of Namibia. I was the team leader with the primary role of ensuring that all team members participated in all phases of the project ranging from field work to report compilation as far as it was possible.

**Ivania Castro:** holds a BSc in Zoology from the Agostinho Neto University, Luanda – Angola; currently I am a Biologist at the Angola National Institute for Biodiversity and Conservation Areas. I was primarily an understudy as working with cameras was novel to me. Hence, I assisted with placement of cameras and with some aspects regarding processing of camera trapping data as well as compiling this report.

**Iracelma Machado:** holds a veterinary degree from the University of São Paulo, Brazil, Faculty of Veterinary Medicine and Zootechnical Engineering; currently I am Doctor of Veterinary Medicine at Institute of Veterinary Services of Angola. My involvement revolved around placement and monitoring of cameras and compiling this report.

**Carolyn Whitesell:** Carolyn is currently completing her PhD in Ecology at University of California, Davis. She gained field experience during her dissertation research on human-lion conflict in Botswana, and previously worked for one year at the Cheetah Conservation Fund in Namibia. She assisted with organizing the logistics for fieldwork and deploying as well as retrieving the cameras.

## **Aim and objectives**

The overall goal of this project was to improve conservation management and protection of wildlife in the Luengue-Luiana and Mavinga National Parks in southeastern Angola. The project provides data against which one can measure the effectiveness of future conservation actions in the study area. The project objectives were to determine the presence, distribution, and abundance of large carnivore species and ungulates in these parks, as well as the presence and distribution of anthropogenic threats to wildlife in the study area. Specific objectives included:

1. Use camera traps to inventory wildlife within Luengue-Luiana and Mavinga National Parks, targeting areas with concentrations of wildlife, such as pans, saltlicks, and key rivers, which will be mapped in the process.
2. Collect spatial data on potential threats to large carnivores and other wildlife (e.g. presence of livestock/herders, settlements, poachers sign, etc).
3. Train park staff of use of camera traps for monitoring wildlife.
4. Formulate recommendations for an improved management and protection of the Angolan KAZA areas for the Angolan wildlife authorities.

These objectives remained unaltered.

## **Changes to original project plan**

The only objective that was not fully delivered was the capacity building objective specifically the section on training personnel from the park on camera trapping data analysis. This was because of the extremely low levels of literacy by park personnel. The remoteness of the area which proved to be a challenge. To this end, we are planning a workshop but targeting mostly personnel from INBAC from the national office. This is being planned for either later this year or early 2018.

Additional problems included the theft of numerous camera traps and challenges of having all team members in the field simultaneously as they belong to different institutions. The latter was addressed by having a rotational approach whereby three team members were always on the ground. Additional efforts were made to have regular contact via communication outlets such as skype or WhatsApp. However, limited internet availability in Luanda prevented us from being able to have regular meetings. High air fares from Namibia to Angola and the bureaucratic process of

acquiring visas also prevented the team from meeting more regularly. As for camera stolen, this was accounted during data analysis.

## **Methodology**

### *Data collection and analysis*

To meet objectives 1 and 2, single Panthera V6 camera traps, were distributed at 252 locations between July and October 2016, covering an area of 27,500 km<sup>2</sup> (Figure 1). The study area was overlaid with a regular grid of 4 x 4 km and cameras placed at intervals of 4 km apart. At each site, cameras were attached to a tree roughly at knee height, facing a vehicle track, game trail or waterhole points. Here we targeted primarily sites with evidence of wildlife signs. The area directly in front of a camera was cleared in order to reduce false triggers. Due to the vastness of the area a rotational approach was used, whereby the target area was divided into four sampling zones, and cameras remained at each zone for about 5 weeks (range: 2–46 days; average 33 days). Photographs were downloaded at the end of each sampling session and through citizen science data was sorted to the species level. This was followed by a verification species ID by team members. In addition to tally dubious activities from camera trapping records, objective 2, we also recorded data on threats through direct observations while traversing the park in route to setting or retrieving cameras or at villages (e.g. hanging skins of wildlife, hunting camps).

