

# NORTHEAST KENYA ANTELOPE SURVEY

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REPORT TO THE ZOOLOGICAL SOCIETY FOR THE CONSERVATION OF SPECIES AND POPULATIONS  
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# Northeast Kenya Antelope Survey

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**Report to Zoological Society for the Conservation of Species and Populations.**

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Cover photograph: Kirk's Dik-Dik *Madoqua kirkii*, Wayamdero Plain, west of Wajir, northeast Kenya. All photographs and maps by Yvonne de Jong and Tom Butynski.

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## SUMMARY

Northeast Kenya is the most poorly known region in eastern Africa as concerns the taxonomy, distribution, abundance, threats, and conservation status of its larger mammal fauna. Nonetheless, this region has a high number of endemic and threatened genera and species. Among the larger mammals, 15 species of antelope are known to occur. Diurnal surveys, nocturnal surveys, and camera trap surveys were conducted to cover as much of northeast Kenya (130,000 km<sup>2</sup>) as possible in four fieldtrips (total of 48 days, total distance driven 7,163 km). The objectives of the Northeast Kenya Antelope Survey were to: (1) considerably improve our understanding of their taxonomic status, distribution, relative abundance, and threats to the region's species of antelope; (2) contribute to the reassessments of their *IUCN Red List* degree of threat status; (3) provide practical, prioritized, recommendations for ameliorating the threats; and (4) bring local, national, and international attention to the unique biodiversity of northeast Kenya, using antelopes as a flagship group.

During this survey, antelope species were nowhere common outside of protected areas. Ten of the 15 antelope species of northeast Kenya were encountered. The most frequently species encountered was Kirk's Dik-Dik *Madoqua (kirkii) kirkii*, followed by Southern Gerenuk *Litocranius walleri walleri* and Bright's Gazelle *Nanger notata*. The least common were Common Waterbuck *Kobus ellipsiprymnus ellipsiprymnus* and Greater Kudu *Tragelaphus strepsiceros*. The five species not encountered (Common Eland *Tragelaphus oryx*, Salt's Dik-Dik *Madoqua saltiana*, Common Duiker *Sylvicapra grimmia*, Peter's Gazelle *Nanger petersii*, Coke's Hartebeest *Alcelaphus buselaphus cokii*) have geographic ranges that are on the margins of this region.

During this survey, we found range extensions for Kirk's Dik-Dik (130 km to the northeast) and Greater Kudu (20 km to the east). The extension for Kirk's Dik-Dik is particularly important as this expands the area of sympatry with Günther's Dik-Dik *Madoqua (guentheri) guentheri* by 18,000 km<sup>2</sup> to the north and, almost certainly means that this species occurs in south Ethiopia. If so, this is a large new mammal for Ethiopia. Phenotypic descriptions and photographs obtained during this survey are not only instrumental for fine-tuning the east limit of Smith's Dik-Dik *Madoqua (guentheri) smithii* and the west limit of Günther's Dik-Dik but also for detecting possible phenotypic clines and hybrid zones.

Beisa Oryx *Oryx beisa* were not encountered outside the protected areas in the southwest corner of the study area during this survey. We suspect that small, unprotected, herds do remain. Bright's Gazelle were most frequently encountered during the February–March 2023 survey, when the drought was at its peak. It might be that this species was attracted to the edges of roads where some forage was present due to water run-off. Bright's Gazelle were sometimes seen near people, villages, and large herds of livestock.

All antelope species in northeast Kenya are threatened to some extent by competition with livestock for food and/or water, habitat degradation, loss and fragmentation, as well as poaching. Most of northeast Kenya is too arid for large-scale agriculture or even large-scale ranching. It appears that the antelope species most vulnerable in the region at this time are Beisa Oryx, Common Eland, and Greater Kudu. Common Impala *Aepyceros melampus melampus*, Common



Waterbuck, Maasai Bushbuck *Tragelaphus scriptus delamerei*, and Coke's Hartebeest. These species have, historically, only occurred in northeast Kenya along the fringes of the Ewaso N'jiro River, and that seems to continue to be the situation. Both species of Dik-Dik are relatively adaptable to human-caused habitat changes. To a certain, extent agriculture might favor them.

Most of northeast Kenya is historically unsuitable for the water-dependent Common Impala, Maasai Bushbuck, Common Waterbuck, Common Eland, and Coke's Hartebeest. We suspect that all of these species declined in abundance during the 3–5-year drought due to severe competition with livestock and, probably, intensified poaching. All of the antelope species known to historically occur in northeast Kenya are still present and widespread, but Kirk's Dik-Dik are uncommon. With average to above average annual rainfall, these species are expected to recover well and to persist in this region long into the future.

Besides lags, man-made perennial water sources (dams) provide water to antelopes and other wildlife in some parts of northeast Kenya. Many man-made water sources are, however, available to wildlife as they are fenced and/or occupied by people, livestock, and dogs. Although the vegetation in and around settlements is typically severely degraded by livestock, the human population in the region is relatively small and there are relatively few roads. Therefore, large parts of northeast Kenya are little affected by people because they lack perennial water sources.

Thirty-one mammal species, other than antelopes, were encountered during this survey, six of which are 'threatened' (Vulnerable, Endangered, Critically Endangered). We obtained altitudinal range extensions and/or geographic range extensions, and natural history data for Desert (Somali) Warthog *Phacochoerus aethiopicus*, Common Warthog *Phacochoerus africanus*, Somali Lesser Galago *Galago gallarum*, Olive Baboon *Papio anubis*, Pancake (Crevice) Tortoise *Malacochersus tornieri*, and several bird species, including Short-Toed Snake Eagle *Circaetus gallicus*.

All 10 antelope distribution maps presented in this report, and some non-antelope species map, will be further updated based on (1) range extensions found during this survey, (2) application of soil and vegetation shapefiles that help identify areas of unsuitable habitat, and (3) our database with locality records compiled over the past 23 years.

## INTRODUCTION

Northeast Kenya lies within the Horn of Africa Biodiversity Hotspot due to its high number of endemic and threatened genera and species (Conservation International 2022). Nonetheless, this is the most poorly known region in eastern Africa as concerns the taxonomy, distribution, abundance, threats, and conservation status of its larger mammal fauna. This hotspot includes at least 5 species of antelope. This information is not only of considerable scientific interest but is also a prerequisite for setting priorities for their conservation.

The four field surveys conducted during this study covered as much of the land area of northeast Kenya (130,000 km<sup>2</sup>) as possible (Figure 1). More specifically, this is the region north of Meru National Park, Rahole National Reserve, Kora National Park, and Garissa (*i.e.*, north of the Tana River), east of the Isiolo-Marsabit-Moyale Road, south of the Ethiopia border, and west of the Somali border.

There has been little research on the mammals of northeast Kenya. Sixty years ago, Stewart and Stewart (1963) provided rough distribution maps for the larger mammals of Kenya based on answers to questions presented to ‘reliable observers’ (*e.g.*, game wardens, veterinary officers, professional hunters), but few of these people would have knowledge of northeast Kenya. Beyond that, there are a few aerial surveys undertaken by the Kenya Wildlife Service (*e.g.*, KWS 2021), but these dealt with only the largest mammals and, at least in some cases, the results greatly underestimated abundance (sometimes by at least 6-fold, *e.g.*, Hartebeest *Alcelaphus buselaphus*). In addition, species were sometimes misidentified (*e.g.*, Impala *Aepyceros melampus* for Hirola *Beatragus hunteri*, and Common Warthog *Phacochoerus africanus* for Desert (Somali) Warthog *Phacochoerus aethiopicus*). As far as we are aware, there have been no ground surveys to assess the taxonomic status, distribution, abundance, and threats for the larger mammals for any part of northeast Kenya. This appears to be due primarily to the remoteness of the region, the aridity and scarcity of perennial water, and insecurity in the vicinity of the border with Somalia. At present, security over at least the west half of this region is such that ground surveys by vehicle can be undertaken.

Northeast Kenya is generally flat, with most of the ground 100–800 metres above sea level. The highest site is Mount Marsabit at 1,707 metres above sea level. All of northeast Kenya lies in the ‘Somalia-Masasi *Acacia-Commiphora* Deciduous Bushland and Thicket Vegetation Zone’ of the ‘Somali *Acacia-Commiphora* Bushland Biotic Zone. This area lies in the ‘Somalia-Maasai Regional Centre of Endemism (White 1983; Olson *et al.* 2001; Happold and Lock 2013). This is a semi-arid region with generally hot temperatures. Rainfall occurs mainly during March–May and November–December. Mean annual rainfall over this region ranges from 200 mm to 700 mm, while mean annual temperature ranges from 25°C to 30°C. January to March are the hottest months with temperatures as high as 38°C.

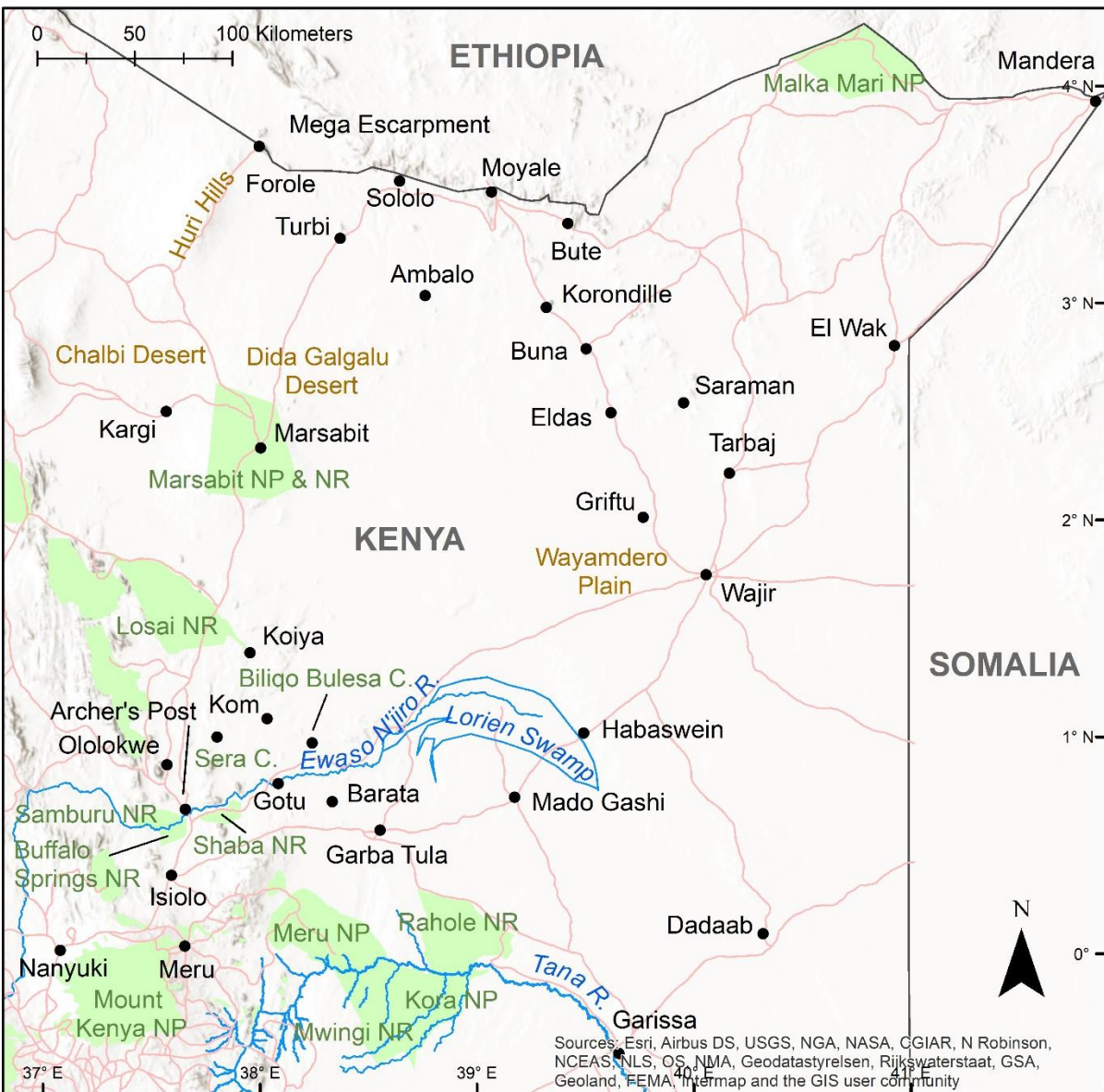


Figure 1. The Northeast Kenya Antelope Survey study area with major roads depicted in red. Note that there are vast areas without roads.

Based on literature, at least 15 species of antelope have been recorded for northeast Kenya, two of which are 'Near Threatened' (Lesser Kudu *Tragelaphus imberbis*, Gerenuk *Litocranius walleri*) and one is 'Endangered' (Beisa Oryx *Oryx beisa*) (Table 1; Stewart and Stewart 1963; Kingdon 1982a,b; Kingdon and Hoffmann 2013; Groves and Grubb 2011; IUCN 2024). One 'Vulnerable' species (Soemmerring's Gazelle *Nanger soemmerringi*) occurs in southeast Ethiopia and 'might' occur in northeast Kenya. In addition to the antelopes, there are four 'Endangered' and three 'Vulnerable' species of larger mammals in northeast Kenya (Table 2).

Table 1. Antelopes of northeast Kenya (Stewart and Stewart 1963; Kingdon 1982a,b; Groves and Grubb 2011; Kingdon and Hoffmann 2013; IUCN 2024).

Antelope Species	IUCN Red List Status 2024	Subspecies and Notes
Bushbuck <i>Tragelaphus scriptus</i>	LC	<i>Tragelaphus scriptus delamerei</i> (NA).
Lesser Kudu <i>Tragelaphus imberbis</i>	NT	<i>Tragelaphus imberbis australis</i> (NA). Given species status by Groves and Grubb (2011).
Greater Kudu <i>Tragelaphus strepsiceros</i>	LC	<i>Tragelaphus strepsiceros</i> (NA). <i>T. s. chora</i> given species status by Groves and Grubb (2011).
Common Eland <i>Tragelaphus oryx</i>	LC	<i>Tragelaphus oryx</i> (NA)
Kirk's Dik-Dik <i>Madoqua kirkii</i>	LC	<i>Madoqua (kirkii) kirkii</i> (NA). Given species status by Groves and Grubb (2011).
Salt's Dik-Dik <i>Madoqua saltiana</i>	LC	<i>Madoqua saltiana swaynei</i> (NA). Given species status by Groves and Grubb (2011).
Günther's Dik-Dik <i>Madoqua guentheri</i>	LC	<i>Madoqua (guentheri) guentheri</i> (NA). Given species status by Groves and Grubb (2011).
Common Duiker <i>Sylvicapra grimmia</i>	LC	<i>Sylvicapra grimmia hindei</i> (NA).
Common Waterbuck <i>Kobus ellipsiprymnus</i>	LC	<i>Kobus ellipsiprymnus ellipsiprymnus</i> (LC) and <i>Kobus ellipsiprymnus defassa</i> (NT). Groves and Grubb (2011) treat these as species.
Impala <i>Aepyceros melampus</i>	LC	<i>Aepyceros melampus melampus</i> (LC)
Bright's Gazelle <i>Nanger notata</i>	LC	
Peters's Gazelle <i>Nanger petersii</i>	LC	
Gerenuk <i>Litocranius walleri</i>	NT	<i>Litocranius walleri walleri</i> (NA). Given species status by Groves and Grubb (2011).
Beisa Oryx <i>Oryx beisa</i>	EN	<i>Oryx beisa beisa</i> (EN). Given species status by Groves and Grubb (2011).
Hartebeest <i>Alcelaphus buselaphus</i>	LC	<i>Alcelaphus buselaphus cokii</i> (LC). Given species status by Groves and Grubb (2011).
<b>Presence in northeast Kenya requires confirmation</b>		
Soemmerring's Gazelle <i>Nanger soemmerringi</i>	VU	<i>Nanger soemmerringi butteri</i> (NA). In southeast Ethiopia. Kingdon (1982b) suspects presence in northeast Kenya.
Klipspringer <i>Oreotragus oreotragus</i>	LC	<i>Oreotragus oreotragus aureus</i> (NA). In central Kenya. Given species status by Groves and Grubb (2011).

LC, Least Concern; NT, Near Threatened; VU, Vulnerable; EN, Endangered; CR, Critically Endangered; DD, Data Deficient; NA, Not Assessed

Table 2. Non-antelope species to be surveyed in northeast Kenya, all of which are Red Listed as 'threatened'.

Species	Current IUCN Red List Status 2024	Subspecies and Notes
Savanna Elephant <i>Loxodonta africana</i>	EN	
Reticulated Giraffe <i>Giraffa reticulata</i>	EN	
Grévy's Zebra <i>Equus grevyi</i>	EN	
Lion <i>Panthera leo</i>	VU	
Leopard <i>Panthera pardus</i>	VU	<i>Panthera pardus pardus</i> (NA)
Cheetah <i>Acinonyx jubatus</i>	VU	<i>Acinonyx jubatus raineyi</i> (NA)
Wild Dog <i>Lycaon pictus</i>	EN	

LC, Least Concern; NT, Near Threatened; VU, Vulnerable; EN, Endangered; CR, Critically Endangered; DD, Data Deficient; NA, Not Assessed

Table 3. Other species of mammal to be surveyed in northeast Kenya.

