



## Assessment of medium and large mammals in the Kafa Biosphere Reserve

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### 1 HIGHLIGHTS

- 25 species were recorded.
- The presence of the endangered wild dog (*Lycaon pictus*) could not be confirmed, it is possible that the species is locally extinct.
- The presence of lion (*Panthera leo*) was confirmed, this may be considered as flagship species.
- Larger mammals are not useful as indicators of the status of conservation of the forests because of their very low densities.
- Camera trapping revealed very low capture rates which would indicate abnormally low mammal density, this needs to be confirmed and investigated.

### 2 INTRODUCTION

Ethiopia is known for high levels of biodiversity and endemism, especially in the highland areas. This is also true for mammals, although levels of endemism are probably higher in other taxa. Still, among the endemic larger mammals we count species such as the Walia ibex, the Ethiopian wolf, the mountain nyala and the Gelada baboon. None of these are known to occur in Kafa zone, but Kafa is known for other important species, such as lion and buffalo.

Several previous expeditions published mammal lists, the most recent one is presented below (Yalden, D.W. 1976, 1980, 1984, 1986; Hillman, 1993 as summarised in EWNHS, 2007):

<b>Order</b>	<b>Carnivora</b>	<b>Family</b>	<b>Viverridae</b>
<b>Family</b>	<b>Mustelidae</b>		<i>Atilax palidinosus</i> Marsh Mongoose
	<i>Aonyx capensis</i> Clawless otter		<i>Ichneumia albicauda</i> White-tailed Mongoose
	<i>Mellivora capensis</i> Honey Badger		<i>Herpestes ichneumon</i> Egyptian mongoose
<b>Family</b>	<b>Canidae</b>		<i>Herpestes senguineus</i> Slender Mongoose
	<i>Canis aureus</i> Common Jackal		<i>Viverra civetica</i> African Civet
	<i>Canis mesomelas</i> Black-backed Jackal	<b>Family</b>	<b>Hyaenidae</b>
<b>Family</b>	<b>Felidae</b>		<i>Crocuta crocuta</i> Spotted Hyaena
	<i>Felis silvestris</i> African Wild Cat	<b>Order</b>	<b>Hyracoidae</b>
	<i>Felis serval</i> Serval	<b>Family</b>	<b>Procaviidae</b>
	<i>Panthera leo</i> Lion		<i>Hetrohyrax brucei</i> Yellow-spotted Hyrax
	<i>Panthera pardus</i> Leopard		

*Procavia capensis* Rock Hyrax  
**Order Lagomorpha**  
 Family Leporidae  
*Lepus habessinicus* Abyssinia Hare

**Order Tubulidentata**  
 Family Orycteropodidae  
*Orycteropus afer* Aardvark

**Order Artiodactyla**  
 Family Hippopotamidae  
*Hippopotamus amphibious* Hippopotamus  
 Family Bovidae

*Kobus defassa* Dafassa Waterbuck  
*Redunca redunca* Bohor Reed buck  
*Sylvicapra grimmia* Grimm's/Bush/ Duiker  
*Syncerus cafer* Buffalo  
*Tragelaphus scriptus* Common Bush buck  
 Family Suidae  
*Hyochoerus meiertzhageni* Giant forest hog  
*Phacochoerus africanus* Common Warthog  
*Potamochoerus larvatus* Bush pig

We expected to confirm the presence of most, if not all of these species. We had particular interest in large carnivores, since these are usually the first species to go extinct in the gradual process of biodiversity erosion (Macdonald et al., 2010). In particular, we were interested in the lion and the wild dog, two apex predators that are well known for their enormous home range, low density and propensity for conflict with people and therefore species of particular concern for conservation (Woodroffe and Sillero, 2012; Bauer et al. in press).