To ensure transfer of knowledge and skills concerning the use of camera trapping to inventory and monitor wildlife (objective 3), park staff members and a member of the National Institute for Biodiversity and the National Veterinary Institute (team members) participated actively in the project (e.g. setting of cameras, downloading, etc.). Recommendations were then formulated based on findings of objective 1, 2 and 4.

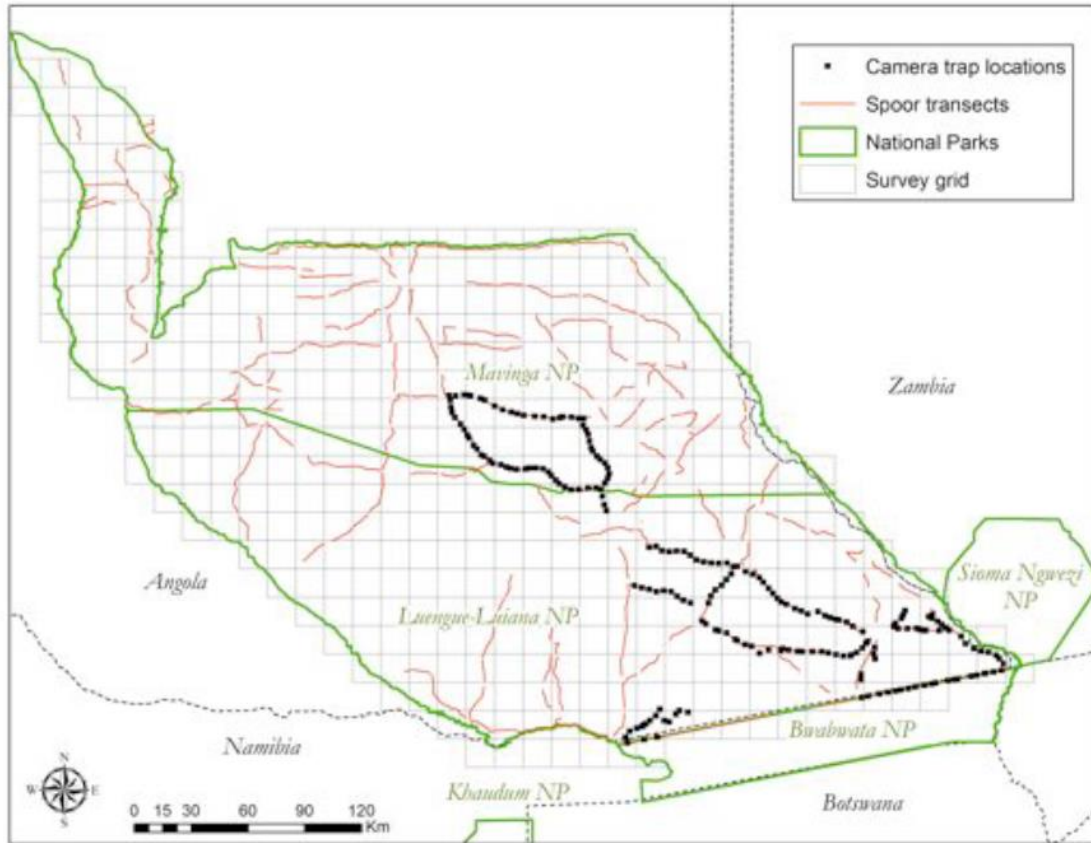


Figure 1. Location of camera traps within the boundaries of Luengue-Luiana and Mavinga National Parks, southeastern, Angola. From: Funston P, Henschel P, Petracca L, MacLennan S, Whitesell C, Fabiano E, and Castro I (2017). The distribution and status of lions and other large carnivores in Luengue-Luiana and Mavinga National Parks, Angola. KAZA TFCA Secretariat (KAZA), Gaborone, Botswana.

## Outputs and Results

### *Objective 1 Species inventory*

A total of 288,479 photographs were recorded, of which 237,910 were blanks over 9,626 camera-trap nights. From the 50,569 photos that did contain animals, 51 mammal species were recorded (Figure 2). Of these, the vervet monkey, Grey duiker and domestic animals had the highest capture rates while springhare, large grey mongoose and a reptile the lowest (Figure 3).





Figure. 2 Poster of species detected during 3 months of camera trapping at the Luengue-Luiana and Mavinga National Parks, southeastern, Angola.