Species	Current IUCN Red List Status 2024	Subspecies and Notes
Desert (Somali) Warthog <i>Phacochoerus aethiopicus</i>	LC	<i>Phacochoerus aethiopicus delamerei</i> (LC)
Common Warthog <i>Phacochoerus africanus</i>	LC	<i>Phacochoerus africanus massaicus</i> (NA)
Olive Baboon <i>Papio anubis</i>	LC	
Vervet Monkey <i>Chlorocebus pygerythrus</i>	LC	<i>Chlorocebus pygerythrus arenaria</i> (NA) and <i>Chlorocebus pygerythrus centralis</i> (NA)
Northern Lesser Galago <i>Galago senegalensis</i>	LC	<i>Galago senegalensis dunni</i> (LC) and <i>Galago senegalensis braccatus</i> (LC)
Somali Lesser Galago <i>Galago gallarum</i>	LC	
Bush Hyrax <i>Heterohyrax brucei</i>	LC	<i>Heterohyrax brucei hindei</i> (NA)
Rock Hyrax <i>Procavia capensis</i>	LC	<i>Procavia capensis jacksoni</i> (NA)
Unstriped Ground Squirrel <i>Xerus rutilus</i>	LC	<i>Xerus rutilus dabagala</i> (NA) and <i>Xerus rutilus rufifrons</i> (NA)

LC, Least Concern; NT, Near Threatened; VU, Vulnerable; EN, Endangered; CR, Critically Endangered; DD, Data Deficient; NA, Not Assessed

The following are among the many questions that this survey attempted to answer as concerns the mammals of northeast Kenya:

- Is Soemmerring's Gazelle present? Kingdon (1982b) suggests that this species might occur in extreme northeast Kenya.
- Is Klipspringer *Oreotragus oreotragus* present?
- Where in this region do Beisa Oryx *Oryx beisa* and the other four species (Table 1) of 'Endangered' large mammal still occur?
- What is the geographic distribution of Salt's Dik-Dik *Madoqua saltiana*? How does this distribution relate to those of Kirk's Dik-Dik *Madoqua (kirkii) kirkii* and Günther's Dik-Dik *Madoqua (guentheri) guentheri*.
- What are the limits of the geographic distributions of the two subspecies of Waterbuck *Kobus ellipsiprymnus*? Is there a phenotypic cline?
- What are the limits of the geographic distributions of Bright's Gazelle *Nanger notata* and Peters's Gazelle *Nanger petersii*? Is there a phenotypic cline?
- Is Hamadryas Baboon *Papio hamadryas* present?
- Are Somali Lesser Galago *Galago gallarum* and Northern Lesser Galago *Galago senegalensis* sympatric, and how do their phenotypes compare to those from other parts of their geographic distribution?
- What are the limits of the geographic distributions of two the subspecies of Northern Lesser Galago? Is there a phenotypic cline?
- What is the geographic distribution of the Common Warthog and Desert (Somali) Warthog? Are they sympatric at any sites?
- Are the phenotypes of Bush Hyrax *Heterohyrax brucei* and Rock Hyrax *Procavia capensis* in northeast Kenya similar to those in other parts of their geographic distributions.

### Goal and Objectives

The two goals of this survey were to prevent the extirpation of species of antelope and other larger mammals from northeast Kenya, and to significantly contribute towards the long-term survival of northeast Kenya's large mammal fauna. Black rhinoceros *Diceros bicornis* have already been extirpated and African buffalo *Syncerus caffer* probably now occur only in the extreme south of this study area. The objectives of this survey were to survey the 15 species of antelope known to occur in northeast Kenya, as well as the other larger mammals, in order to: (1) considerably improve our understanding of their taxonomic status, distribution, relative abundance, and threats; (2) contribute to the reassessments of their *IUCN Red List* degree of threat status; (3) provide practical, prioritized, recommendations for ameliorating the threats; and (4) bring local, national, and international attention to the unique biodiversity of northeast Kenya, using antelopes as a flagship group.



## METHODS

### Distances travelled

Four fieldtrips were conducted during this survey for a total of 48 days. We drove from central Kenya (Laikipia County) to northeast Kenya. The total distance driven during this survey was 7,163 km (Table 4). This is more than the anticipated driving distance as presented in our proposal (5,460 km). Figure 2 shows the survey area and the routes used during the four surveys.

Table 4. Distances travelled by vehicle and by foot during the Northeast Kenya Antelope Survey. Total distance driven by Land Rover was 7,163 km.

Period	Number of days	Distance vehicle diurnal (km)	Distance vehicle nocturnal (km)	Distance on foot diurnal (km)	Distance on foot nocturnal (km)
23 February – 8 March 2023	14	1,799	9	15	21
3 – 7 August 2023	6	987	-	12	9
26 October – 6 November 2023	11	1,880	-	4	26
11 – 27 January 2024	17	2,474	14	21	18
<b>Total</b>	<b>48</b>	<b>7,140</b>	<b>23</b>	<b>52</b>	<b>74</b>

In order to assess presence and relative abundance of antelopes and other larger mammals (hereafter, referred to as ‘focal species’; Tables 1, 2 and 3), and meet the need to cover large areas in a limited time, rapid assessment survey methods were used (Butynski and Koster 1994; White and Edwards 2000; Nekaris and Jayewardene 2004; De Jong and Butynski 2009; Butynski and De Jong 2012, 2017). Differences in research conditions, constraints, and opportunities in northeast Kenya, as well as the natural histories of the focal species, required that a variety of methods and approaches be employed.

### Diurnal surveys

Vehicle surveys were conducted on the most remote roads available with the aim to cover all major habitat types. Vehicle surveys typically began soon after dawn and lasted until near dusk, with a break during the heat-of-the-day. Vehicle speed was usually 10–20 km/h. Zeiss Victory 10x42 and Zeiss Dialyt 7x42B binoculars were used.

Information collected during surveys included date, weather, start time, end time, survey route with place names (Garmin GPSMAP 65), travel speed (GPS), and travel distance (GPS). When a focal species was encountered, the following data was obtained: time, coordinates (GPS), altitude, species, number of individuals seen, group composition, vegetation type, and visual assessment of tree density. The aim during every encounter was to obtain detailed descriptions of as many individuals as time and visibility allow. Photographs were taken with a Canon EOS 5D Mark III digital camera fitted with a Canon 400 mm lens, and with a Nikon D7100 digital camera fitted with a Nikon 80–400 mm lens. All photographs were taken in ‘RAW’ format.

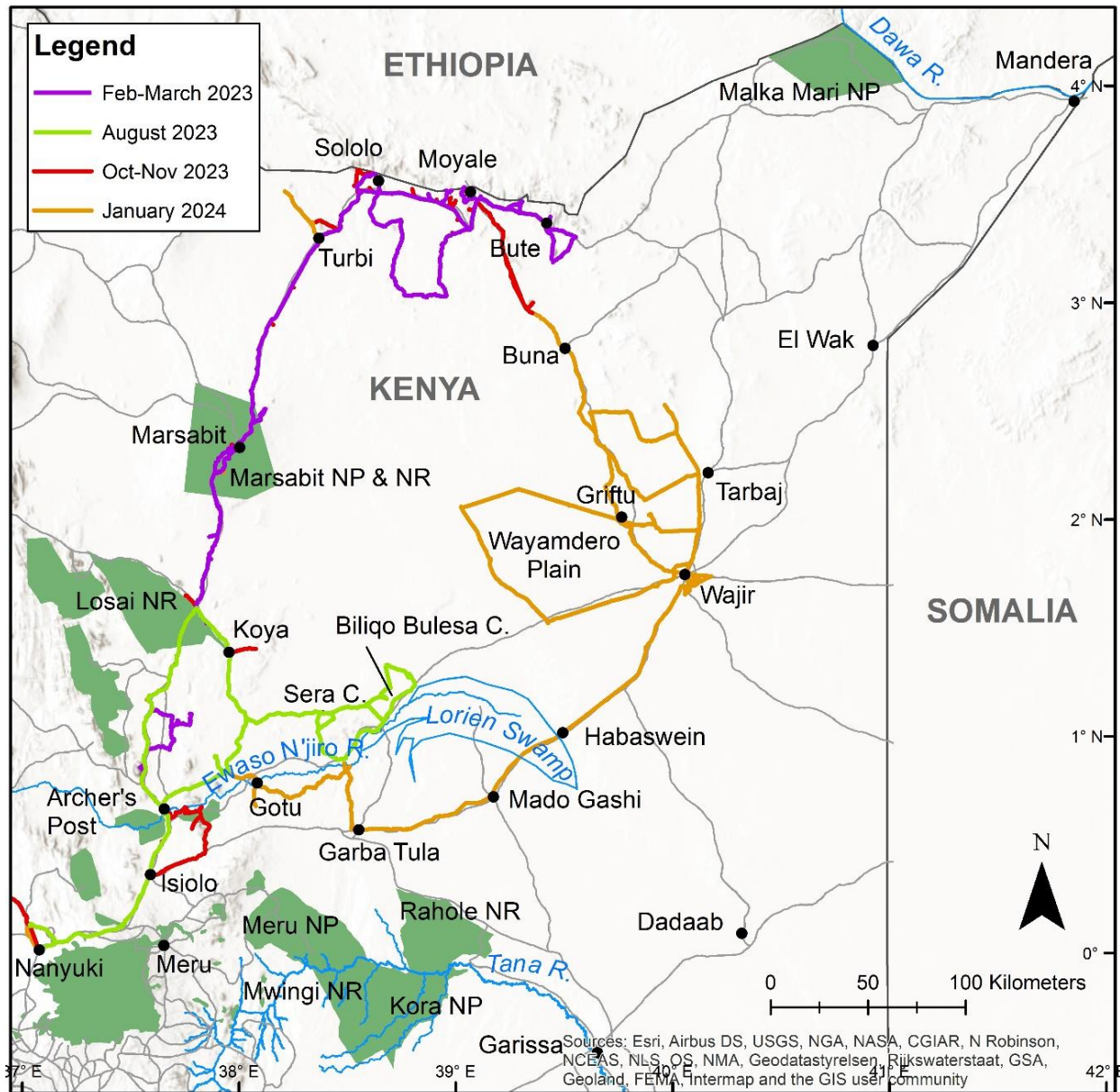


Figure 2. Study area for the Northeast Kenya Antelope Survey and roads along which surveys were conducted. Some roads were surveyed up to four times, such as the tarmac highway from Nanyuki to Moyale.

The track of each survey route was saved in a GPS and downloaded into an ASUS notebook using Garmin MapSource software. By recording the start and end time for each survey, the rate of travel, the distance travelled (as determined by GPS), and the number of groups or individuals observed of each species, crude indices of abundance were obtained (i.e., groups encountered/kilometer and groups encountered/hour). By surveying large areas, a rough indication of the distribution of all focal taxa in the region was obtained. Throughout the survey, notes on threats and human pressures were taken.

### Nocturnal surveys

Presence of galagos and other species was recorded during nocturnal surveys conducted from a vehicle and/or by foot at all camps. These surveys were typically conducted during 19:00–22:00 h and 04:00–06:00 h. Reflection from the eyes of focal taxa (antelopes, carnivores, galagos) can be observed at >100 m in suitably open habitats. Torches (Semlos, Fenix TK20R, EagleTac M3C4) and Petzl Tikka RXP headlamps were used. Walks and drives were conducted slowly (0.5–1 km/h on foot and 5–10 km/h by vehicle) with pauses to scan the area, observe animals, and record vocalizations.

The following data were recorded: date, weather, moon phase, start time, finish time, localities surveyed (GPS), walking/driving speed (GPS), and distance covered (GPS). When focal taxa were encountered, binoculars were used. The following data were collected for each encounter: date, time, GPS coordinates, altitude, species, number of individuals, height above ground, vegetation type, and tree density. In addition, photographs were taken using a Canon Speedlite 430EX II flash.

Listening post surveys were conducted in the vicinity of camps and from high points at dusk, dawn, and before and after nocturnal vehicle or walking surveys. The advertisement calls of galagos, carnivores, and other species provide information that can be used for species identification (Bearder *et al.* 1995; Zimmermann 1995). Audio recordings of galago vocalizations and other nocturnal mammals and birds, preferably the loud advertisement call, were obtained using a Zoom F3 Field Recorder with Sennheiser MKE600 shot-gun microphone and up to two Open Acoustic AudioMoths. The time and date of each recording is automatically saved on the audio file.



Figure 3. Adult male Bright's Gazelle *Nanger notata* and sandgrouse, northeast Kenya.

### Camera trap surveys

Up to seven camera traps were installed around camps. These were set to take infrared triggered photographs with a time lapse of 2 seconds. Various baits (including soya sauce, sardines, salt, bread, dog food, cat food) were used to attract mammals.



Figure 4. Bat-eared Fox *Otocyon megalotis* captured by camera trap at Ambalo, north Kenya.

### Research permits

This research was undertaken with the following permits from the Kenya National Commission for Science, Technology and Innovation: Thomas M. Butynski - NACOSTI/P/23/30982; Yvonne A. de Jong - NACOSTI/P/23/25861.

## RESULTS

Ten of the 15 antelope species of northeast Kenya were encountered during this survey (Table 5). The most frequently species encountered was Kirk's Dik-Dik, followed by Southern Gerenuk and Bright's Gazelle. The least common were Common Waterbuck and Greater Kudu.

Table 5. Minimum numbers of antelope encountered during the Northeast Kenya Antelope Survey.

Species	Feb–March 2023	August 2023	Oct–Nov 2023	January 2024	Total
Kirk's Dik-Dik <i>Madoqua kirkii kirkii</i>	167	124	29	138	458
Southern Gerenuk <i>Litocranius walleri walleri</i>	78	28	15	79	200
Bright's Gazelle <i>Nanger notata</i>	48	1	46	63	158
Günther's Dik-Dik <i>Madoqua guentheri</i>	63	3	21	11	98
Dik-Dik sp.? <i>Madoqua</i>	17	10	19	16	62
Beisa Oryx <i>Oryx beisa</i>	30	0	31	0	61
Common Impala <i>Aepyceros melampus melampus</i>	10	0	18	0	28
Masaai Bushbuck <i>Tragelaphus scriptus delamerei</i>	18	0	0	3	21
Southern Lesser Kudu <i>Tragelaphus imberbis australis</i>	13	2	0	0	15
Common Waterbuck <i>Kobus ellipsiprymnus ellipsiprymnus</i>	0	0	4	0	4
Greater Kudu <i>Tragelaphus strepsiceros</i>	0	1	0	0	1
<b>Total</b>	<b>444</b>	<b>169</b>	<b>183</b>	<b>310</b>	<b>1,106</b>

Below we give a general description of each of the four surveys. This is followed by an account of each antelope species encountered in order of most-common to least-common. We then briefly mention the antelope species not encountered, antelope conservation in northeast Kenya. Finally, we present our conclusions. We end this report with notes on the non-antelope species encountered and a mammal species list.

### February–March 2023 Survey

The February–March survey (14 days) was conducted mostly in extreme north Kenya, near the border with Ethiopia (Figure 2). This region was in a 5-year drought (some people said that it was a 7-year drought). Almost all of the Cattle, Donkeys, and Camels had died, as had a large



proportion of the populations of Sheep and Goats. Livestock carcasses were abundant around the edges of all settlements and towns. We, however, found no wildlife carcasses.

Since there is no wildlife abundance baseline for this region, it is difficult to judge the impact of this drought on the larger wild mammals, but water-dependent wild mammals were rare. For example, only one Desert Warthog was encountered, and this individual was emaciated and living on a hospital compound. People everywhere said that Warthog were typically common around settlements and villages in the region, but this is not now the case.

On the higher, more mesic, ground in Marsabit National Park, where we camped for 1 night, large mammals were common. Here we saw 18 Masaai Bushbuck, 17 Grévy's Zebra, a herd of Buffalo, Olive Baboon, Spotted Hyaena *Crocuta crocuta*, White-Tailed Mongoose *Ichneumia albicauda*, and Ochre (Huet's) Bush Squirrel *Paraxerus ochraceus*. No Galagos were seen or heard.

In the woodlands on the higher ground at Moyale, where we camped for 2 nights, we observed or camera-trapped Somali Lesser Galago, Olive Baboon, Vervet Monkey, Spotted Hyaena, Side-Striped Jackal *Lupulella adusta*, African Civet *Civettictis civetta*, Northern Crested Porcupine *Hystrix cristata*, Common Genet *Genetta genetta*, White-Tailed Mongoose, Slender Mongoose *Galerella sanguinea*, and Egyptian Mongoose *Herpestes ichneumon*. A species of Dik-Dik was said to be present.

#### August 2023 Survey

This short survey (6 days) was conducted in the south part of the survey area, in the region to the north of the Ewaso N'jiro River (Figure 2). There were good rains here during April and May. The grass was high and well-seeded. Nonetheless, we found no natural sources of water in this area and few larger mammals were encountered (Table 5). This was likely due to the severe drought of the previous 3 years. No species of antelope was common across this area, although there were small areas where Kirk's Dik-Dik was common. In Sera Conservancy we observed Günther's (Smith's) Dik-Dik and Kirk's Dik-Dik simultaneously (~100 m apart). One adult male Greater Kudu was encountered during this survey, a range extension eastward of >20 km (Figure 31). In addition to antelopes, we obtained new distribution records and natural history data for the Somali Lesser Galago, African Golden Wolf *Canis lupaster*, and Common Warthog.

#### October–November 2023 Survey

This survey (11 days) was conducted mostly in the Kom region (east of Losai National Reserve), in the Sololo region (Kenya-Ethiopia border west of Moyale), southeast of Moyale (road to Buna), and along the south bank of the Ewaso N'jiro River (Shaba National Reserve; Figure 2). Due to extreme rainfall and flooding during this survey, we were very limited in our movements as many roads were impassable. All camps during this survey were in *Acacia-Commiphora* bushland or woodland. An area of sympatry for Somali Lesser Galago and Kenya Less Galago was found at Ololokwe (= Ol Doinyo Sabachi). Vervet Monkey and Olive Baboon are also here. Thus, all four species of primate known for northeast Kenya are at this site and readily observed. Somali Lesser Galago was found at several camps but, unexpectedly, Ethiopia Lesser Galago has yet to be found by us in Kenya. This the case even though we spent considerable time camping close to the



Ethiopian border. Also surprising is that most of the kopjes (granitic inselbergs) of northeast Kenya appear to lack any species of Hyrax. Where Hyrax were present, it was always Bush Hyrax, never Rock Hyrax. It appears that the only Ground Squirrel in northeast Kenya is Unstriped Ground Squirrel *Xerus rutilus*.