### 3 MATERIALS AND METHODS

#### 3.1 Study area

We focused on the following study sites:

- Boka / Adiyu (Bamboo forest, highland forest)
- Kaka / Adiyu (lowland savannah)
- Wush Wush (Tea plantation and core zone forest)
- Gojeb valley downstream (lowland, around the town of Gimbo)
- Gojeb wetland upstream (wetland and Boginda / Gewata core zone forests)

**Table 1: Locations of camera traps and other important waypoints are indicated below.**

Area	Site	Code	Habitat	Object	Alt (m)	Lat. (N)	Long. (E)
BONGA	Bamboo forests	BA	Bamboo forests dominated by <i>Arundunaria alpina</i>				
BONGA	Alem-Gono wetland	GO-wet	Wetlands				
BONGA	Boka forests	BK	Montane forests	CT, porcupine scat	2597	7.24094	36.45224
BONGA	Boka forests	BK	Montane forest	CT, jackal scat, hare	2508	7.2631	36.45378
BONGA	Boka forests	BK	Lowland	Interviews	1600	7.26233	36.647
BONGA	Awurada valley (Gumi River, PFM sites)	AW	Montane forests/Riverine vegetation				
BONGA	Alem Gono	AG	Wetland				
BOGINDA	Gojeb wetland	GO-wet	Wetland	Buffalo & waterbuck tracks	1567	7.55372	36.04739
BOGINDA	Gojeb wetland	GO-wet	Wetland	CT, leopard picture	1562	7.55154	36.04663
BOGINDA	Gojeb river	GO-riv	River/floodplain forests	CT	1604	7.56214	36.02321
BOGINDA	Boginda forests	BO	Montane forests	CT	2086	7.5072	36.11194
BONGA	Wush Wush forest core area	WW-F	Montane forests	CT	1795	7.27848	36.19352
BONGA	Wush Wush tea plantation	WW-T	Tea plantation	CT, red duiker	1828	7.36835	36.12787
BONGA peri-urban	Outskirt of town	PU	Mixed use	CT & hippo track	1731	7.31785	36.24127
BONGA peri-urban	Outskirt of town	PU	Mixed use	Callup	1694	7.30169	36.23618
GOJEB Bridge	bridge on main road to Jimma	GB	Lowland,	Interviews	1430	7.43676	36.36898
GOJEB Bridge	bridge on main road to Jimma	GB	Lowland,	Interviews	1322	7.46678	36.35624

### 3.2 Sampling methods

Our methods consisted of camera traps, direct observations, transect walking, scat analysis, tracks and signs (footprints, calls) and interviews with key informants based on a guidebook with pictures of all African mammals (Kingdon, 2004).

### 3.3 Data analysis

Camera trap pictures were identified by the author, in case of doubt after consultation with other group members. Group members working on other taxa reported opportunistic encounters with mammals and these reports were included. We attempted to use calling stations to assess hyena density (e.g. Bauer, 2007), but this was unsuccessful.

The Chapter 3.1 on primates provides a detailed explanation of DNA analysis procedures and protocols, as well as our supporting institutions and experts

## 4 RESULTS AND DISCUSSION

Medium and large mammals live at very low densities compared to other species and therefore the number of observations is low, which makes a quantitative assessment difficult to begin with. But despite 56 'trapping days/nights' (number of days or nights x number of cameras) we only collected 15 animal pictures. Data is too scarce to conduct any statistical analysis or to make firm statements, but a success rate this low would generally indicate densities that are far below the natural situation, in other words, indicative of severe human disturbance.