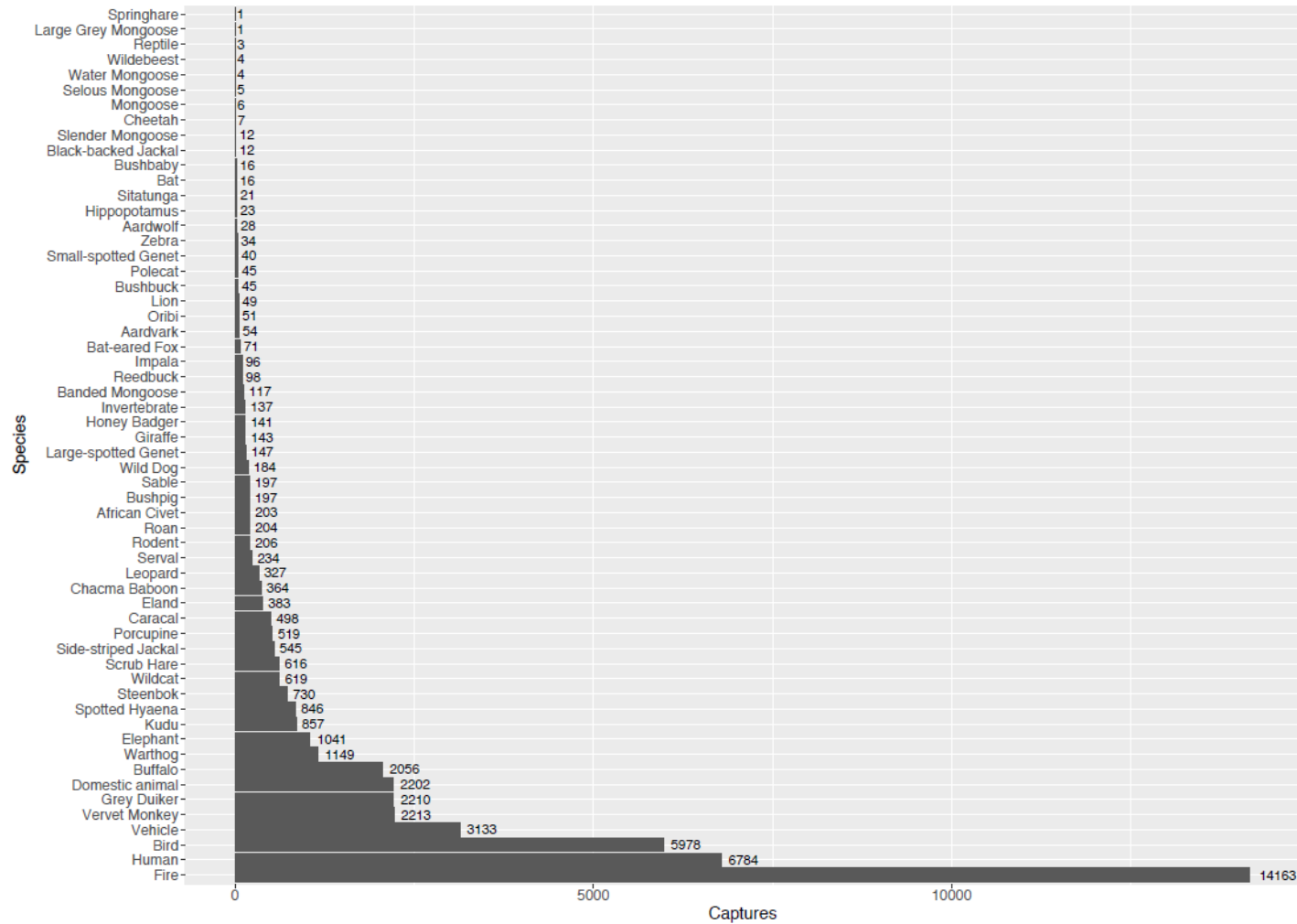


Figure 3. Photographic capture rates of species recorded Luengue-Luiana and Mavinga National Parks, southeastern, Angola. From: Funston P, Henschel P, Petracca L, MacLennan S, Whitesell C, Fabiano E, and Castro I (2017). *The distribution and status of lions and other large carnivores in Luengue-Luiana and Mavinga National Parks, Angola*. KAZA TFCA Secretariat (KAZA), Gaborone, Botswana.