#### January 2024 Survey

This survey (17 days) was conducted along the Ewaso N'jiro River, around Wajir town, and through the vast region northwest of Wajir. Away from the settlements, there was an abundance of tall grass as a result of the good rains in November, but few large wild herbivores or cattle, goats, sheep, camels, or donkeys. Large areas had no people or livestock, but they also lacked surface water. There were areas where even Dik-Dik were not observed. A large area of sympatry between Kirk's Dik-Dik and Günther's Dik-Dik was located, while other areas seemed to have few, or no, Dik-Dik.

One of the highlights of this trip was the finding of a Pancake Tortoise *Malacochersus tornieri* crossing the road from one small rocky hill (kopje) to another. This is a major eastward extension (>100 km) of the geographic range of this 'Critically Endangered' species (Appendix I). One night was spent in Marsabit National Park. Surprised at the presence of Grévy's Zebra there, we wrote a blog about this national park and its mammals (Appendix II).

Grasshoppers of all sizes were in great abundance and, with them, many large flocks of Abdim's Stork *Ciconia abdimii*, White Stock *Ciconia ciconia*, and Cattle Egret *Bubulcus ibis*. Grasshopper Buzzard *Butastur rufipennis* was common. A probable adult Short-Toed Snake-Eagle *Circaetus gallicus* (Figure 5), a rare species for Kenya (only one previous record) was observed north of Marsabit, north Kenya. We have requested that our photographs of this individual be reviewed by the East Africa Rarities Committee of the East Africa Natural History Society.



Figure 5. Probable adult Short-Toed Snake-Eagle *Circaetus gallicus*, north of Marsabit, north Kenya.

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**Kirk's Dik-Dik Species Group *Madoqua (kirkii)*** (Günther, 1880) **Least Concern**

At least 458 Kirk's Dik-Dik *Madoqua (kirkii) kirkii* were seen during this survey (Figures 6 and 7). This was the antelope most frequently encountered. Figure 8 shows the localities where individuals were confirmed. Sixty-two Dik-Dik were not identified to species-level and, therefore, not included on this map. Up to four individuals were seen together, although 1 or 2 individuals were most commonly encountered. The altitudinal range of these encounters was 237–911 m asl. This is well within the known altitudinal range for this species (0–2,000 m asl; IUCN/SSC Antelope Specialist Group 2016e).

*Taxonomic note*

The taxonomic arrangement of *Madoqua* is mainly based on pelage colouration and skull size and remains under debate. Cotterill (2003), Brotherton (2013), and Kingdon (2013, 2015) recognize four species in the *Madoqua (kirkii)* species group: Kirk's Dik-Dik *Madoqua (k.) kirkii* (Günther, 1880); Damara Dik-Dik *M. (k.) damarensis* (Günther, 1880); Cavendish's Dik-Dik *M. (k.) cavendishi* Thomas, 1898; Thomas's Dik-Dik *M. (k.) thomasi* (Neumann, 1905). Groves and Grubb (2011) follow this taxonomy but, in addition, accept Hinde's Dik-Dik *M. (k.) hindei* Thomas, 1902. They do not recognize any subspecies. Here we follow the taxonomy of Groves (2011), Groves and Grubb (2011), which was also applied by De Jong and Butynski (2017). The taxonomic arrangement of *Madoqua* requires a thorough review. The observations and photographic material collected during this survey are expected to be instrumental in that review.



Figure 6.  
Immature female  
and adult female  
Kirk's Dik-Dik  
*Madoqua (kirkii)*  
*kirkii*, north of  
Buna, north  
Kenya.

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### Distribution

Kirk's Dik-Dik were encountered in three regions in northeast Kenya:

1. 'Central Kenya'. On both sides of the Ewaso N'jiro River, an area well known for this species, with Kargi as the northern extreme (Figure 8).
2. 'Turbi'. At least 46 individuals were encountered across about a 149 km-wide region between Turbi, Moyale, and Buna (Figure 8). Some of these individuals were within 5 km of the Ethiopian border. The records near Ethiopia extend the range of Kirk's Dik-Dik ~130 km to the northeast (IUCN/SSC Antelope Specialist Group 2016e; De Jong and Butynski 2017). The nearest Kirk's Dik-Dik record, to the best of our knowledge, is north of Kargi in an oasis in the Chalbi Desert, a little west of Mount Marsabit (Figure 8; Y. de Jong and T. Butynski pers. obs. 2012). Kirk's Dik-Dik were encountered 5 km from Ethiopia in *Acacia-Commiphora* woodland on red soil and black-cotton soil. This vegetation type extends into Ethiopia. We, therefore, strongly suspect that this population extends into Ethiopia. At this time there are no records of Kirk's Dik-Dik for Ethiopia.
3. 'Wajir'. In and around Wajir town, 68 Kirk's Dik-Dik were recorded. They were as far as 79 km to the southwest, 40 km to the west, 37 km to the north, and 12 km to the east of Wajir town (Figure 8). We strongly suspect that this species occurs farther to the east. Security was not sufficient for us to survey the region east of Wajir town. Kirk's Dik-Dik were, to the best of our knowledge, not known to occur north of Wajir. This is a northwards range extension of ~25 km (De Jong and Butynski 2017).

The region between Marsabit and Turbi is mainly comprised of lava plains and other rocky volcanic soil types. This is a geographic barrier for Dik-Dik. The Marsabit and Turbi populations, 130 km apart, are probably only marginally connected, if connected at all. The Turbi population is more likely connected to the Wajir population through, at least, the Buna area. The Wajir population is probably connected with central Kenya through the vast bushlands that occur along both the north and south sides of the Ewaso N'jiro River and along both sides of the vast Lorien Swamp into which it empties. This swamp does not have habitat for Dik-Dik.

### Sympatry

Kirk's Dik-Dik is known to be sympatric with Smith's Dik-Dik over an area of ~70,000 km<sup>2</sup> in central Kenya and with Günther's Dik-Dik in central east Kenya over an area of ~110,000 km<sup>2</sup> (Figure 18 in De Jong and Butynski 2017). With the discovery of Kirk's Dik-Dik east of Turbi and north of Wajir (Figure 8), the known area of sympatry with Günther's Dik-Dik is increased by ~18,000 km<sup>2</sup>, yielding a total area of ~128,000 km<sup>2</sup>). The geographic range of Günther's Dik-Dik might, however, be less extensive than currently thought (see below).

In central Kenya, we observed one Kirk's Dik-Dik ~100 m from three Smith's Dik-Dik in open *Acacia - Commiphora* woodland at the foot of a big rocky hill at 790 m asl on Sera Conservancy, Samburu County. In areas of sympatry, Kirk's Dik-Dik seems to prefer sandy soils and Günther's



Dik-Dik rocky ground (*i.e.*, gravel) on gentle slopes. In areas of allopatry, it seems that both species occupy both sandy and rocky ground.

During our recent examination of Dik-Dik specimens at the Natural History Museum (London) we did not find any Kirk's Dik-Dik for north Kenya or for anywhere in Ethiopia. We plan to return to the Kenya-Ethiopia border in 2024 to determine the extent of the Kirk's Dik-Dik range and to confirm the species in central south Ethiopia.



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Figure 7. Adult male Kirk's Dik-Dik *Madoqua (kirkii) kirkii*, Korondille, north Kenya.





**Southern Gerenuk *Litocranius walleri walleri* (Brooke, 1879) Not Assessed**

At least 180 Southern Gerenuk *Litocranius walleri walleri* (Figures 9 and 11) were seen during 103 encounters in this survey. Southern Gerenuk was the second most often encountered antelope in northeast Kenya. Figure 10 shows the localities where individuals were confirmed. Up to 11 individuals were seen together, however, 1–3 individuals were most commonly seen during an encounter. Southern Gerenuk were encountered between 229 m asl and 979 m asl. This is well within the known range for this species (0–1,600 m asl; IUCN/SSC Antelope Specialist Group 2016c).



Figure 9. Adult female Southern Gerenuk *Litocranius walleri walleri* in *commiphora* woodland north of Habaswein, Kenya.

*Taxonomic note*

We here provisionally follow the taxonomic arrangement of Grubb (2002), Leuthold (2013a) and IUCN/SSC Antelope Specialist Group (2016c) who accept two subspecies of *Litocranius walleri*; Southern Gerenuk *L. w. walleri* (Brooke, 1878) and Northern Gerenuk *L. w. sclateri* (Neumann, 1899). Both are given species status by Groves and Grubb (2011).

*Distribution*

Southern Gerenuk were encountered throughout northeast Kenya. All encounters were well within the known range for this species (IUCN/SSC Antelope Specialist Group 2016c).





Figure 10. Encounters with Southern Gerenuk *Litocranius walleri walleri* during the Northeast Kenya Antelope Survey. Geographic range taken from IUCN/SSC Antelope Specialist Group (2016c).



Figure 11. Adult male Southern Gerenuk *Litocranius walleri walleri*, Gotu, central Kenya.

**Bright's Gazelle *Nanger notata* (Thomas, 1897) Least Concern**

At least 158 Bright's Gazelle *Nanger notata* (Figure 12 and 14) were seen in 37 encounters during this survey. This species was the third most encountered antelope species in northeast Kenya during this survey. Figure 13 depicts the localities where this species was confirmed. Up to at least 31 individuals were seen in a herd, although most herds comprised 2–3 animals. Bright's Gazelle were found between 264–993 m asl. This is well within the reported range for this species (0–2,000 m asl; IUCN/SSC Antelope Specialist Group 2016f).

*Taxonomic note*

The taxonomic arrangement of the Nanger Gazelles is complex and under debate. Here we follow the taxonomic arrangement of Groves and Grubb (2011) and Siegismund *et al.* (2013) who treat *notata* as a species within the Grant's Gazelle Species Group *Nanger (granti)*. The IUCN/SSC Antelope Specialist Group (2016f) treats *notata* as a subspecies of Grant's Gazelle *Nanger granti* (Brooke, 1872).



Figure 12. Adult male Bright's Gazelle *Nanger notata*, Wayamdero Plain, west of Wajir, northeast Kenya.

*Distribution*

Bright's Gazelle were encountered throughout northeast Kenya. All observations were well within the known range (Siegismund *et al.* 2013; IUCN/SSC Antelope Specialist Group 2016f).



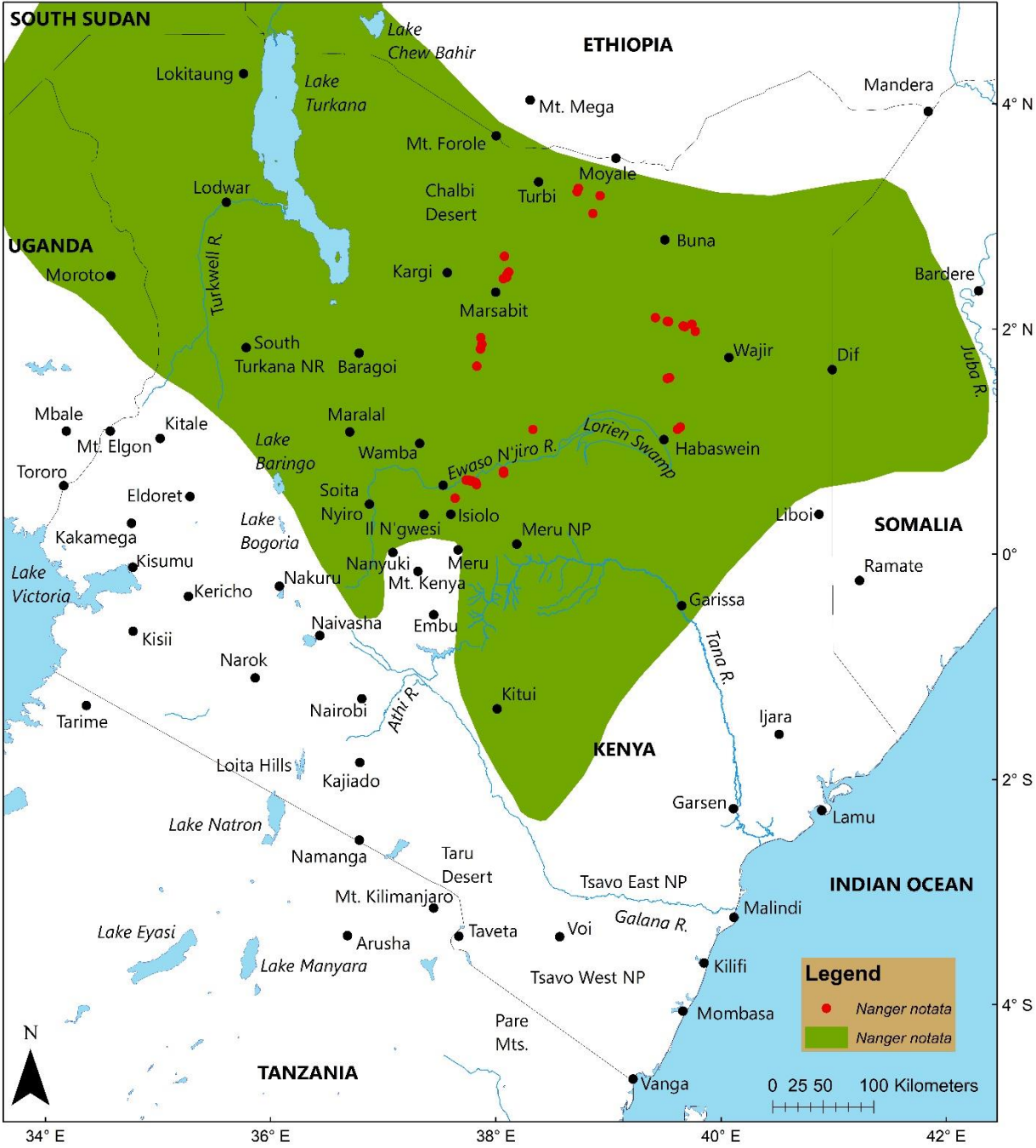


Figure 13. Encounters with Bright’s Gazelle *Nanger notata* during the Northeast Kenya Antelope Survey. Geographic range from IUCN/SSC Antelope Specialist Group (2016f).



Figure 14. Adult female Bright's Gazelle *Nanger notata*, Log Logo, south of Marsabit, north Kenya.

**Günther's Dik-Dik Species Group *Madoqua (guentheri)*** (Thomas, 1894) **Least Concern**

At least 98 Günther's Dik-Dik *Madoqua (guentheri)* were seen during this survey; 42 Smith's Dik-Dik *Madoqua (guentheri) smithii* (Figure 16) and 56 Günther's Dik-Dik *Madoqua (guentheri) guentheri*. Figure 15 shows the localities where individuals were confirmed. 62 Dik-Dik were not identified to species level and, therefore, are not depicted in Figure 15. Up to four individuals were seen together, although encounters with one or two animals were far more common. Günther's Dik-Dik were encountered between 383 m asl and 1,167 m asl. This is well within the known range of this species (0-2,100 m asl; IUCN/SSC Antelope Specialist Group 2016d).

*Taxonomic note*

The taxonomic arrangement of the *Madoqua guentheri* Species Group is mainly based on pelage coloration and skull size, and remains under debate. Drake-Brockman (1930) provisionally recognised four subspecies: *guentheri* Thomas, 1894; *smithii* Thomas, 1901; *wroughtoni* (Drake-Brockman, 1909); *hodsoni* (Pocock, 1926). This taxonomy has been widely followed (Allen 1939; Ansell 1972; Yalden *et al.* 1984; Kingswood and Kumamoto 1996; Hoppe and Brotherton 2013; Kingdon 2015). Grubb (2005) and Groves (2011) recognize but two subspecies as they take *wroughtoni* and *hodsoni* to be synonyms of *guentheri*. Groves and Grubb (2011) and Groves (unpublished data, pers. comm.) found absolute differences among body and skull measurements of *guentheri* and *smithii*. On this basis, they treat them as species (with no subspecies). Here we follow the taxonomy of Groves and Grubb (2011). De Jong and Butynski (2017) also applied this taxonomy but noted that the taxonomic arrangement of *Madoqua* requires a thorough review. The observations and photographs obtained during this survey will be useful for this review.

*Distribution*

Günther's Dik-Dik were encountered in roughly four regions in northeast Kenya. All were well within this species' known range:

1. Smith's Dik-Dik in 'Central Kenya'. On both sides of the Ewaso N'jiro River in central Kenya, an area well known for the species (Figure 15). Here this species is broadly sympatric with Kirk's Dik-Dik.
2. Smith's Dik-Dik north of Marsabit.
3. Günther's Dik-Dik 'Turbi'. East of Turbi, at least 47 individuals were recorded 54–3 km from the Ethiopia border, over an area running at least 83 km west to east (*i.e.*, parallel) to the border (Figure 15). Throughout this region, this species was sympatric with Kirk's Dik-Dik. Both species were fairly common.
4. Günther's Dik-Dik between Wajir and Buna. Nine individuals were recorded. We strongly suspect that this species occurs still farther to the east, but security was not sufficient to survey that region. Kirk's Dik-Dik were found 33 km to the north and 38 km to the south of where we found Günther's Dik-Dik. Whether this is a region of allopatry or sympatry requires more research.