### 4.1 Interview & photo identification in 4 different local communities

**Table 2: Results from interviews and photo identification at local communities.**

	Kaka (Adiyo lowland) <sup>(1)</sup>	Duma / Gojeb wetland and Gewata / Boginda forest (non-exhaustive) <sup>(2)</sup>	Gojeb-town (Gimbo lowland) <sup>(3)</sup>	Wush Wush & Bonga forest (non-exhaustive) <sup>(4)</sup>
Porcupine	+			
Hyena	+	+	+	+
Jackal	+	+	+	+
Warthog	+	+	+	+
Bushpig	+	+	+	+
Common duiker	+		+	
Red duiker	+			
Klipspringer	+			
Bushbuck	+		+	
Rock hyrax	+			
Civet	+		+	+
Caracal	+			
Dik dik	+			
Honey badger	+			
Lion	-	occasionally	-	historical, not at present
Wild dog	-	historically present, present status uncertain	-	-

	Kaka (Adiyo lowland) <sup>(1)</sup>	Duma / Gojeb wetland and Gewata / Boginda forest (non-exhaustive) <sup>(2)</sup>	Gojeb-town (Gimbo lowland) <sup>(3)</sup>	Wush Wush & Bonga forest (non-exhaustive) <sup>(4)</sup>
Leopard	-	+	+	
Cheetah	-		-	
Serval	-		-	
Genet	-		+	
Buffalo	-	+	-	
Giraffe	-			
Defassa waterbuck		+	uncertain	
Hippopotamus			+	
Clawless otter			+	
Bohor reedbuck			+	
Kirk's dik dik			+	

1: very heavy agricultural encroachment, very little natural habitat in this ecosystem

2: nice natural habitat in this ecosystem, only slightly used for unsupervised grazing

3: very heavy agricultural encroachment, very little natural habitat in this ecosystem

4: nice natural habitat patches in the tea plantation, but the natural Bonga forest appears rather degraded

## 4.2 Synthesis: Mammal presence confirmed

**Table 3: Occurrence of mammals confirmed during the field study.**

Common name	Scientific name	Observation during assessment
Olive Baboon	<i>Papio anubis</i>	Common everywhere
Colobus, Guereza	<i>Colobus guereza</i>	Common everywhere
Grivet	<i>Cercopithecus pygerythrus</i>	Common everywhere
Spotted Hyaena	<i>Crocuta crocuta</i>	Heard almost everywhere, DNA
African wolf and/or common jackal	<i>Canis lupaster</i> and/or <i>Canis aureus</i>	CT and scat Boka
Common Genet	<i>Genetta genetta</i>	CT Awurada
Rusty spotted genet	<i>Genetta maculata</i>	DNA
Lion	<i>Panthera leo</i>	PC: resident in Adiyo, transient elsewhere
Leopard	<i>Panthera pardus</i>	Skull and picture in Gojeb, DNA
Wild dog	<i>Lyacon pictus</i>	PC: possibly in Gewata / Gojeb, elsewhere recently extirpated
Clawless otter	<i>Aonyx capensis</i>	Obs and scat Gojeb
Civet	<i>Civetica civetica</i>	Roadkill Bonga, DNA
Slender Mongoose	<i>Herpestes sanguineus</i>	CT Boka
Rock Hyrax	<i>Procavia capensis</i> / <i>Heterohyrax brucei</i>	CT Boka, DNA

Common name	Scientific name	Observation during assessment
Hare	<i>Lepus</i> sp.	CT and Obs Boka and Gojeb, common everywhere
Crested Porcupine	<i>Hystrix cristata</i>	Tracks and scat Boka, DNA
Hippopotamus	<i>Hippopotamus amphibius</i>	Tracks in Gojeb-wetland, skull in Gojeb-town, heard in Bonga, DNA
Warthog	<i>Phocochoerus aethiops</i>	Tracks Gojeb
Bush Pig	<i>Potamochoerus larvatus</i>	Tracks Gojeb, DNA
Bushbuck	<i>Tragelaphus scriptus</i>	Obs Bonga
Duiker Grey	<i>Sylvicapra grimmia</i>	CT Boka, DNA
Kirk's dik dik	<i>Madoqua kirkii</i>	CT Boka, PC Gojeb
Dafassa Waterbuck	<i>Kobus defassa</i>	Track, scat and horns Gojeb
Bohor Reed buck	<i>Redunca redunca</i>	PC Adiyu
Buffalo	<i>Syncerus caffer</i>	Tracks Gojeb