Species that were detected were grouped into two major functional groups that they were equally represented; carnivores (49%, n = 18) and ungulates (51%, n = 19). Within the carnivore guild the majority were small carnivores (72%) (Table 1) while for ungulates species richness was fairly balanced (53% for large > 100 kg adult female mass versus 47%) (Table 2).

Table 1. Camera trap rates in the four sampling zones in Luengue-Luiana and Mavinga National Parks, Angola, July to October 2016.

<b>Species</b>	<b>Number of captures</b>
<b>Large carnivores</b>	
Spotted hyaena	464
Leopard	221
African wild dog	75
Lion	21
Cheetah	2
<b>Small carnivores</b>	
African wildcat	505
Side-striped jackal	388
Caracal	307
Civet	182
Serval	177
Large-spotted genet	147
Honey badger	98
Mongoose spp.	49
Bat-eared spp.	46
Small-spotted genet	40
Polecat	38
Aardwolf	20
Black-backed jackal	11

\* From: Funston P, Henschel P, Petracca L, Maclennan S, Whitesell C, Fabiano E, and Castro I (2017). *The distribution and status of lions and other large carnivores in Luengue-Luiana and Mavinga National Parks, Angola*. KAZA TFCA Secretariat (KAZA), Gaborone, Botswana.

Table 2. Camera trap rates of large (> 100 kg adult female mass) and small (< 100 kg) ungulates in the four sampling zones in Luengue-Luiana and Mavinga National Parks, Angola, July to October 2016.

Species	Number of captures
<b>Large ungulates</b>	
Elephant	219
Kudu	176
Buffalo	148
Eland	104
Roan	97
Sable	65
Giraffe	41
Zebra	10
Wildebeest	8
Hippopotamus	5
<b>Small ungulates</b>	
Grey duiker	1006
Warthog	289
Steenbok	262
Bushpig	116
Common reedbuck	51
Oribi	49
Bushbuck	27
Impala	20
Sitatunga	15

\* From: Funston P, Henschel P, Petracca L, MacLennan S, Whitesell C, Fabiano E, and Castro I (2017). *The distribution and status of lions and other large carnivores in Luengue-Luiana and Mavinga National Parks, Angola*. KAZA TFCA Secretariat (KAZA), Gaborone, Botswana.

Spatially small carnivores were detected in more stations (178 stations, 86%), followed by small ungulates (174 stations, 85%), large carnivores (128 stations, 62%) and lastly large ungulates (110 stations, 53%) (Figure 4).