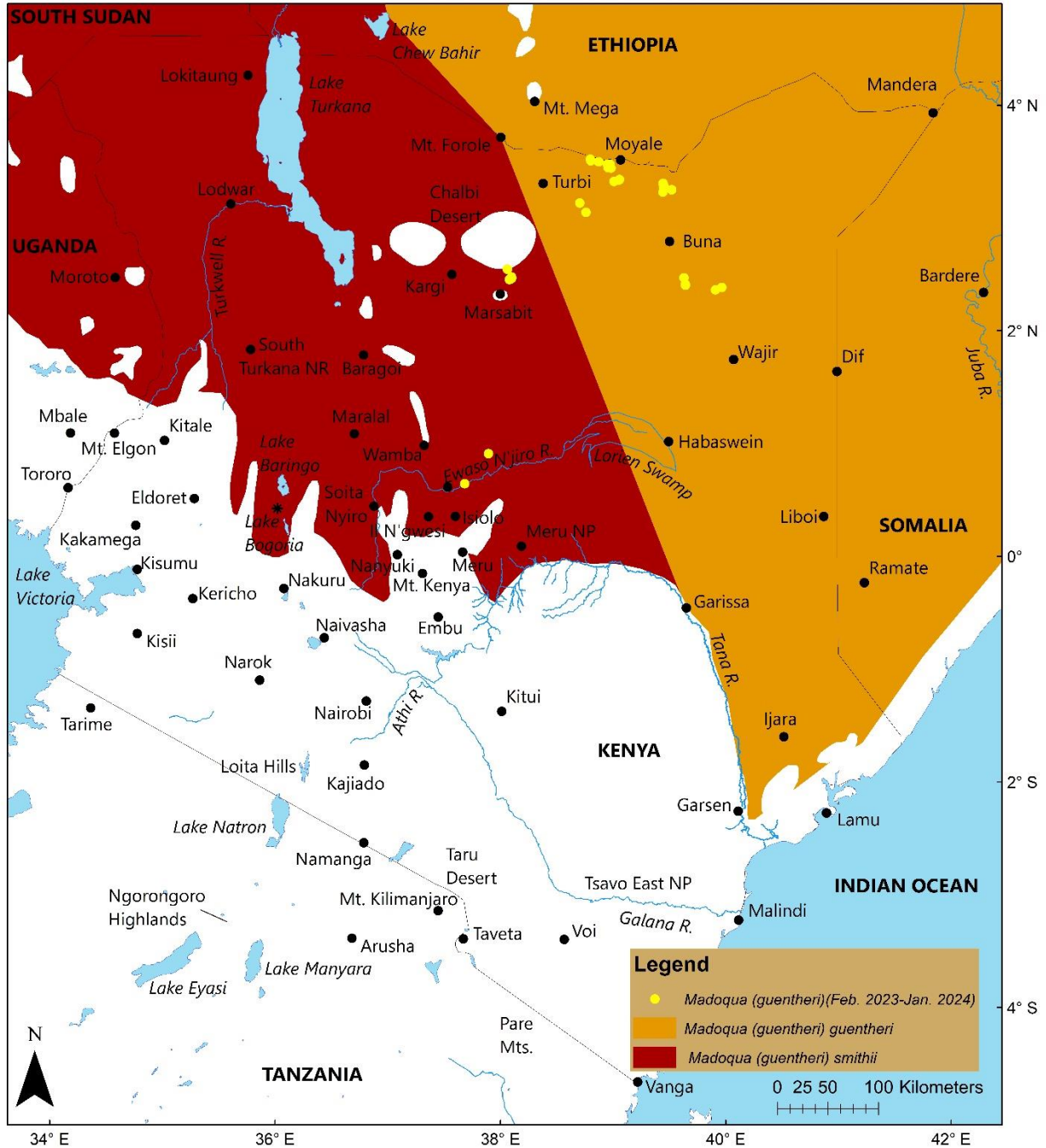


Figure 15. Encounters with Günther’s Dik-Dik *Madoqua (guentheri)* during the Northeast Kenya Antelope Survey. Geographic range of Günther’s Dik-Dik from IUCN/SSC Antelope Specialist Group (2016d) and De Jong and Butynski (2017).

Hoppe and Brotherton (2013), IUCN/SSC Antelope Specialist Group (2016d), and De Jong and Butynski (2017) show Günther’s Dik-Dik to be present in and around Habaswein and Wajir. However, despite the many encounters with Kirk’s Dik-Dik in this region, we were not able to confirm presence of Günther’s Dik-Dik.

The region between Turbi and Kargi is comprised mainly of near treeless lava plains and other rocky volcanic soil types, a geographic barrier for Dik-Dik. We suspect that Smith's Dik-Dik is the species southwest of this geographic barrier and that Günther's Dik-Dik is northeast of this barrier. Further phenotypic analysis of the Dik-Diks photographed over this region is, however, required to confirm this.

The limits of the geographic distributions of *M. (g.) guentheri* and *M. (g.) smithii* are poorly understood (De Jong and Butynski 2017). They state the following, “*Madoqua (g.) guentheri* occurs over most of Somalia, southeast Ethiopia west to about Lake Chew Bahir (=Lake Stephanie), and in northeast Kenya west to about Lake Chew Bahir and southwest to east of the Tana River. The larger, darker, *Madoqua (g.) smithii* occurs in southeast South Sudan, northeast Uganda, extreme southwest Ethiopia, and northwest and central Kenya south to Lake Bogoria, Mount Kenya, and the north bank of the Tana River (Groves 2011, Groves and Grubb 2011, Hoppe and Brotherton 2013, Y. de Jong and T. Butynski pers. obs.). The authors drew a straight line between Mount Forole on the Kenya-Ethiopia border to Garissa, central east Kenya, with the intention to collect data to better understand the east limit of Smith's Dik-Dik and the west limit of Günther's Dik-Dik.

During our recent examination of Dik-Dik specimens at the Natural History Museum (London) we compared *M. (g.) guentheri* and *M. (g.) smithii*. These data, together with photographs and locality data obtained during this field survey will be instrumental for ‘finetuning’ the geographic limits of the Group *Madoqua (guentheri)* species group. We found, however, that there is considerable phenotypic variation within *Madoqua* due, perhaps, to hybridization and clines. In addition, aberrant individuals are relatively common, some even described and named as new taxa, such as Hodson's Dik-Dik *Madoqua hodsoni*, based on an aberrant individual collected on Mt. Mega, south Ethiopia, and now considered a synonym of *M. (g.) guentheri* (De Jong and Butynski 2017).



Figure 16. Adult female Smith's Dik-Dik *Madoqua (guentheri) smithii*, north of Marsabit, north Kenya.

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**Beisa Oryx *Oryx beisa* (Rüppell, 1835) Endangered**

At least 61 Beisa Oryx *Oryx beisa beisa* (Figures 17 and 19) were encountered four times during this survey. Figure 18 shows the localities where individuals were confirmed. Twice, a large herd was encountered (at least 29 and 30 individuals) and twice solitary individuals were seen. Beisa Oryx were encountered between 784 m asl and 849 m asl, which is well within the known range of the species (0–1,700 m asl; IUCN/SSC Antelope Specialist Group 2018). All Beisa Oryx were seen in protected areas; Sera Conservancy and Shaba National Reserve.

*Taxonomic note*

Ansell (1972) treated *beisa* as a subspecies of *Oryx gazella*. Kingdon (1997), Grubb (2005), Wacher and Kingdon (2013), and IUCN/SSC Antelope Specialist Group (2018) restored this taxon to species status. Here we follow Wacher and Kingdon (2013) and IUCN/SSC Antelope Specialist Group (2018) by recognizing two subspecies; *beisa* and *callotis* Thomas, 1892. Both taxa are given species status by Groves and Grubb (2011).



Figure 17. Beisa Oryx *Oryx beisa beisa*, Shaba National Reserve, central Kenya.

*Distribution*

During this survey, Beisa Oryx were encountered only in Shaba National Reserve and Sera Conservancy (Figure 18). These two sites are well within the species' known range (Wacher and Kingdon 2013; IUCN/SSC Antelope Specialist Group 2018). Beisa Oryx are said to occur north of Wajir according to the Senior Warden of Wajir County (Shariff Ahmed, pers. comm. 2024). Over 3,000 individuals are reported for Wajir County based on a 2021 aerial survey (KWS 2021).









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Figure 19. Beisa Oryx *Oryx beisa beisa*, Sera Conservancy, central Kenya.

**Common Impala *Aepyceros melampus melampus* (Lichtenstein, 1812) Least Concern**

At least 28 Common Impala *Aepyceros melampus melampus* (Figure 20) were seen in eight encounters during this survey. Figure 21 shows the localities where individuals were found. One herd of at least 10 individuals was observed, but herds of 2–3 individuals were most common. Common Impala were encountered between 784 m asl and 907 m asl, which is well within the known range of this species (0–1,700 m asl; IUCN/SSC Antelope Specialist Group 2016a).

*Taxonomic note*

Fitz and Bourgarel (2013) and IUCN/SSC Antelope Specialist Group (2016a) recognize two subspecies, Common Impala *melampus* and Black-Faced Impala *petersi* Bocage, 1879. Both taxa are given species status by Groves and Grubb (2011). Here we follow the taxonomic arrangement of Fitz and Bourgarel (2013) and IUCN/SSC Antelope Specialist Group (2016a).

*Distribution*

Common Impala were encountered within the currently known range (Figure 21; Fritz and Bourgarel 2013; IUCN/SSC Antelope Specialist Group 2016a). The most northern record was on Sera Conservancy at the north edge of the species range.



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Figure 20. Adult male Common Impala *Aepyceros melampus melampus*, Shaba National Reserve, central Kenya.



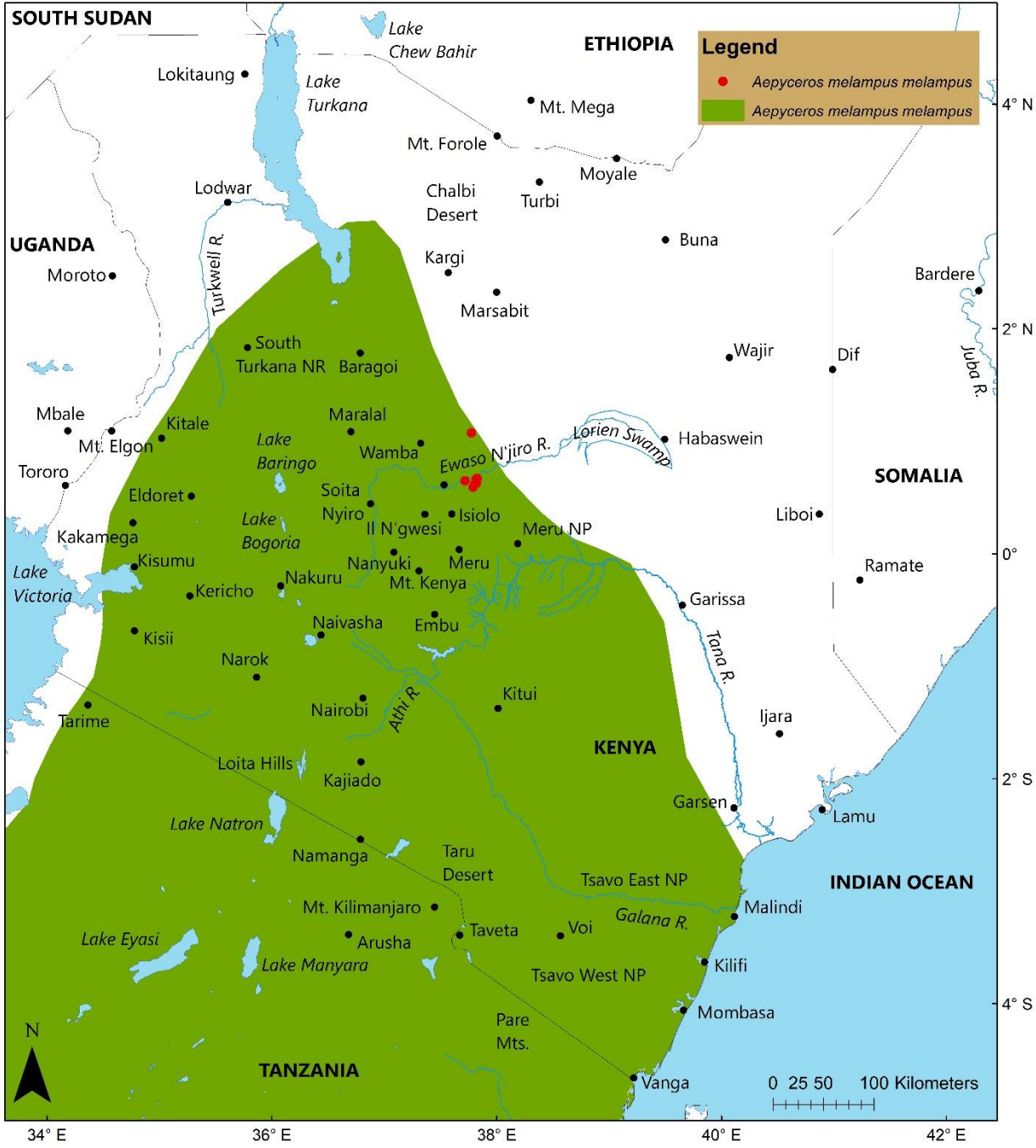


Figure 21. Encounters with Common Impala *Aepyceros melampus melampus* during the Northeast Kenya Antelope Survey. Geographic range from IUCN/SSC Antelope Specialist Group (2016a).

**Masaai Bushbuck *Tragelaphus scriptus delamerei* Pocock, 1900 Not Assessed**

At least 21 Bushbuck *Tragelaphus scriptus* (Figures 22 and 24) were seen in seven encounters during this survey. Bushbuck were only encountered in Marsabit National Park (Figure 23). Phenotypically, the Bushbuck at Marsabit appears to be closest to Maasai Bushbuck *T. s. delamerei* Pocock, 1900. Groves and Grubb (2011) treat *T. s. delamerei* as a synonym of *T. sylvaticus* (Sparrman, 1780).

Up to 11 individuals were seen together, but solitary individuals were more common. Maasai Bushbuck were encountered 1,137–1,498 m asl, which is well within the known range for this species (0–4,000 m asl; IUCN/SSC Antelope Specialist Group 2016h).

*Taxonomic note*

Bushbuck have a complex taxonomic history, mostly because its phenotype greatly varies throughout its range. No fewer than 27 subspecies were recognized by Allen (1939). Groves and Grubb (2011) recognize eight species of Bushbuck while the IUCN/SSC Antelope Specialist Group (2016h) recognizes but one. Here we follow Plumptre and Wronski (2013) and IUCN/SSC Antelope Specialist Group (2016h) who recognize 11 subspecies of Bushbuck.



Figure 22. Maasai Bushbuck *Tragelaphus scriptus delamerei*, Lake Paradise, Marsabit National Park, north Kenya.



*Distribution*

Maasai Bushbuck were encountered only in Marsabit National Park (Figure 23). This site is on the northeast edge of the distribution of this species in Kenya (Plumptre and Wronski 2013; IUCN/SSC Antelope Specialist Group 2016h). This is likely extremely isolated population---much more so than depicted on the latest maps.



Figure 23. Encounters with Maasai Bushbuck *Tragelaphus scriptus delamerei* during the Northeast Kenya Antelope Survey. Geographic range from IUCN/SSC Antelope Specialist Group (2016h).



Figure 24. Subadult male Maasai Bushbuck *Tragelaphus scriptus delamerei*, Marsabit National Park, north Kenya.



**Southern Lesser Kudu *Tragelaphus imberbis australis* (Heller, 1913) Not Assessed**

At least 15 Southern Lesser Kudu *Tragelaphus imberbis australis* (Figures 25 and 27) were seen in eight encounters during this survey. Figure 26 shows the localities where individuals were confirmed. Up to five individuals were seen together, although solitary individuals were more commonly encountered. Southern Lesser Kudu were encountered between 616 m asl and 787 m asl, which is well within the known range of the species (<1,740 m asl; IUCN/SSC Antelope Specialist Group 2016g).

*Taxonomic note*

Two subspecies of *Tragelaphus imberbis* are recognized by Leuthold (2013) and none by the IUCN/SSC Antelope Specialist Group (2016g). *Tragelaphus i. australis* was given species status by Groves and Grubb (2011) as *Ammelaphus australis* Heller, 1913. Here we follow the taxonomy of Leuthold (2013).



Figure 25. Adult male Southern Lesser Kudu *Tragelaphus imberbis australis*, Sera Conservancy, central Kenya. This individual appears to be thin, probably the result of the 3-year drought.

*Distribution*

Southern Lesser Kudu were encountered within the known range (Figure 26; Leuthold 2013b; IUCN/SSC Antelope Specialist Group 2016g).



Figure 26. Encounters with Southern Lesser Kudu *Tragelaphus imberbis australis* during the Northeast Kenya Antelope Survey. Geographic range from IUCN/SSC Antelope Specialist Group (2016g).





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Figure 27. Adult female Southern Lesser Kudu *Tragelaphus imberbis australis*, Obbu, north Kenya.

**Common Waterbuck *Kobus ellipsiprymnus ellipsiprymnus* (Ogilby, 1833) Least Concern**

At least four Common Waterbuck *Kobus ellipsiprymnus ellipsiprymnus* (Figure 29) were encountered during this survey, all in Shaba National Reserve (Figure 28); one solitary adult male and a herd of three. Common Waterbuck were encountered between 788 m asl and 811 m asl, which is well within the known range of the species (0–3,000 m asl; IUCN/SSC Antelope Specialist Group 2016b).

Two Waterbuck taxa occur in Kenya; Defassa Waterbuck *Kobus ellipsiprymnus defassa* (Rüppel, 1835) and Common Waterbuck *Kobus ellipsiprymnus ellipsiprymnus*. Their taxonomic arrangement is debated; some authors (e.g., Lorenzen *et al.* 2006; Spinage 2013; Kingdon 1982a, 2015; IUCN/SSC Antelope Specialist Group 2016b) treat these taxa as subspecies, while others (e.g., Stewart and Stewart 1963, Groves and Grubb 2011) consider them species. Here we follow the taxonomic arrangement of Lorenzen *et al.* (2006); Spinage (2013); Kingdon (1982a, 2015); IUCN/SSC Antelope Specialist Group (2016b).