CT= caught on camera trap

PC= personal communication from local community

Obs= live specimen observed by team member

DNA= scat analysis

## 5 CONCLUSIONS AND RECOMMENDATIONS FOR CONSERVATION AND MONITORING

Because of their low densities larger mammals make very poor indicator species. It would lead to a low detection probability and research intensity would need to be very high in order to detect any changes over time. For this reason, none of the listed species qualify as indicator species. However, many of the larger mammal species qualify as flagship species. Undoubtedly the most enigmatic among them is the lion (Vulnerable on the Red List; Bauer et al., in press), but primates and large ungulates like hippopotamus and buffalo are also possible.

The main threat to the top flagship species, the lion, is undoubtedly the conflict with farmers. Previous studies (Brhane Beraki, 2014; Gebresenbet et al., in prep) have demonstrated that livestock depredation is a common phenomenon and that the lions of the Kafa BR derive a substantial portion of their dietary requirements from livestock depredation. Due to the tolerant nature and the immense respect for lions in the local culture this has so far led to very limited retaliatory killing, but since the population is small it is very sensitive; one single targeted poisoning event could potentially wipe out all lions.

Through a PhD research conducted by Fikirte Gebresenbet, University of Oklahoma, supervised by Hans Bauer, University of Oxford, and conducted with full support and collaboration of NABU, we expect sufficient research and monitoring effort for the short and medium term. However, NABU is advised to develop a long-term strategy with regard to the sustainable management and monitoring of lions in the Kafa BR.

With regard to the wild dog, we conclude that this highly endangered species may be locally extinct. The species is not popular with locals and the general public and therefore not considered a great loss by the uninformed layman. However, for a zoologist, the disappearance of the species with the highest demands on habitat quality is an alarm bell. The processes that have led to this situation may at first only affect this sensitive species, but over time these processes may also lead to the extinction of other species. It is therefore important to conduct further research on the status of the wild dog, on the threats and on the potential mitigation of those threats.

## 6 REFERENCES

Bauer, H. (2007) Status of large carnivores in Bouba Ndjida National Park, Cameroon. *African Journal of Ecology* 45, 448-450.

Bauer, H., Packer, C., Funston, P., Henschel, P. & Nowell, K (in press) *Panthera leo*, 2015 IUCN Red List.

Brhane Beraki (2014) Economic impact and peoples' perception on conservation of lions (*Panthera leo*) in Kafa, South west of Ethiopia. MSc thesis, Department of Biology, Mekele University.

EWNHS (2007) Rapid Biodiversity Assessment in Kaffa Zone. FAO, Rome.

Kingdon (2004) *Guide to African Mammals*. A&C Black Publishers, London.

Macdonald D, Loveridge A, Sillero-Zubiri S (2010) (eds) *Biology and Conservation of Wild Carnivores. The Canids and the Felids Two-Volume Set*. (Oxford University Press).

Woodroffe, R., et Sillero-Zubiri (2012) *Lycaon pictus* (West Africa subpopulation). In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.1. ([www.iucnredlist.org](http://www.iucnredlist.org)).

## 7 ANNEX

### 7.1 Photos



**Fig. 1: Camara trap: Kirk's dik dik (*Madoqua kirkii*), Montane Forest – Bamboo Forest, Boka (BK)**



**Fig. 2: Camara trap: Hare (*Lepus* sp.), Montane Forest – Bamboo Forest, Boka (BK) and Gojeb (GO)**



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**Fig. 3: Camara trap: Duiker (*Sylvicapra grimmia*), Montane Forest – Bamboo Forest, Boka (BK)**



**Fig. 4: Camara trap: Common Jackal (*Canis aureus*), Montane Forest – Bamboo Forest Boka (BK)**