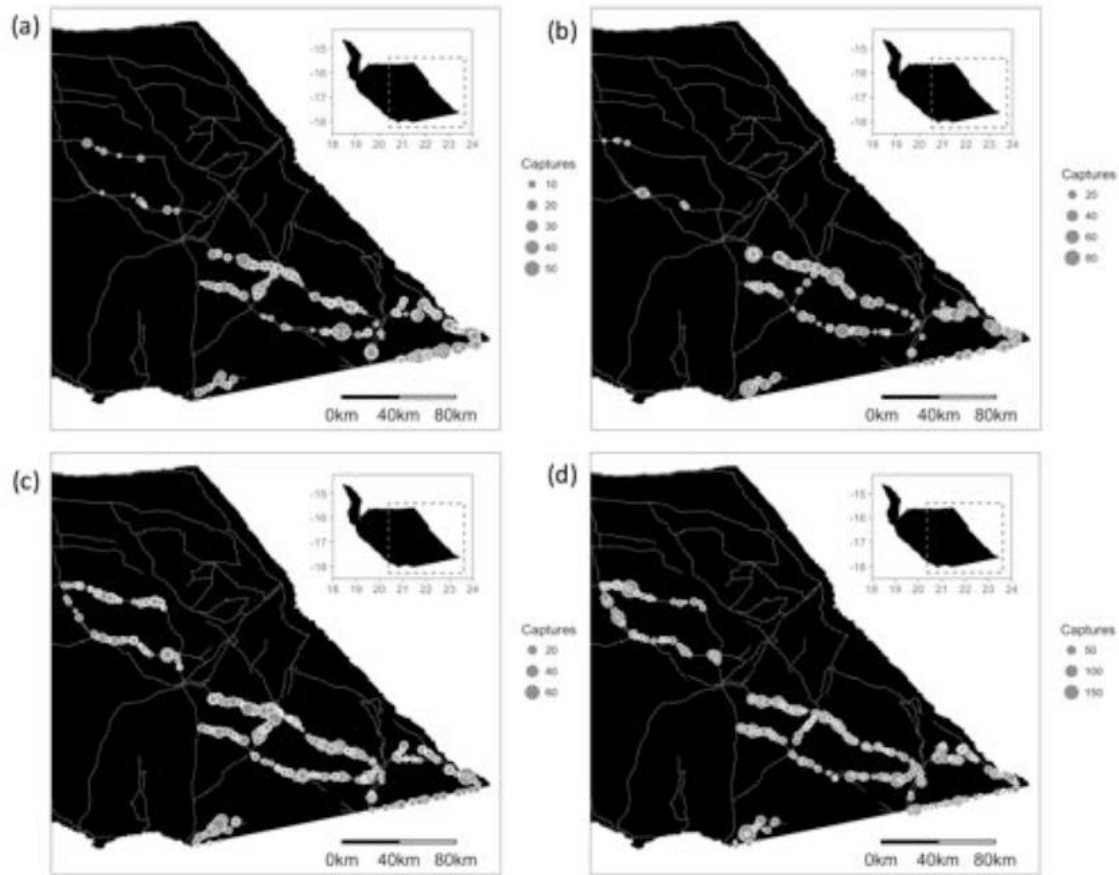


Figure 4. Spatial distribution of capture rates of a) large carnivores, b) small carnivores, c) large ungulates (> 100 kg adult female mass) and d) small (< 100 kg) ungulates, in the four sampling zones in Luengue-Luiana and Mavinga National Parks, Angola, July to October 2016. From: Funston P, Henschel P, Petracca L, MacLennan S, Whitesell C, Fabiano E, and Castro I (2017). *The distribution and status of lions and other large carnivores in Luengue-Luiana and Mavinga National Parks, Angola*. KAZA TFCA Secretariat (KAZA), Gaborone, Botswana.

#### *Objective 2 Threat to wildlife*

Activities considered to pose a threat to wildlife included bushmeat hunting (n = 83), diamond mining (n = 7), fishing (n = 1) and logging (n = 10). A total of 82 specimens were identified as been hunted with the Grey duiker having the highest percentage (23%), followed by warthog (15%) and roan (n = 13) (Figure 5). Additionally, 532 human settlements spread across the study area were registered.