*Distribution*

The two encounters with Common Waterbuck during this survey were both in Shaba National Reserve, on the east edge of the geographic range of this subspecies (Figure 28; Spinage 2013; IUCN/SSC Antelope Specialist Group 2016b). The maps presented in these two sources are, however, incorrect in that they indicate that Common Waterbuck occur in the region between Archer's Post and Marsabit. Here, and over other large regions of the geographic distributions shown in these maps, the habitat is far from suitable for Common Waterbuck.

An intermediate-zone between the two subspecies of Waterbuck occurs in central Kenya, just west of Shaba National Reserve (outside the study area). Preliminary findings by De Jong and Butynski (2017) indicate that the intermediate zone in central Kenya is narrow and lies in south Samburu County, most likely extending southward across the North Ewaso N'jiro River into west Isiolo County. Find more information about this intermediate zone at: <https://www.wildsolutions.nl/waterbuck-kobus-ellipsiprymnus-laikipia-county>.



Figure 28. Encounters with Common Waterbuck *Kobus ellipsiprymnus ellipsiprymnus* during the Northeast Kenya Antelope Survey. Geographic range from IUCN/SSC Antelope Specialist Group (2016b).





Figure 29. Adult male Common Waterbuck *Kobus ellipsiprymnus ellipsiprymnus*, Shaba National Reserve, central Kenya.



**Greater Kudu *Tragelaphus strepsiceros* (Pallas, 1766) Least Concern**

One Greater Kudu *Tragelaphus strepsiceros* (Figure 30) was encountered during this survey. Figure 31 shows the location where the individual was seen. The one individual was encountered at 512 m asl, which is well within the known range of the species (0–2,400 m asl; IUCN/SSC Antelope Specialist Group 2020).

*Taxonomic note*

Three subspecies recognized by Kingdon (1997), none by Owen-Smith (2013) and IUCN/SSC Antelope Specialist Group (2020). Groves and Grubb (2011) recognize four species. Here we follow the taxonomic arrangement of Owen-Smith (2013) and IUCN/SSC Antelope Specialist Group (2020).

*Distribution*

The one encounter with Greater Kudu was northwest of Koya (N1.46804; E37.90719, 512 m asl; Figure 31). This site is ~20 km east of the geographic range as depicted on the latest distribution maps of the species (Owen-Smith 2013; IUCN/SSC Antelope Specialist Group 2020).



Figure 30. Adult male Greater Kudu *Tragelaphus strepsiceros*, Suyian Ranch, Laikipia, central Kenya. Photograph taken during an earlier survey, January 2021.

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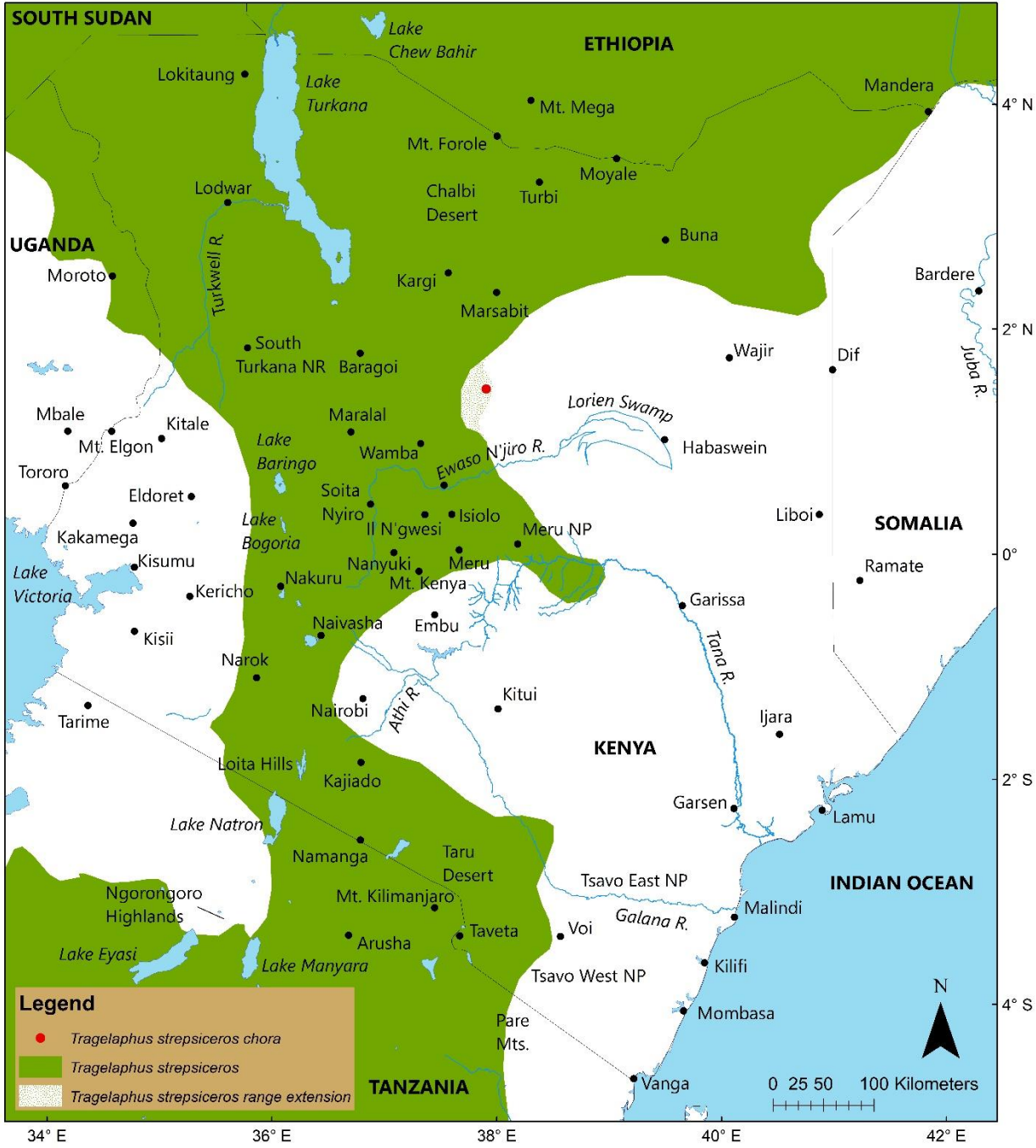


Figure 31. Encounters with Greater Kudu *Tragelaphus strepsiceros* during the Northeast Kenya Antelope Survey. Geographic range from IUCN/SSC Antelope Specialist Group (2020).

### **Antelope species not encountered**

Five of the 15 antelope species which were expected to occur in the study area, or in its vicinity, were not encountered during this survey; Common Eland, Salt's Dik-Dik, Common Duiker, Peter's Gazelle, and Coke's Hartebeest. All five were expected to occur at only at the very edge of the study area or just outside (Table 1).

- Common Eland: This is one of the focal species of Northern Rangeland Trust (NRT). The Sera Conservancy population was stable until 2019 (Wandera *et al.* 2020). Sera Conservancy is at the southwest corner of the study area, close to the limit of the geographic range of this species.
- Salt's Dik-Dik: This species might be present in the Mandera region at what might be the south limit of its geographic range. Yalden *et al.* (1984; *Catalogue of the Mammals of Ethiopia*) indicate that Salt's Dik-Dik is present in Ethiopia just north of the northeast corner of Kenya. This species might be present in Malka Mari National Park and in the vicinity of Mandera town. During this survey, security in this region was considered to be poor. We now plan to fly to Mandera and, with the help of the Kenya Wildlife Service, survey this region.
- Common Duiker: This species is expected to occur in south extreme of the study area (e.g., Sera Conservancy, Shaba National Reserve).
- Peter's Gazelle: During this survey we did reach the southeast part of the study area where this species might occur. Many photographs were taken of Bright's Gazelle. These will help to better determine the east limit of this species and where it meets, or grades into, Peter's Gazelle. This is likely to be in the region between Wajir town and Garissa town. There may be a phenotypic cline between the two taxa in is region.
- Coke's Hartebeest: Only expected to occur at the southwest extreme of the of the study area.

Soemmerring's Gazelle and Klipspringer, for which confirmation was required for their presence in northeast Kenya (Table 1), were not encountered during this survey.

## ANTELOPE CONSERVATION IN NORTHEAST KENYA

During this survey, antelope species were nowhere common in northeast Kenya outside of protected areas. The most common antelope species were water-independent species (*i.e.*, Kirk's Dik-Dik, Günther's Dik-Dik, Gerenuk, Bright's Gazelle). All of the antelope species historically known for northeast Kenya are still present and widespread, but uncommon. This low abundance is probably due to population declines during the recent 3–5-year drought and, locally, to competition with livestock (cattle, camels, donkeys, sheep, goats) for food and/or water. In addition, poaching probably has a considerable impact on antelope numbers in this region. With average to above average annual rainfall, these species are expected to recover well and to persist in this region long into the future.

Generally, competition with livestock for food and/or water, habitat degradation, loss and fragmentation, as well as poaching, are threats all antelope species in northeast Kenya. Most of northeast Kenya is too arid for large-scale agriculture or even large-scale ranching. It appears that the antelope species most vulnerable in northeast Kenya at this time are Beisa Oryx, Common Eland, and Greater Kudu. Common Impala, Common Waterbuck, Maasai Bushbuck, and Coke's Hartebeest have, historically, only occurred in northeast Kenya along the fringes of the Ewaso N'jiro River, and that seems to continue to be the situation (Stewart and Stewart 1963).

Both species of Dik-Dik are relatively adaptable to human-caused habitat changes. To a certain extent agricultural activities might favor them (*e.g.*, presence of food crops, open ground, absence of large predators).

Southern Gerenuk is not assessed on the IUCN Red list of Threatened Species. The species is, however, 'Near Threatened'. Southern Gerenuk was the second most frequently encountered antelope and present throughout the survey area. Hunting, habitat degradation and loss due to livestock grazing and browsing, as well as agricultural expansion are the main causes of their decline (IUCN/SSC Antelope Specialist Group 2016c). We suspect that, in northeast Kenya, these threats are localized. These threats do not seem to have as much negative impact on Southern Gerenuk as on Southern Lesser Kudu (species NT, subspecies not assessed) and Greater Kudu (LC). Over its range, ~10% of Gerenuk occur in protected areas (East 1999). This percentage is likely greater in northeast Kenya due to the presence of community conservancies.

Bright's Gazelles were most commonly encountered during the February–March 2023 survey, when the drought was at its peak. It might be that the species was more attracted to the edges of roads where some forage was present due to water run-off from the roads. Bright's Gazelle were sometimes seen near large herds of livestock, people, and villages (Figure 32). The main threats to their long-term survival are similar to the other antelopes (habitat degradation, loss, and fragmentation due to agricultural expansion, competition with livestock and poaching).

During this survey, Beisa Oryx were not encountered outside protected areas. Aerial survey prior to the 3–5-year drought indicate, however, that small, unprotected, herds remain over much of northeast Kenya in 2021 (KWS 2021). The Beisa Oryx population in northeast Kenya appears to be highly vulnerable. On Sera Conservancy, in the southwest part of the study area, there is a (170 km<sup>2</sup>) enclosure where populations of Beisa Oryx, Black Rhinoceros, Grévy's



Zebra, and other large mammals are well maintained and breeding. The eventual release of these animals, in addition to translocations from other sites in Kenya where these three species are doing well (e.g., the private wildlife conservancies of Laikipia County) have the potential to reestablish these species over a large part on northeast Kenya.



Figure 32. Adult male Bright's Gazelle *Nanger notata*, Griftu, northwest of Wajir town, northeast Kenya.

Most of northeast Kenya is historically unsuitable for the water-dependent Common Impala, Maasai Bushbuck, Common Waterbuck, Common Eland, and Coke's Hartebeest. We suspect that all of these species have declined in abundance during the 3–5-year drought due to severe competition with livestock and, probably, intensified poaching.

Southern Lesser Kudu are historically present throughout northeast Kenya. Their numbers are reported to be in decline due to poaching, competition with livestock, habitat degradation and loss, and rinderpest (IUCN/SSC Antelope Specialist Group 2016g). This species is listed as Near Threatened on the IUCN Red List of Threatened Species. Although this species is not common across northeast Kenya, human and livestock densities are relatively low over large parts of this region where sources of perennial water are absent. Southern Lesser Kudu are solitary or in small herd and are often difficult to locate. As a result, it is likely that a good number of individuals along our survey routes were undetected.

Greater Kudu are historically absent from the south part of the study area (Figure 31; Stewart and Stewart 1963) and only sparsely distributed across its range in Kenya (IUCN/SSC Antelope Specialist Group 2020). Despite being largely water-independent, this species becomes water dependent when the vegetation is dry (Owen-Smith 2013). Greater Kudu occur in small herd in dense vegetation and are often difficult to detect. It is likely that some individuals along our survey routes went undetected.

Northeast Kenya is less populated than the rest of Kenya. In 2019, the North Eastern Province had fewer than 3 million people (Kenya National Census 2019). There are relatively few roads

and vehicles in northeast Kenya. Many roads are in poor condition, in fact, during wet periods many are impassable, isolating large areas, some with sizeable towns.

As pointed out above, people and their livestock are in both direct and indirect competition for antelopes and other wildlife over some parts of northeast Kenya. Man-made perennial water sources in the form of dams are scattered throughout the landscape providing water to people and livestock during all or most of the year. Some of these are poorly maintained and unlikely to persist due to lack of maintenance and, apparently, theft of infrastructure such as pumps. Often these water sources are inaccessible to wildlife due to the full-time presence of people, livestock, and dogs, particularly during the dry-season and droughts. Some are fenced. Large herds of livestock often move as far as 10 km from these perennial water sources, negatively impacting the vegetation and the availability of grass and browse for wildlife. As much of northeast Kenya is more than 10 km from sources of perennial water, the impact of people and livestock over large areas is probably not significant. As such, these areas are expected to continue to provide the food that water-independent antelopes and other indigenous species require.

Lagas (seasonal streams and rivers) are an extremely important geological feature in northeast Kenya. They maintain plant and animal communities not found elsewhere and support a relatively high biodiversity. Smaller lagas typically hold water for a few months of the year, while the larger lagas probably serve as a source of perennial water during most, if not all, years.

The water-independent antelope species were nowhere common during this survey, but they were widespread across the vast bushlands and grasslands. These antelopes were often not particularly afraid of us while we were inside the vehicle. This suggests that poaching is not a major problem over much of northeast Kenya.

A UNESCO (2024) report, prepared by the National Museums of Kenya, states that there are about 550 Savanna Elephant, 3,000 African Buffalo, and 800 Greater Kudu in Marsabit National Park. No reference is made in this report as to the source of these figures. We suspect that the numbers of Savanna Elephant, African Buffalo, and Greater Kudu in Marsabit National Park are far lower than presented in this UNESCO report, perhaps less than 5% of the numbers presented in this report. At this time, we recommend that this report not be cited.

In February 2023, near the end of a severe 5-year drought, there were many herders with Goats foraging deep within Marsabit National Park (Figure 33). Many trees had been cut to provide browse to the Goats. The destruction of forest was extensive. No large mammals or rangers were encountered in this part of the protected area. When we visited the same section of Marsabit National Park in January 2024, no livestock or herders were encountered, but the destruction of the forest that occurred during the drought was clearly visible. Illegal harvesting of forest products, human encroachment, livestock grazing, wildlife poaching, and fire are all recognized threats to the conservation of this national park and its biodiversity (KWS 2015).



Figure 33. Many Goats and herders were encountered in the south part of Marsabit National Park during February 2023. Note that tree had been cut to provide browse to the goats.



## NOTES ON OTHER MAMMALS

Other than antelopes, 31 mammal species were encountered during this survey, six of which are ‘threatened’ (Vulnerable, Endangered, or Critically Endangered) according to the IUCN Red List of Threatened Species (Table 6; 2024).

We encountered five of the seven ‘Endangered’ species listed in Table 2. Seven of the nine focal species, other than antelopes, were encountered (Table 3). Below, we highlight five of the non-antelope species encountered.



Figure 34. Grévy’s Zebra *Equus grevyi*, Desert Warthog *Phacochoerus aethiopicus*, and Bright’s Gazelle *Nanger notata* on the edge of Buffalo Springs National Reserve, Archer’s Post, central Kenya.

Table 6. Species of mammal, other than antelopes, encountered during the Northeast Kenya Antelope Survey.

Non-antelope Species	IUCN Red List Status 2024	Locality (or Vicinity) Encountered
Savanna Elephant <i>Loxodonta africana</i>	EN	Gotu, Kom, Koya, Losai NR, Marsabit NP, Sera Conservancy and vicinity, Shaba NR
African Buffalo <i>Syncerus caffer</i>	NT	Marsabit NP, Shaba NR
Black Rhinoceros <i>Diceros bicornis</i>	CR	Sera Conservancy
Reticulated Giraffe <i>Giraffa reticulata</i>	EN	Biliqo Bulesa Conservancy, Gotu, Habaswein, Lorien Swamp, Moyale South (skull), Saraman (evidence), Shaba NR, Wajir (Figure 38)
Grévy's Zebra <i>Equus grevyi</i>	EN	Buffalo Springs NR, Marsabit NP, Sera Conservancy, Shaba NR (Figure 36)
Desert (Somali) Warthog <i>Phacochoerus aethiopicus delamerei</i>	LC	Buffalo Springs NR, Bute, Gotu, Habaswein, Sera Conservancy, Shaba NR, Sololo, Wajir (evidence), Eldas (Figure 40)
Central African Warthog <i>Phacochoerus africanus massaicus</i>	LC	Biliqo Bulesa Conservancy (most likely this species)(Figure 40)
Aardvark <i>Orycteropus afer</i>	LC	Turbi (evidence only)
Northern Crested Porcupine <i>Hystrix cristata</i>	LC	Koiya, Moyale
Olive Baboon <i>Papio anubis</i>	LC	Barata, Biliqo Bulesa Conservancy, Buna, Bute, Gotu, Korondille, Kom, Koya, Marsabit NP, Moyale, Ololokwe, Saraman (evidence), Sera Conservancy, Shaba NR, Sololo, Turbi, Wajir North (Figure 47)
Northeastern Vervet Monkey <i>Chlorocebus pygerythrus arenaria</i>	NA	Barata, Biliqo Bulesa Conservancy, Kom, Lorien Swamp, Marsabit (evidence), Moyale, Ololokwe, Sera Conservancy, Shaba NR
Somali Lesser Galago <i>Galago gallarum</i>	LC	Bute, Koya, Marsabit, Moyale, Ololokwe, Sololo, Turbi, (Figure 41)
Kenya Lesser Galago <i>Galago senegalensis braccatus</i>	LC	Ololokwe
Bush Hyrax <i>Heterohyrax brucei hindei</i>	NA	Barata, Biliqo Bulesa Conservancy, Ololokwe, Sera Conservancy, Shaba NR
Unstriped Ground Squirrel <i>Xerus rutilus</i>	LC	Throughout the study area
Ochre Bush Squirrel <i>Paraxerus ochraceus</i>	LC	Marsabit NP
Common Genet <i>Genetta genetta</i>	LC	Marsabit North, Moyale, Wajir North
African Civet <i>Civettictis civetta</i>	LC	Lorien Swamp, Moyale, Sololo (evidence)
Dwarf Mongoose <i>Helogale parvula</i>	LC	Barata, Bute, Sera Conservancy, Shaba NR, Wajir
Egyptian Mongoose <i>Herpestes ichneumon</i>	LC	Moyale
Slender Mongoose <i>Herpestes sanguineus</i>	LC	Moyale
White-tailed Mongoose <i>Ichneumia albicauda</i>	LC	Barata, Kom, Koya, Marsabit NP, Moyale, Wajir
Bat-eared Fox <i>Otocyon megalotis</i>	LC	Ambalo, Barata

Side-striped Jackal <i>Canis adustus</i>	LC	Moyale
Black-backed Jackal <i>Canis mesomelas</i>	LC	Ambalo, Merti, Moyale, Shaba NR, Sololo, Wajir North,
African Golden Wolf <i>Canis lupaster</i>	LC	Buna, Merti
Spotted Hyaena <i>Crocuta crocuta</i>	LC	Throughout the study area
Striped Hyaena <i>Hyaena hyaena</i>	NT	Barata, Biliqo Bulesa Conservancy, Merille, Mt. Marsabit
Lion <i>Panthera leo</i>	VU	Kom, Shaba NR
Leopard <i>Panthera pardus</i>	VU	Barata
Hare <i>Lepus species?</i>	-	Ambalo, Barata, Biliqo Bulesa Conservancy, Koya, Turbi

LC, Least Concern; NT, Near Threatened; VU, Vulnerable; EN, Endangered; CR, Critically Endangered; DD, Data Deficient; NA, Not Assessed



Figure 35. Subadult male Olive Baboon *Papio anubis*, Moyale, north Kenya.



### Grévy's Zebra *Equus grevyi* (Oustalet, 1882) Critically Endangered

A total of 135 Grévy's Zebra *Equus grevyi* were encountered during this survey. These were 784-1,492 m asl. All encounters were in protected areas; Buffalo Springs National Reserve, Shaba National Reserve, Sera Conservancy, and Marsabit National Park (Figure 36). All records will be shared with the Grévy's Zebra Trust. For more details concerning our encounters with Grévy's Zebra in Marsabit National Park see the blog 'Marsabit National Park and its forest-dwelling Grévy's Zebra and other animals' in Appendix I or: [www.wildsolutions.nl/marsabit/](http://www.wildsolutions.nl/marsabit/). Although Rubenstein *et al.* (2016) do not include Marsabit National Park within the geographic range of Grévy's Zebra, this species is known for this national park (Williams 1981; KWS 2021).

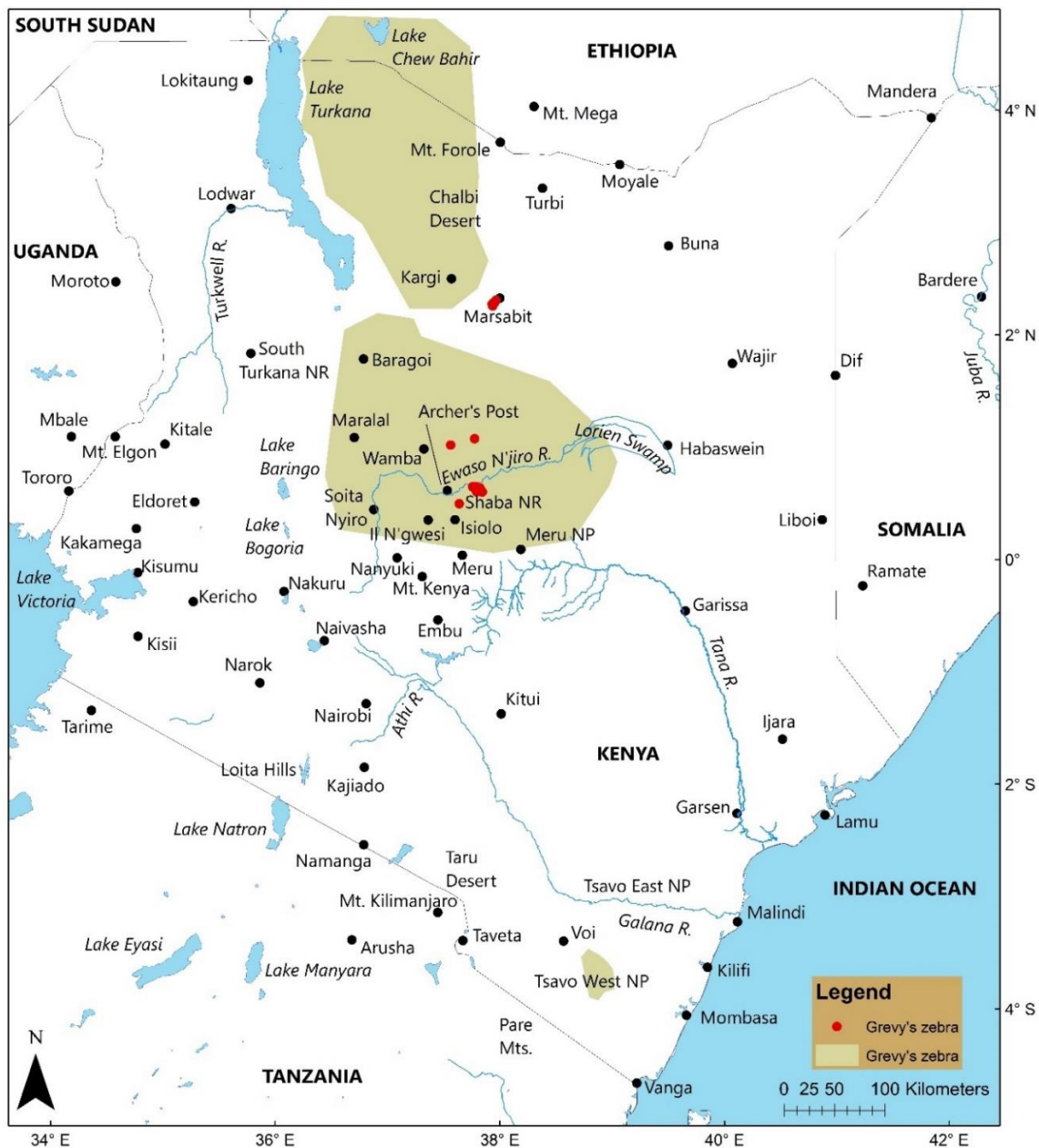


Figure 36. Encounters with Grévy's Zebra *Equus grevyi* during the Northeast Kenya Antelope Survey. Geographic range from Rubenstein *et al.* (2016). See also maps in KWS (2021).

**Reticulated Giraffe *Giraffa reticulata* de Winton, 1899 Endangered**

A total of 115 Reticulated Giraffe *Giraffa reticulata* (Figure 37) were encountered during this survey. There were in Sera Conservancy, Biliqo Bulesa Conservancy, and Shaba National Reserve in central Kenya, and at Lorien Swamp and between Habaswein and Wajir, northeast Kenya (Figure 38). One skull was found south of Moyale, extreme north Kenya. Sixty-three were encountered on communal land in the vicinity of Lorien Swamp, Habaswein, and Wajir. The Reticulated Giraffe outside protected areas in the east part of the study area are said to be mainly threatened by poaching as they are a primary target of the bushmeat trade in this region. KWS and the Somali Giraffe Project aim to reduce poaching. KWS (2021) estimates that Wajir County supports 6,120 Reticulated Giraffe.



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Figure 37. Adult male Reticulated Giraffe *Giraffa reticulata* just north of Habaswein, northeast Kenya.

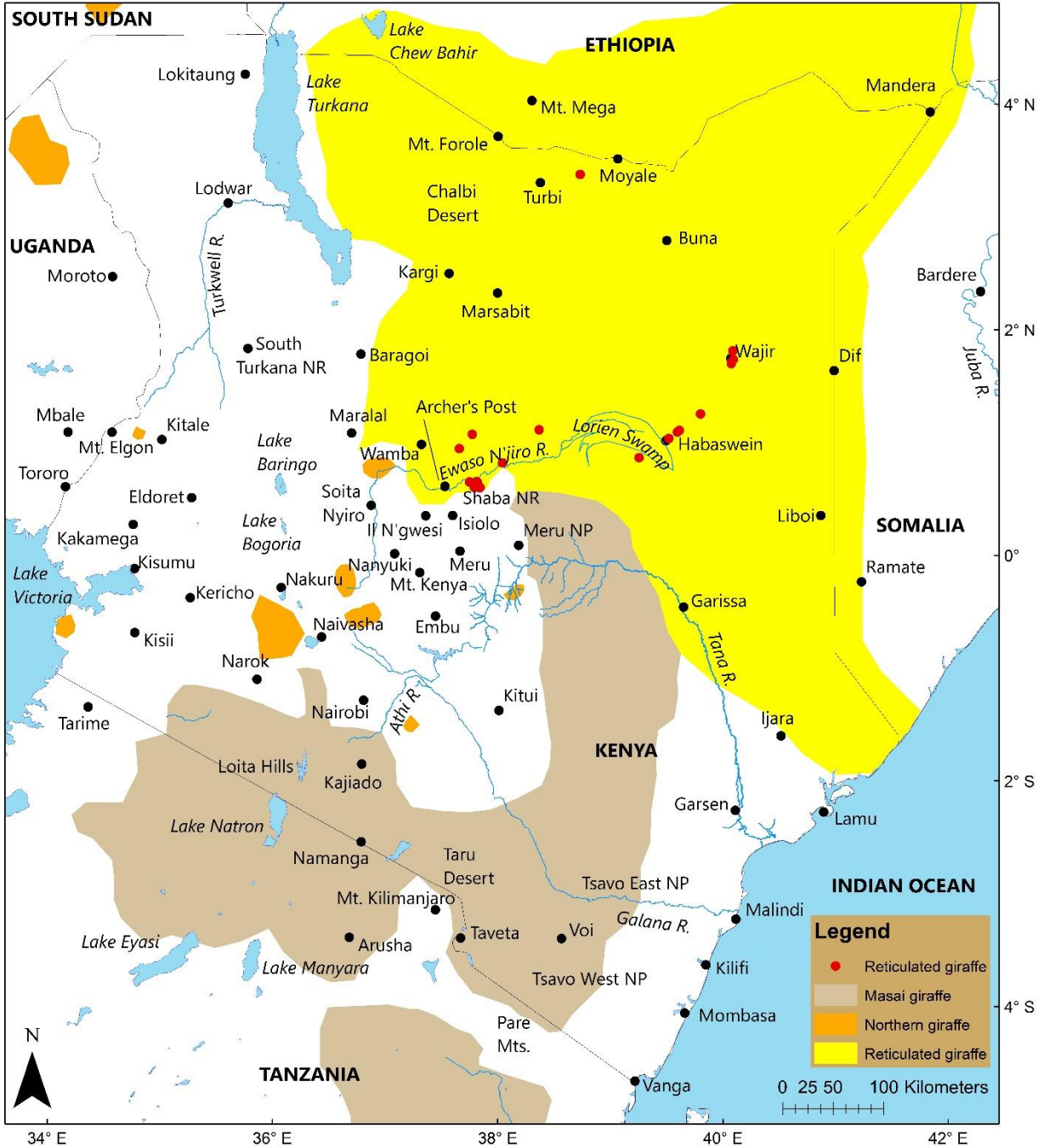


Figure 38. Encounters with Reticulated Giraffe *Giraffa reticulata* during the Northeast Kenya Antelope Survey. Geographic range from Muller et al. (2018).



**Desert (Somali) Warthog *Phacochoerus aethiopicus delamerei* (Pallas, 1766) Least Concern**

A total of 29 Desert (Somali) Warthog *Phacochoerus aethiopicus delamerei* (Figure 39) were seen in nine encounters during this survey, some of which provide substantial range extensions (De Jong *et al.* 2022; Figure 40). The presence of Desert Warthog was confirmed in two additional areas based on photographs shown by police at Quate and by KWS staff at Wajir.

On the 5 August 2023, we encountered Warthog southwest of Merti. As these individuals were flighty, we failed to identify which species. We both had the impression, however, that these were Common Warthog *Phacochoerus africanus* (Gmelin, 1788). We placed seven camera traps for 1 night at this site, but no individuals were captured. As this would be a considerable eastward range extension for Common Warthog, we plan to revisit this site during Phase 2 of this survey to determine the species.

Locality records obtained during this survey are important for the conservation of what is probably Africa's most poorly known non-forest large mammal. We suspect that the Desert Warthog might be the large wild mammal that was most negatively affected by the recent 3–5-year drought. Many people indicated that Warthog were typically common in a particular area, but that they had all died during the drought. We found Warthog only at sites with perennial water, such as along the Ewaso N'jiro River and Lorien Swamp. Warthog have a high reproductive capacity and, once droughts are over, probably can relatively rapidly repopulate large areas. This survey will serve as a baseline against which to gauge this recovery.



Figure 39. Adult male Desert Warthog *Phacochoerus aethiopicus delamerei*, Eldas, north of Wajir, northeast Kenya.

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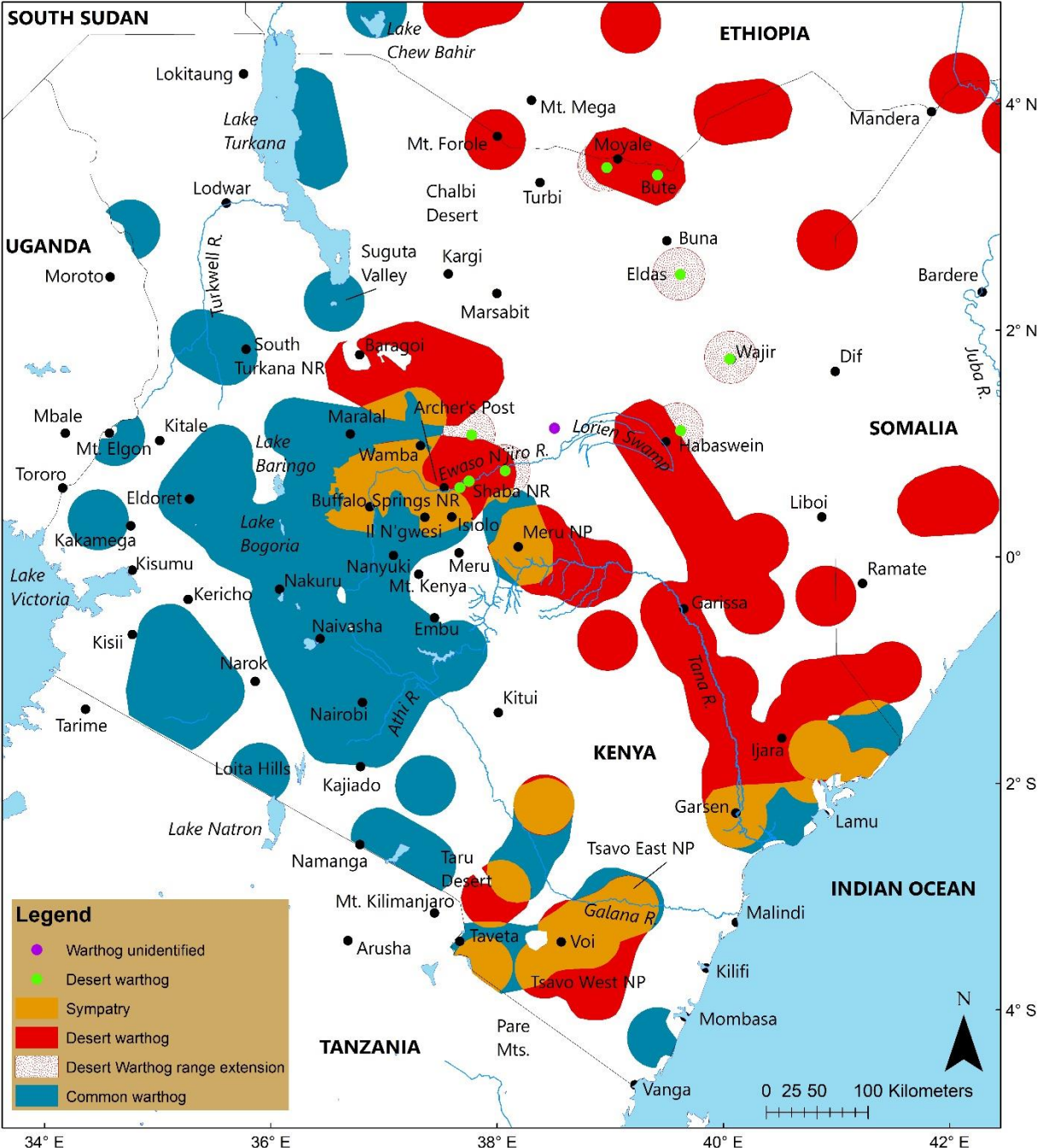


Figure 40. Encounters with Desert Warthog *Phacochoerus aethiopicus delamerei* during the Northeast Kenya Antelope Survey. Geographic range adopted from De Jong et al. (2022).