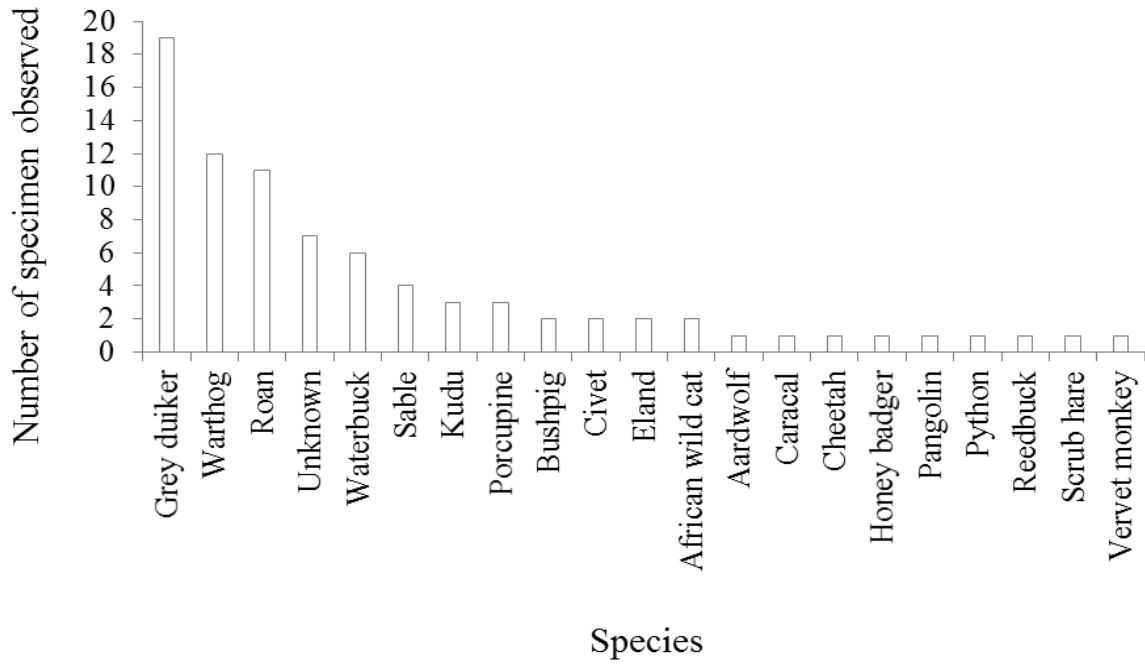


Figure 5. Numbers of observed opportunistic specimens hunted while conducting a camera trapping surveying in the Luengue-Luiana and Mavinga National Parks, Angola, July to October 2016.

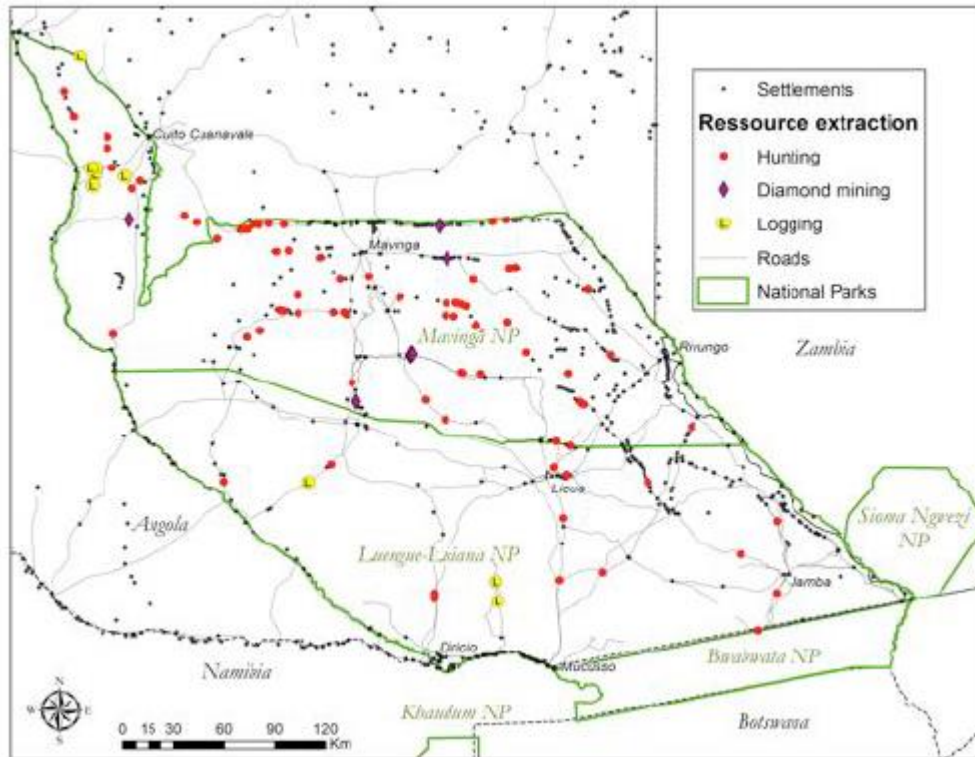


Figure 6. Map of locations of all settlements and road/tracks within Luengue-Luiana and Mavinga National Parks, Angola, with all signs of bushmeat hunting (poaching), timber harvesting and diamond mining symbolised from July 2015 to October 2016. From: Funston P, Henschel P, Petracca L, MacLennan S, Whitesell C, Fabiano E, and Castro I (2017). *The distribution and status of lions and other large carnivores in Luengue-Luiana and Mavinga National Parks, Angola*. KAZA TFCA Secretariat (KAZA), Gaborone, Botswana.