### Lesser Galagos *Galago* spp. É. Geoffroy, 1796

During this survey, we collected 12 localities for the poorly known Somali Lesser Galago *Galago gallarum* Thomas, 1901, two of which require confirmation and one of which was already known (Ololokwe). Most of these records fill large gaps in the known geographic range and a few represent range extensions (De Jong and Butynski 2023; Figure 41). At Ololokwe, Somali Lesser Galago is sympatric with Kenya Lesser Galago *Galago senegalensis braccatus* Elliot, 1907, in Yellow Fever *Vachellia xanthophloea* woodland.

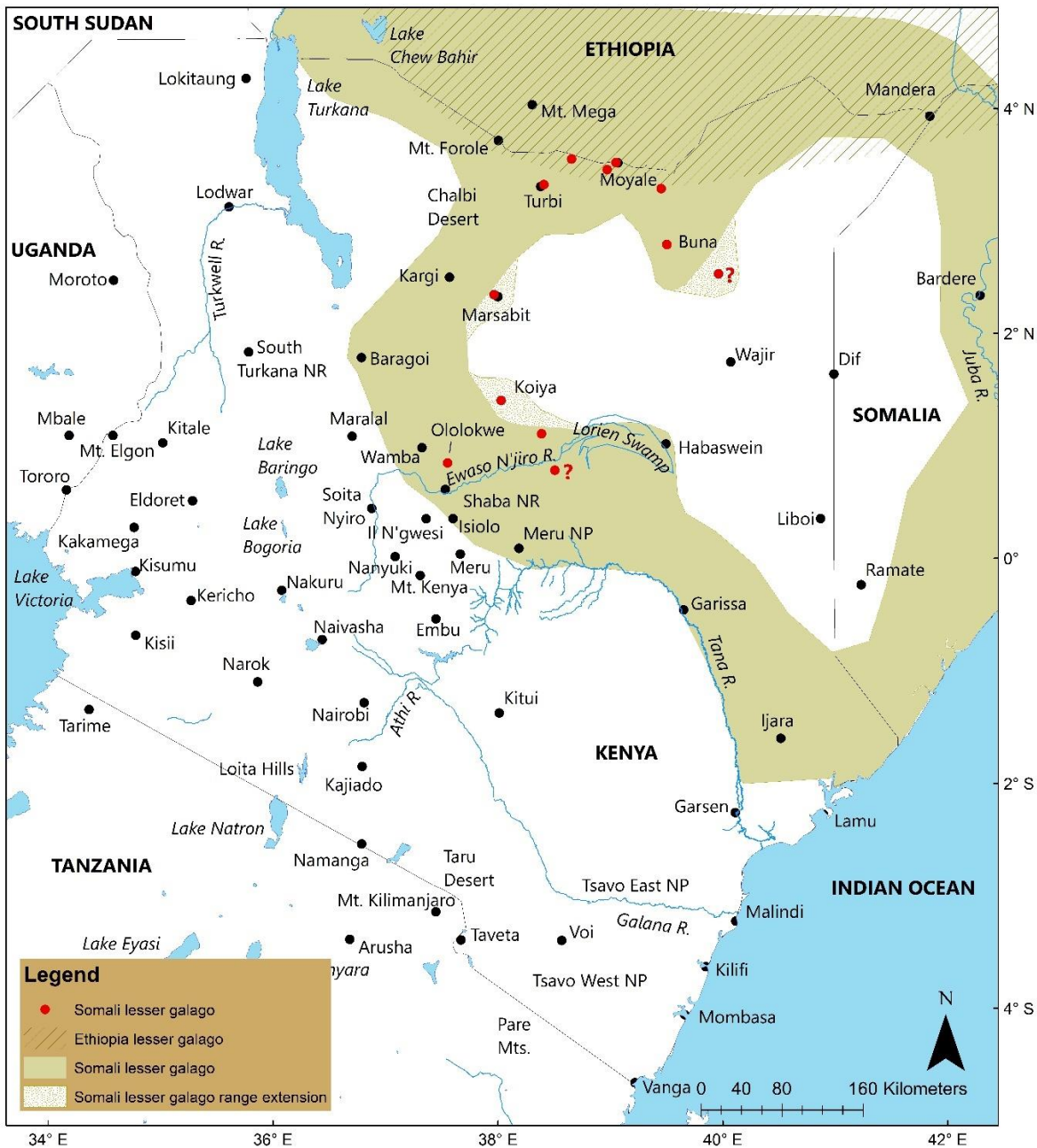


Figure 41. Encounters with Somali Lesser Galago *Galago gallarum* during the Northeast Kenya Antelope Survey. Geographic range of Ethiopia Lesser Galago *Galago senegalensis dumni* depicted diagonal lines at the top of the map. Geographic ranges adopted from De Jong and Butynski (2023).



During this survey, data was collected on Somali Lesser Galago social interactions and feeding behaviour (Figures 42, 43 and 44). Many audio recordings and photographs were obtained. These are important for describing the vocal profile and phenotypic variation for this species (De Jong and Butynski in prep.).

Although we spent several nights in or near what the literature indicates is the geographic range of the Ethiopia Lesser Galago *Galago senegalensis durni* Dollman, 1910 (De Jong and Butynski 2023, Figure 41), no records were obtained of this subspecies. We have yet to find this subspecies in Kenya.



Figure 42. Adult female Somali Lesser Galago *Galago gallarum*, Marsabit, north Kenya.



Figure 43. Adult male and adult female Somali Lesser Galago *Galago gallarum*, Sololo, north Kenya.



Figure 44. Adult Somali Lesser Galago *Galago gallarum* feeding on *Acacia* gum, Moyale, north Kenya.



**Olive Baboon *Papio anubis* (Lesson, 1827) Least Concern**

Eighty-six groups of Olive Baboon *Papio anubis* were encountered during this survey. Olive Baboon were the most common non-human primate species observed during this survey. The group encountered east of Eldas, southeast of Buna, was slightly outside the known geographic range (Figure 47; De Jong and Butynski 2023). In addition, there was evidence of a group at Saraman. These records extend the known geographic range eastwards. Figure 47 shows the locations of both of these groups.

Olive Baboon have an altitude range of 540–3,310 m asl in East Africa (De Jong and Butynski 2023) but are known to occupy habitats between 200–3,850 m asl in Northeast Africa (Palombit 2013, Butynski and De Jong 2022). During this survey, we encountered this species as low as 360 m asl in the vicinity of Barata, just south of Ewaso N’jiro River. This is a new low altitude record for East Africa.



Figure 45. Adult male Olive Baboon *Papio anubis*, Barata, east Kenya. This individual has some phenotypic traits of Ibean Yellow Baboon *Papio cynocephalus ibleanus*.



Most, if not all, adult males in the Barata group showed some phenotypic traits of Ibean Yellow Baboon *Papio cynocephalus ibleanus* Thomas, 1893 (Figures 45 and 46). These include a slightly pointed crown, pale grey nasal pelage, grizzled yellow-grey cheek whiskers, prominent pointed ears, kinked tail, and a yellow wash on the outer hindlimbs. It is likely that this group is part of the phenotypic cline with the Ibean Yellow Baboon populations east and south of the range of Olive Baboon (Figure 47). Phenotypic clines are reported in several regions of eastern Africa where one Baboon species is overtaken by one, or even two, other species (De Jong and Butynski in prep.). Our descriptions and photographs of the Barata group helps to document one of these clines.



Figure 46. Adult male Olive Baboon *Papio anubis* with some phenotypic traits of Ibean Yellow Baboon *Papio cynocephalus ibleanus*, Barata, east Kenya.



## CONCLUSIONS

Ten of the 15 antelope species known to occur in northeast Kenya were encountered during this survey. The most common species of antelope encountered during the Northeast Kenya Antelope Survey was Kirk's Dik-Dik, followed by Southern Gerenuk and Bright's Gazelle, all species which are not dependent on water. The five species not encountered (Common Eland, Salt's Dik-Dik, Common Duiker, Peter's Gazelle, Coke's Hartebeest) were expected to occur at the edge of the study area or just outside.

Range extensions for Kirk's Dik-Dik (130 km to the northeast) and Greater Kudu (20 km to the east) were obtained during this survey. The extension for Kirk's Dik-Dik is particularly important as this substantially expands the area of sympatry with Günther's Dik-Dik ~18,000 to the north. This almost certainly means that this species occurs in south Ethiopia. If so, this is a large new mammal for Ethiopia.

During this survey, Beisa Oryx were not encountered outside the protected areas in the southwest corner of the study area. We suspect that small, unprotected, herds do remain. These were located during a 2021 aerial survey conducted by the Kenya Wildlife Service (KWS 2021). This survey was, however, conducted near the beginning of the 3–5-year drought. The Beisa Oryx population in northeast Kenya appears to be small and, therefore, highly vulnerable. Sera Conservancy has a large enclosure (170 km<sup>2</sup>) where Beisa Oryx are well maintained and breeding. The eventual release of these animals, in addition to translocations from other sites in Kenya where this species is doing well, have the potential to reestablish Beisa Oryx over a large part of northeast Kenya.

Competition with livestock for food and/or water, habitat degradation, loss, and fragmentation, as well as poaching, are the primary threats for most species of antelope in northeast Kenya. These threat become particularly severe during prolonged droughts. Most of northeast Kenya is too arid for large scale agriculture, including livestock ranching. It appears that the antelope species most vulnerable in northeast Kenya are Beisa Oryx, Common Eland, Greater Kudu, Southern Lesser Kudu, Maasai Bushbuck, Common Impala, and Common Waterbuck.

Most of the antelope species known to historically occur in northeast Kenya are still present and widespread, but uncommon. Besides the mentioned threats, their low abundance is probably also due to intensified poaching and competition with livestock during the recent 3–5-year drought. With average to above average annual rainfall, these species are expected to recover well and to persist in this region long into the future. The database provided in this report will help assess the speed and extent of this recovery.

Besides lagas, man-made perennial water sources (dams) provide water to antelopes and other wildlife in northeast Kenya. Many of these water sources are, however, often fenced and/or occupied by people, livestock, and dogs much of the time, particularly during the daylight hours. The vegetation in and around settlements is typically severely degraded by livestock. In northeast Kenya, however, the human population is relatively small and there are relatively few roads. Large parts of northeast Kenya are little affected by people because they lack perennial water sources.



Thirty-one mammals species, other than antelopes, were encountered during this survey, six of which are ‘threatened’ (Vulnerable, Endangered, Critically Endangered, IUCN (2024; Table 6). We encountered five of the seven ‘Endangered’ species listed in Table 2. Seven of the nine non-antelope focal species were encountered (Table 3). Below we highlight a few of these species.

During this survey we obtained altitudinal range extensions, geographic range extensions, and natural history data for Desert (Somali) Warthog, Common Warthog, Somali Lesser Galago, Olive Baboon, Pancake (Crevice) Tortoise, and Heuglin’s Bustard.

More than 12,000 photographs were taken in RAW format during this survey, mostly of antelope, primates, warthog, and birds, but also of reptiles, amphibians, insects, plants, and habitats. Most records have been uploaded to [our account on iNaturalist.org](#). Many photographs have been shared with taxonomic and species authorities and will be used for blogs, reports, and articles by us or others.

Audio recordings obtained during this survey have been stored in our AudioDataBase and many have been, or will be, shared on iNaturalist.org. Recordings of primates will be placed on our website [[www.wildsolutions.nl](http://www.wildsolutions.nl)] and/or used in future research.



Figure 48. Immature male Southern Gerenuk *Litocranius walleri walleri*, Wajir, northeast Kenya.

## NEXT STEPS

In this report we made use of the antelope distribution maps compiled by the IUCN/SSC Antelope Specialist Group, downloaded from the IUCN Red List of Threatened Species website (IUCN.org). We will update the 10 antelope distribution maps, and those of other taxa, where needed based on the following:

1. During this survey we found range extensions for Kirk's Dik-Dik and Greater Kudu. In ArcGIS we will update the shapefiles.
2. Extensive areas of unsuitable habitat are included in most of the current antelope distribution maps (2013 *Mammals of Africa*, IUCN.org) but also in distribution maps of other species such as Reticulated Giraffe and Olive Baboon. For example, the extensive lava fields in north Kenya are geographic barriers for various taxa, including Gerenuk and both species of Dik-Dik. Although Gerenuk were encountered in areas with lava, distribution records collected during this survey show that extensive areas of lava form a geographic barrier for this species. With the help of soil and vegetation shapefiles we will remove large sections of unsuitable habitat from the antelope distribution maps.
3. During our 23 years of surveys in East Africa, we compiled a large database of locality records. We will use these records to finetune the outer limits of the geographic range of all nine antelope species and some of the other taxa encountered during this survey, including the primates and those mammals with a threatened status. We will communicate those extensions with the species authorities. For example, we know that the geographic range of Beisa Oryx extends southwards in central Kenya to at least Ol Pejeta Conservancy and Lolldaiga Hills Ranch in Laikipia County, that the range of Gerenuk extends southwards in central Kenya (Soita Nyiro Conservancy, Mpala Ranch, and Lolldaiga Hills Ranch in Laikipia County), and that the geographic range of Reticulated Giraffe can be adjusted southwards in central Kenya and other parts of Kenya.

Once adjustments have been made, we will make the shapefiles available to the IUCN/SSC Antelope Specialist Group for the next IUCN Red List assessments of each taxon.

We have submitted a second grant proposal to ZGAP in support of our 'North Kenya Antelope Survey' (Phase 2). We aim to undertake Phase 2 during May 2024–June 2025; three 2-week surveys totaling at least 42 field days. These surveys will be conducted along ~6,300 km of road and include foot-surveys in the vicinity of 42 nights camps. The methods applied will be the same as during the 2023 Northeast Kenya Antelope Survey.

The North Kenya Antelope Survey will cover as much of north Kenya as possible. This is the region north of the Ewas N'jiro River, east of Lake Turkana, west of the Somali border, and south of the Ethiopia border (Figure 49). During the North Kenya Antelope Survey we plan to: (1) fly to Mandera town and survey the region from there, including the poorly known Malka Mari National Park (probably with security provided by the Kenya Wildlife Service); (2) survey the area between Barata and Lorien Swamp; (3) and survey along the Kenya-Ethiopia border from Moyale town westward to Lake Turkana (= Lake Rudolf), including Mount Forole, Huri Hills,

Chalbi Desert, Sele Guble Pass, Lake Chaw Bahir (= Lake Stefanie), Ileret, and Sibiloi National Park).

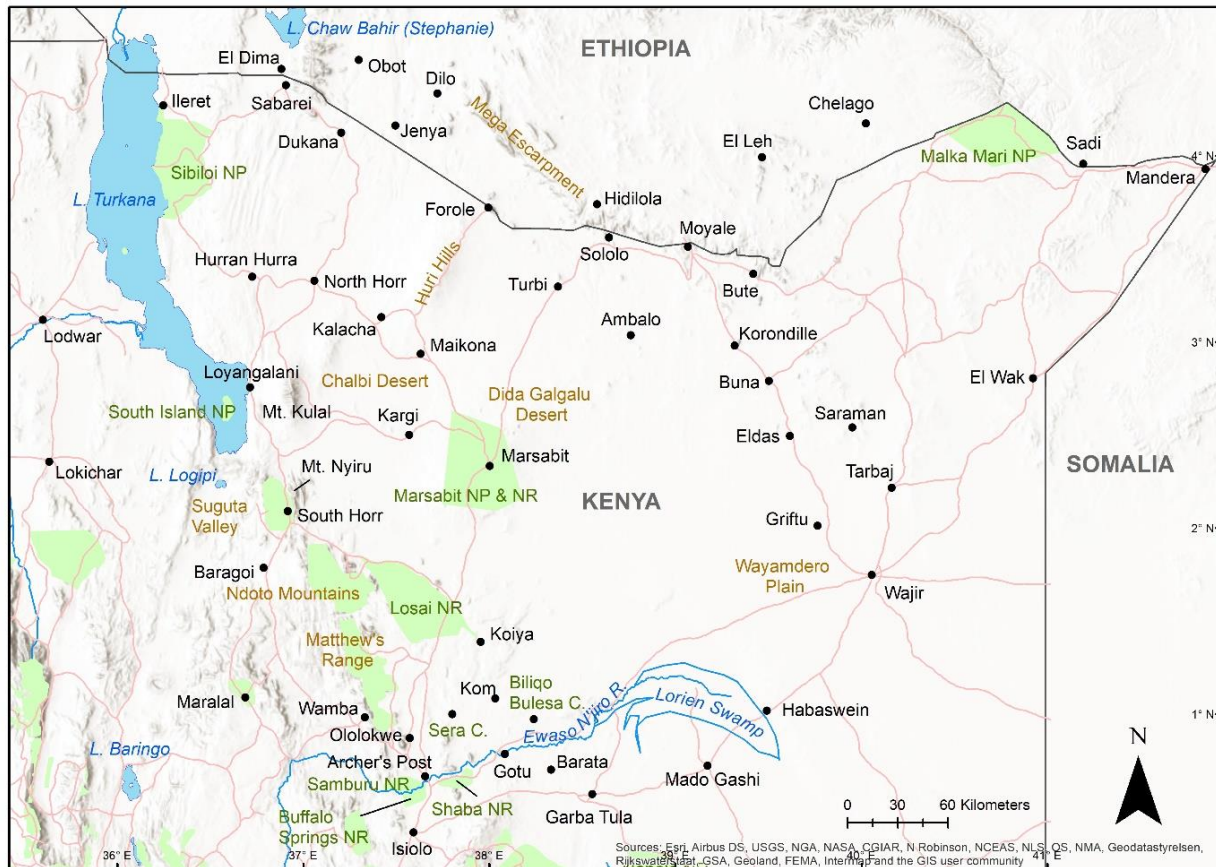


Figure 49. The Northern Kenya Antelope Survey study area with major roads depicted in red. Map by Yvonne de Jong and Tom Butynski.