### Objective 3 Recommendations

Overarching recommendations, for the responsible institutions, is that they should engage in activities that promote tourism, improve the park current anti-poaching task force, and design and implement a land-use zoning plan. The latter should consider the possibility of adopting the concept of community based natural resource management (e.g. conservancies). This concept has the potential of addressing issues related to monitoring of wildlife including anti-poaching, while providing communities with alternative livelihoods (e.g. ecotourism).

### Communication and Application of results

The project findings so far have been communicated via presentations at various national (e.g. environmental day) and regional (e.g. KAZA-TFCA meeting) workshops as well as through the

distribution of a poster exhibiting the different species detected. Forty posters were distributed and are currently displayed at various locations such as KAZA-TFCA Secretariat, park manager offices, INBAC main offices, the University of Namibia, and at clinics, policy stations and schools within the study area. Findings were directly incorporated into the park's management plans. For example, spatial information about hunting camps aided managers in designing suitable anti-poaching strategies.

### **Monitoring and Evaluation**

The effectiveness of the project's activities was evaluated based upon the number of camera traps from which we were able to download photos (data), although it should be noted that the theft of cameras in certain areas can be used as an indicator to human presence and potentially as an indicator of illegal activities. Additionally, the project scientific advisor ensured that the project activities were implemented timely and effectively. This included monitoring that team members participated effectively despite challenges of us being in different countries, the project expenditure was within the project budget, data processing and compilation of the main report were completed as scheduled.

### **Achievements and Impacts**

The most important outputs were successfully creating distribution maps of different mammal species and threats occurring in Luengue-Luiana National Park. This information is vital because it informs future park management decisions and gives a clear picture of the current situation in the area. From an ecological perspective, a key achievement was the detection of 51 species, belonging to different taxonomic or functional groups (e.g. herbivores versus carnivores) or trophic levels. These results are significant as they reveal the potential of the area for the conservation at the scale of guilds, for tourism, as the wildlife seems to be below the area ecological carrying capacity. Conservation at guild levels can provide leverage towards securing funding and future research collaborations between various national and international institutions. From a socio economic aspect, a key achievement was the documentation that the residing population in the parks are have limited economic means, and that this may be a cause for the observed illegal harvesting of wildlife. This is of significance as indicates that if



conservation is to be successful there is a need to first improve these communities' livelihoods. Exploring livelihoods alternatives such as the feasibility of establishing community natural resource management programs, should occur soon, particularly because the spatial distribution of wildlife already seems to be lower in areas highly populated with humans and in areas in which hunting camps were found.

Additionally, the project findings have contributed to the Angolan Institute of Veterinary Services, initiative of establishing a National Programme for the Prevention and Control of Wildlife diseases with particular emphasis in the areas of conservation as well as a Department of Wildlife geared towards health and environmental education.

Together these achievements contribute directly to the project goal of providing the park management with scientifically derived information about the species richness, distribution, threats and recommendation to improve these parks management and conservation targets.

### **Capacity Development and Leadership capabilities**

Three project participants, one of which was not a team member but a park ranger, were exposed to various aspects related to the use of camera trapping for monitoring wildlife. Field related aspects included different sampling designs (e.g. trail versus random), selection of strategic sites to place cameras and considerations when placing a camera up (e.g. height).

### **Conclusion**

This project successfully deployed camera traps as a method to measure the presence and distribution of mammals in Luengue-Luiana National Park in Angola, an area that has been negatively impacted by civil conflict. While the placement of camera traps was limited by road access and the presence of landmines in the region, it still proved an effective tool to complete the project's objectives. Overall, this region is facing multiple threats, including bushmeat poaching, but the results of this project provide important information for future land-use zoning and highlights areas where anti-poaching efforts may be most effective. Furthermore, and given that no previous systematic surveys were conducted in these parks, our findings are novel to a

broader community such as the Angolan wildlife authorities, the general public and the scientific community at large. Consequently, the findings provide a baseline information against which one can measure the effectiveness of future conservation actions (or inaction) in the study area. Overall, and despite the numerous years of civil conflict in the region, it is still a promising area for wildlife conservation.

#### *Problems encountered and lessons learnt*

The coordination, field component and data processing went smooth. The only major challenge revolved around the logistics of getting team members from Luanda (Angola) to the sampling site. At the end, these team members, had to fly through Windhoek to Katima Mulilo, which was a more expensive route but successful. Another challenge was the lack of roads within the park. Here, we had to limit ourselves to main roads which increased camera visibility hence their likelihood of being stolen. As for the methodology and conservation tools applied this were found to be effective towards the project aim and objectives. A major lesson learnt was on how best to find ways of working with larger organizations and personalities.

#### *In the future*

Further surveys are planned as this work only covered about 30% of these parks total surface area. Hence, we currently applying for funding to implement this activity. In addition, we hope through this next phase, to have one or two Angolan Masters students involved in the project. These students are likely to be from the Angolan National Institute of Biodiversity and Conservation Areas.

## Financial Report

Itemized expenses	Total CLP Requested (USD)*	Total CLP Spent (USD)	% Difference	Details & Justification <small>(Justification must be provided if figure in column D is +/- 25%)</small>	Proposed Spending <small>(Preliminary Report Only)</small>
<b>PHASE I - PROJECT PREPARATION</b>					
Communications (telephone/internet/postage)	0.00		#DIV/0!		
Field guide books, maps, journal articles and other printed materials	0.00		#DIV/0!		
Insurance	0.00		#DIV/0!		
Visas and permits	0.00		#DIV/0!		
Team training	0.00		#DIV/0!		
Reconnaissance	0.00		#DIV/0!		
Other (Phase 1)	0.00		#DIV/0!		
<b>EQUIPMENT</b>					
Scientific/field equipment and supplies	0.00		#DIV/0!		
Photographic equipment	0.00		#DIV/0!		
Camping equipment	0.00		#DIV/0!		
Boat/engine/truck (including car hire)	3,200.00	3162.31	-1%		
Other (Equipment)	3,500.00	3846.15	10%		
<b>PHASE II - IMPLEMENTATION</b>					
Accommodation for team members and local guides	0.00		#DIV/0!		
Food for team members and local guides	0.00		#DIV/0!		
Travel and local transportation (including fuel)	5,000.00	5548.00	11%		
Customs and/or port duties	0.00		#DIV/0!		
Workshops	800	47.92	-94%	Spent less on repairs than expected	
Outreach/Education activities and materials (brochures, posters, video, t-shirts, etc.)	0.00		#DIV/0!		
Other (Phase 2)	0.00		#DIV/0!		
<b>PHASE III - POST-PROJECT EXPENSES</b>					
Administration	0.00		#DIV/0!		
Report production and results dissemination	0.00		#DIV/0!		
Other (Phase 3)	0.00		#DIV/0!		
<b>Total</b>	<b>12,500.00</b>	<b>12,604.38</b>			
*These figures should be the same as those listed in the original proposal					

## Appendices

Output	Number	Additional Information
Number of CLP Partner Staff involved in mentoring the Project		
Number of species assessments contributed to (E.g. IUCN assessments)		
Number of site assessments contributed to (E.g. IBA assessments)		
Number of NGOs established		
Amount of extra funding leveraged (\$)	\$35000	
Number of species discovered/rediscovered	51	
Number of sites designated as important for biodiversity (e.g. IBA/Ramsar designation)		
Number of species/sites legally protected for biodiversity		
Number of stakeholders actively engaged in species/site conservation management		
Number of species/site management plans/strategies developed	1	Information used to develop site management plans
Number of stakeholders reached		
Examples of stakeholder behaviour change brought about by the project.		
Examples of policy change brought about by the project		
Number of jobs created	3	During the project
Number of academic papers published		
Number of conferences where project results have been presented	3	Forum in Livestone, Cuando-Cubango and Luanda

### Address list and web links

<https://www.panthera.org/cms/sites/default/files/The%20Distribution%20and%20Status%20of%20Lions%20and%20Other%20Large%20Carnivores%20in%20Luengue-Luiana%20and%20Mavinga%20National%20Parks%2C%20Angola.pdf>

### Distribution list

Okavango-Zambesi Transfronteir Conservation Area (KAZA)

Angola Ministry of Environment/National Institute for Biodiversity and Conservation Areas