Antelopes will again be the main focus of this survey, in particular the newly discovered population of Kirk's Dik-Dik along the Kenyan-Ethiopian border. During our recent examination of Dik-Dik specimens at the Natural History Museum (London), we did not find Kirk's Dik-Dik specimens from either north Kenya or for Ethiopia. Yalden, Lagen, and Kock (1984; *Catalogue of the Mammals of Ethiopia*) indicate that Salt's Dik-Dik (i.e., Swayne's Dik-Dik *Madoqua saltiana swaynei*) is present in Ethiopia just north of the northeast corner of Kenya. We have reviewed the literature in order to better understand the phenotypic traits that best distinguish Kirk's Dik-Dik from Swayne's Dik-Dik in the field.



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Figure 50.  
Grasshopper  
Buzzard *Butastur  
rufipennis*,  
Habaswein,  
northeast  
Kenya.



## Appendix I

# Range Extension for the Pancake Tortoise *Malacochersus tornieri* in Northeastern Kenya

Yvonne A. de Jong and Thomas M. Butynski  
Eastern Africa Primate Diversity and Conservation Program, Nanyuki, Kenya

Blog published on the 11<sup>th</sup> of March 2024 on [www.wildsolutions.nl/pancake-tortoise](http://www.wildsolutions.nl/pancake-tortoise)

It took us only a second to realize what we were looking at. On the track in front of our Land Rover was a flat, turtle-like, creature scurrying from one rocky hill (or 'kopje) to another. What we were seeing was an adult male Pancake Tortoise (or Crevice Tortoise *Malacochersus tornieri*). The Pancake Tortoise is referred to locally, in Kiswahili, as 'Kobe kama Chapati'---Chapati Tortoise.



Adult male Pancake Tortoise (Crevice Tortoise) *Malacochersus tornieri*, northeastern Kenya.

According to the *IUCN Red List of Threatened Species*, the Pancake Tortoise is a 'Critically Endangered' species (Mwaya *et al.* 2019). Since this is the only species in the genus *Malacochersus*, this genus can also be considered to be 'Critically Endangered'.

The Pancake Tortoise has a relatively soft and flexible shell that enables it to be considerably more agile than other tortoises. It is able to climb and slide down steep rocks (>30°). Whereas most species of tortoise withdraw into their tough shell when threatened, the Pancake Tortoise makes a dash for it and wedges itself deep in a rock crevice or under a boulder. It wedges in with its carapace and claws and is extremely difficult to dislodge (Spawls *et al.* 2002, 2018). The individual that we encountered was surprisingly speedy and soon out-of-sight among the vegetation and rocks at the base of the hill.



Pancake Tortoise *Malacochersus tornieri* habitat, northeastern Kenya.



Pancake Tortoise *Malacochersus tornieri* habitat, northeastern Kenya.



The Pancake Tortoise is endemic to eastern Africa and has a very disjunct geographic distribution. It occurs in central northern and central southern Kenya, and in northern and central Tanzania. A small population is present in extreme northern Zambia. This diurnal species lives on and near small rocky hills and rock outcrops of the Precambrian Crystalline Basement System in semi-arid *Acacia-Commiphora* deciduous bushlands within the Somalia-Maasai and Zambezian Floristic Regions. Here the mean annual rainfall is 250–500 mm. The known altitudinal range is 400–1,800 metres above sea level. The diet of the Pancake Tortoise is comprised of flowers, herbs, grasses, and succulents, supplemented with seeds and arthropods (Spawls *et al.* 2002, 2018; Mwaya *et al.* 2019; Eustace *et al.* 2021).

Our brief encounter with this extraordinary species was during an antelope survey in northeastern Kenya. We will not, here, provide the location of our encounter with this Critically Endangered reptile because it is severely over-exploited by commercial collectors for the global exotic wildlife trade. We can report, however, that this individual was more than 100 km east of the currently known range (Mwaya *et al.* 2019; Eustace *et al.* 2021) at an altitude of 425 metres above sea level.



Adult male Pancake tortoise *Malacochersus tornieri*, northeastern Kenya.

The bizarre appearance of the Pancake Tortoise (flat, pancake-like dorsal-ventral profile, attractive shell), together with its relative agility and docility make it an attractive trade item for zoological and private collections. As a result, over-exploitation is a major threat to the long-term survival of this species, together with habitat degradation, loss, and fragmentation (Mwaya *et al.* 2019, Eustace *et al.* 2021). Climate change and severe drought are believed to be other



causes of this species' decline (Mwaya *et al.* 2019). Eustace *et al.* (2021) modelled climatic suitable habitats for Pancake Tortoises in current and future scenarios. Their models predict that the geographic range will expand and be more continuous under future climate change. Nonetheless, they warn that, since about 77% of the geographic range of this species lies outside of protected areas, the collection of wild individuals for the international exotic animal trade will remain a serious threat---even though this collecting is illegal in Kenya and Tanzania (Mwaya *et al.* 2019).

We plan to return to the site in which we found this one Pancake Tortoise in order to assess the limits of the area occupied and to obtain some indication of abundance.

We thank the Zoologische Gesellschaft für Arten- und Populationsschutz (ZGAP) for funding the Northeast Kenya Antelope Survey which led to the discovery of this Pancake Tortoise site.

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Adult male Pancake Tortoise *Malacochersus tornieri*, northeastern Kenya.

## Appendix II

# Marsabit National Park and its forest-dwelling Grévy's zebra and other animals

Thomas M. Butynski and Yvonne A. de Jong

Eastern Africa Primate Diversity and Conservation Program, Nanyuki, Kenya

Blog published on the 26<sup>th</sup> of February 2024 on [www.wildsolutions.nl/marsabit](http://www.wildsolutions.nl/marsabit)

Marsabit National Park (1,554 km<sup>2</sup>), located in northern Kenya, is named after Mount Marsabit, a shield volcano (1,707 m asl; 6,300 km<sup>2</sup>) that last erupted ~600,000 years ago (Scoon 2022). The higher reaches of Mount Marsabit are mostly covered with mid-altitude and montane forest that is dependent on frequent heavy mist to supplement the low rainfall. This unique forest is an island among the arid and semi-arid plains of northern Kenya as it is bounded by the Koroli Desert to the west, the Chalbi Desert to the northwest, the Dida Galgalu Desert to the north and northeast, and the vast, semi-arid, plains leading to Somalia and the Indian Ocean to the east and southeast. Dominant trees in the montane forest include pencil cedar *Juniperus procera* and African olive *Olea europaea africana*. Big fig trees *Ficus* are common. *Acacia* woodlands and bushlands cover the lower slopes. There are several volcanic craters, some with freshwater lakes (e.g., Lake Paradise, Lake Marsabit, Lake Horr), that offer grazing around their perimeters and drinking water for most, or all, of the year.



Adult male Grévy's zebra *Equus grevyi* in montane forest at 1,490 m asl in Marsabit National Park, northern Kenya.



The charismatic and ‘Endangered’ Grévy’s zebra *Equus grevyi* is, today, endemic to central and northern Kenya and central and southern Ethiopia (Rowen and Ginsberg 1992, Williams 2002, 2013, Rubenstein *et al.* 2016). This species typically lives in arid and semi-arid grasslands and shrublands, hence our surprise when we encountered Grévy’s zebra in the lush cloud forest of Marsabit National Park while conducting an antelope survey in northeastern Kenya. When we visited Marsabit National Park in February 2023, while northern Kenya was experiencing a 5-year drought, we saw 17 Grévy’s zebra within, and in the vicinity of, Gof Sokorte Duda, the crater with a 150-meter-deep caldera in which Lake Paradise is located (1,334 m asl; ~50 ha when full). In January 2024, after the region received good rains in November, we saw at least 10 Grévy’s zebra, including a herd of at least three individuals moving through forest at 1,490 m asl. It appears that this species is resident in the grassland and forest around Lake Paradise.

Williams (1981) lists Grévy’s zebra among the mammals present in Marsabit National Reserve (which, at that time, included today’s Marsabit National Park). He also states (p. 70), “*Reticulated giraffe* are common on the mountain, where they have taken to spending much of their time in the forest—a most unlikely habitat for giraffe.” During the few days that we were in Marsabit National Park we did not encounter giraffe.

Historically, Grévy’s zebra occurred widely in the Horn of Africa east of the Eastern (Gregory) Rift Valley from central Ethiopia southwards to central Kenya and southwest Somalia. This species is, apparently, now absent from Somalia. The populations in Ethiopia and Kenya are discontinuous and widely scattered (Rowen and Ginsberg 1992, Williams 2002, 2013, Rubenstein *et al.* 2016). Reintroduced or introduced populations are present at several sites in Kenya, including the Tsavo Conservation Area, Oserian Wildlife Sanctuary, and OI Pejeta Conservancy.



Lake Paradise, Marsabit National Park, in February 2023 during northern Kenya’s 5-year drought. This site appears to be particularly important for the survival of Grévy’s zebra in this national park.





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 Adult Grévy's zebra *Equus grevyi*, Lake Paradise, Marsabit National Park, northern Kenya, in February 2023 during northern Kenya's 5-year drought.

Kenya's population of Grévy's zebra declined from about 13,700 individuals in the late 1970s to about 1,600 in 2017, an 88% decline. Nonetheless, Kenya holds about 90% of the world's population of Grévy's zebra (Rubenstein *et al.* 2016, KWS 2017, 2021). Conservation actions, conducted by organizations such as the Grevy's Zebra Trust, Northern Rangeland Trust, and Kenya Wildlife Service, as well as by group ranches and private ranches, have served to increase Kenya's population as of 2021 to somewhere between 2,650 and 3,000 individuals. About 1,000 Grévy's zebra live in Laikipia County. Marsabit County has approximately 110 Grévy's Zebra (KWS 2021). Habitat degradation, loss, and fragmentation due to over-grazing by livestock, as well as competition with livestock and people over water, are the main threats to Grévy's zebra. Other treats include hunting by people in addition to disease, such as anthrax, due to contact with unvaccinated livestock (Williams 2002, 2013, Rubenstein *et al.* 2016, KWS 2017, 2021).

Other species of mammal in Marsabit National Park include African buffalo *Syncerus caffer*, Maasai bushbuck *Tragelaphus scriptus delamerei*, lesser kudu *Tragelaphus imberbis*, greater kudu *Tragelaphus strepsiceros*, Beisa oryx *Oryx beisa beisa*, gerenuk *Litocranius walleri*, Bright's gazelle *Nanger (granti) notata*, reticulated giraffe *Giraffa reticulata*, savanna elephant *Loxodonta africana*, leopard *Panthera pardus*, spotted hyaena *Crocuta crocuta*, striped hyaena *Hyaena hyaena*, white-tailed mongoose *Ichneumia albicauda*, and ochre (Huet's) bush squirrel *Paraxerus ochraceus* (Williams 1981, Butynski and De Jong personal observations).





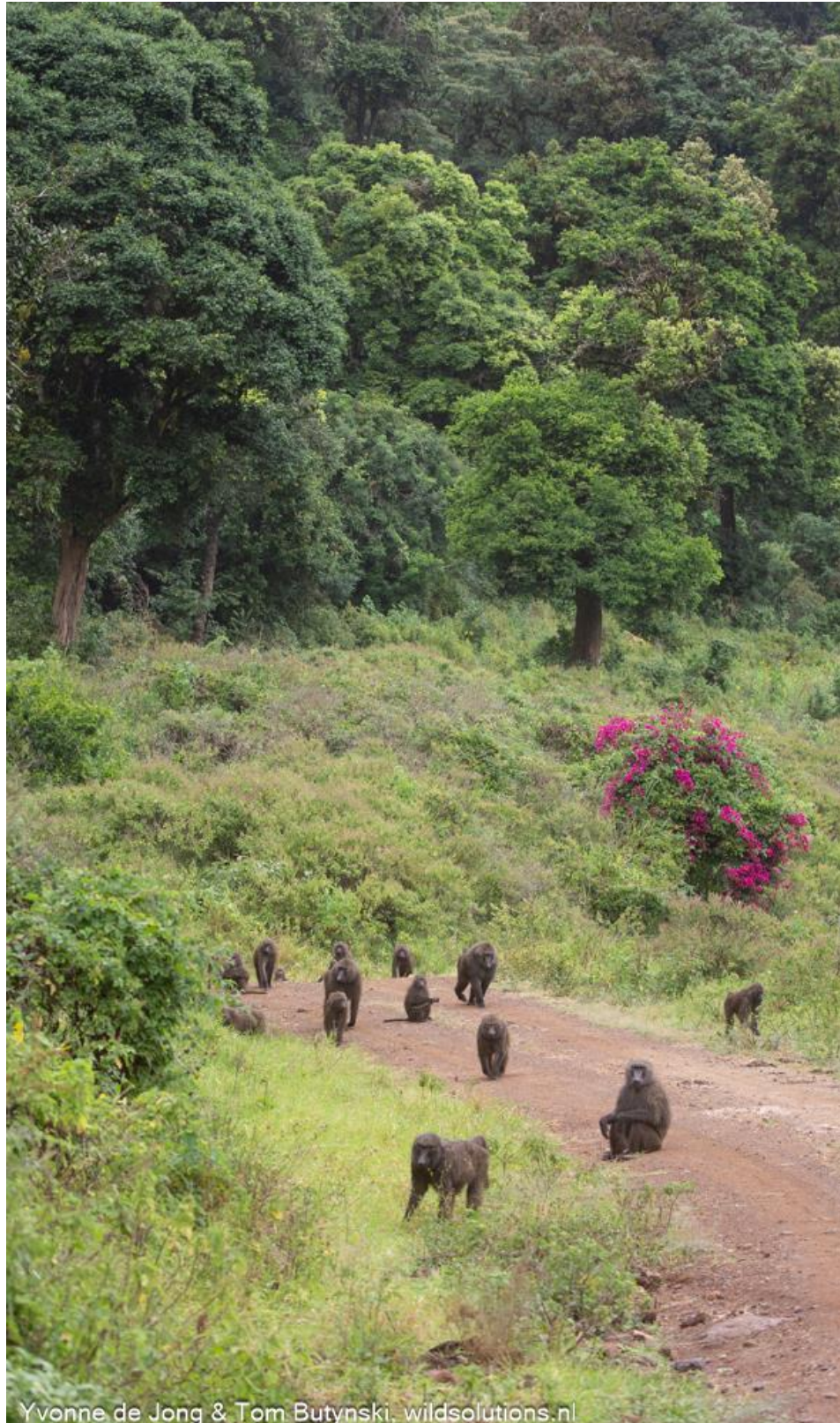
Adult female bushbuck *Tragelaphus scriptus*, Marsabit National Park, northern Kenya.



Adult female Somali lesser galago *Galago gallarum* near Marsabit National Park, northern Kenya.

There is considerable misinformation about the wildlife of Marsabit National Park in the literature and on the www. For example, there are only three species of primate in Marsabit National Park. Olive baboon *Papio anubis* is common and northeastern vervet *Chlorocebus pygerythrus arenaria* is uncommon. Somali lesser galago *Galago gallarum* is present in the acacia woodlands. There is no support for reports that four additional species of primate occur on Mount Marsabit, or anywhere in this region: Thomas's dwarf galago *Galagoides thomasi*, black-and-white colobus (guereza) *Colobus guereza*, patas monkey *Erythrocebus patas*, or Sykes's monkey *Cercopithecus mitis* (Williams 1981, Grubb *et al.* 2003, De Jong and Butynski personal observations). Similarly, there is no evidence for the presence of East African springhare *Pedetes surdaster* (Williams 1981, Butynski and De Jong personal observations).





Olive baboons *Papio anubis*, Marsabit National Park, northern Kenya.



At least 360 species of bird, including 52 species of raptor, have been recorded for Marsabit National Park, many of which are migrants (Williams 1981).



Adult hooded vulture *Necrosyrtes monachus*, Marsabit National Park, northern Kenya.

While the conservation value of Marsabit National Park remains high, particularly due to the fact that this mountain serves as a critical water catchment for this arid region and holds a unique biodiversity comprised of many globally threatened species, these values are in decline. Marsabit National Park is under threat, primarily as a result of the large number of people and livestock that live along its boundaries---and their ever-increasing numbers. The water catchment has been damaged due to the degradation and loss of forest and woodland. Biodiversity is in decline as some animal species have been lost. These include black rhinoceros *Diceros bicornis*, probably lion *Panthera leo* and wild dog *Lycaon pictus*, and several forest-dependent birds (Borghesio 2003).

Marsabit National Park was once famous as a refuge for elephants with exceptionally big tusks, most notably Ahmed whose tusks each weighed >68 kg (>150 lbs; Mohamed Amin Foundation). The days of the 'big tuskers' on Mount Marsabit seem to be gone.

Climate change is another major concern for this forest island and its forest-dependent species. If the climate becomes drier, the area covered by mid-altitude and montane forest will be reduced, as will the size of its populations of plants and animals. Given the great isolation of these forests, one result is likely to be in-breeding depression and eventual loss of many species.



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Adult lemon dove *Aplopelia larvata*, Marsabit National Park, northern Kenya.

Marsabit National Park, although far from Nairobi (~560 kms = ~350 mi), is now much more assessable than in the past due to a good tarmac highway system to Marsabit town. This is a scenic and unusual national park with a pleasant climate, few visitors, and an interesting and important biodiversity. All naturalists and seekers of a bit of adventure will find a visit to Marsabit National Park rewarding!

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Adult male Grévy's zebra *Equus grevyi*, Marsabit National Park, northern Kenya.

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