HORN OF AFRICA ANTELOPE SURVEY (2024–2025)

NORTHERN KENYA


Yvonne de Jong & Tom Butynski, wildsolutions.nl

THOMAS M. BUTYNSKI AND YVONNE A. DE JONG

REPORT TO THE ZOOLOGICAL SOCIETY FOR THE CONSERVATION OF SPECIES AND POPULATIONS
SEPTEMBER 2025

Horn of Africa Antelope Survey (2024–2025):
Northern Kenya

Thomas M. Butynski (PhD)
Yvonne A. de Jong (PhD)

Eastern Africa Primate Diversity and Conservation Program
P.O. Box 149, Nanyuki, Kenya

www.wildsolutions.nl
tbutynski@aol.com / yvonne@wildsolutions.nl

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

This survey was kindly made possible by the inheritance of Michael Amend.

September 2025

Cover photograph: Southern Gerenuk *Litocranius walleri walleri*, east of Bute, northeastern Kenya.

All photographs and maps by Yvonne de Jong and Tom Butynski

CONTENT

SUMMARY

Northern Kenya is the most poorly known region in Eastern Africa as concerns the taxonomy, distribution, abundance, threats, and conservation status of its larger mammals. Nonetheless, this region is known to hold a high number of threatened species and subspecies. Among the larger mammals, 18 species of antelope are known to occur. During June 2024–March 2025, we completed 'Phase Two' of the 'Horn of Africa Antelope Survey'. Phase Two consisted of four fieldtrips in northern Kenya, covering as much of the land area as possible north of the Ewas N'jiro River, east of Lake Turkana, west of the Somali border, and south of the Ethiopia border. Diurnal surveys, nocturnal surveys, and camera trap surveys were conducted by two researchers (total of 42 field days; total distance driven 7,246 km).

The objectives of Phase Two were to: (1) considerably improve our understanding of the 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 northern Kenya, using antelopes as a flagship group.

During Phase Two, antelope species were nowhere common outside of protected areas. Ten of the 18 antelope species of northern Kenya were encountered. The species most frequently encountered was Günther's Dik-Dik *Madoqua* (*guentheri*), followed by Bright's Gazelle *Nanger notata*. Similar to the finding during Phase One, the least common were Common Waterbuck *Kobus ellipsiprymnus ellipsiprymnus* and Greater Kudu *Tragelaphus strepsiceros*. The eight 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,* Mountain Reedbuck *Redunca fulvorufula chanleri*, Klipspringer *Oreotragus oreotragus aureus*, Tiang *Damaliscus lunatus tiang*) have geographic ranges that are on the margins of this region.

During Phase Two, we obtained range extensions for Kirk's Dik-Dik. This species was encountered between Bute and Malka Mari National Park, thereby extending its range ~100 km to the northeast. Together, the findings of Phase One and Phase Two have extended the known range of Kirk's Dik-Dik ~300 km to the northeast. With these range extensions, the known area of sympatry between Kirk's Dik-Dik and Günther's Dik-Dik is ~140,000 km². This means that Kirk's Dik-Dik probably occurs in southern Ethiopia. If so, this is a new large mammal for Ethiopia. Phenotypic descriptions and photographs obtained during this survey are not only instrumental for fine-tuning the eastern limit of Smith's Dik-Dik *Madoqua* (*guentheri*) *smithii* and the western limit of Günther's Dik-Dik, they are also valuable for detecting phenotypic clines and hybrid zones.

Beisa Oryx *Oryx beisa,* Common Impala *Aepyceros melampus melampus***,** Maasai Bushbuck *Tragelaphus scriptus delamerei,* and Common Waterbuck were not encountered outside protected areas. We suspect, however, that unprotected herds remain at some sites in northern Kenya.

A brief survey in the remote Malka Mari NP during Phase Two is the first biodiversity survey for this national park. Malka Mari NP and its vicinity suffers from security issues and poaching. We found Günther's Dik-Dik, Southern Gerenuk, and Greater Kudu in Malka Mari NP at low

densities. In addition, *P. hamadryas* was found here---a new large species of primate/mammal for Kenya and East Africa.

During a brief survey in northern Sibiloi NP during Phase Two we found that this national park faces a complex set of threats, including poaching, livestock invasions, and other security issues. The long-term presence of people with their large herds of livestock was unmistakable as no medium- or large-sized wild mammals were encountered. It may be that the nationally threatened Tiang, for which Sibiloi NP was once the stronghold and held thousands, is now down to a few individuals.

All antelope species in northern Kenya are threatened to some extent by competition with livestock for food and/or water, habitat degradation, loss, and fragmentation, as well as by poaching. Most of northern Kenya is too arid for large-scale agriculture or even large-scale ranching. It appears that the antelope species most vulnerable in this region at this time are Mountain Reedbuck, Beisa Oryx, Common Eland, Greater Kudu, Southern Lesser Kudu, Maasai Bushbuck, Common Impala, Klipspringer, Tiang, and Common Waterbuck. Common Impala, Common Waterbuck, and Coke's Hartebeest have, historically, only occurred in northern Kenya along the fringes of the Ewaso N'jiro River. This seems to still be the situation. Maasai Bushbuck continue to be present on Mount Marsabit and along the Ewaso N'jiro River. Both species of Dik-Dik are relatively adaptable to human-caused habitat changes. To a certain extent, livestock grazing and browsing might favor them.

Most of northern Kenya is, historically, unsuitable for the water-dependent species or those that rely on green grass, including Tiang, Mountain Reedbuck, Common Duiker, Common Impala, Maasai Bushbuck, Common Waterbuck, Common Eland, and Coke's Hartebeest. We suspect that all of these species declined in abundance and distribution during the recent 3–5-year drought due to severe competition with livestock and, probably, intensified poaching. Most of the antelope species historically present in northern Kenya are probably still present and widespread, but uncommon. With average to above average annual rainfall, these species are expected to recover somewhat and to persist in this region long into the future. The data obtained during this survey will serve as a baseline for this expected recovery.

Besides lagas (seasonally dry rivers), man-made perennial water sources (dams and boreholes) provide water to antelopes and other wildlife in some parts of northern Kenya. Many man-made water sources are, however, unavailable 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 few roads. Therefore, the natural habitats of large parts of northern Kenya are little affected by people due to the scarcity of perennial sources of water.

Twenty-eight mammals species, other than antelopes, were encountered during this survey, four of which are 'threatened' (Savanna Elephant *Loxodonta africana*, Reticulated Giraffe *Giraffa reticulata*, Grévy's Zebra *Equus grevyi*, Leopard *Panthera pardus*). During this survey we found three new primate taxa for Kenya and East Africa: Hamadryas Baboon *Papio hamadryas*, Omo Vervet *Chlorocebus pygerythrus zavattarii*, and Ethiopian Lesser Galago *Galago senegalensis dunni*. We also

obtained altitudinal range extensions, geographic range extensions, and natural history data for Somali Lesser Galago and Olive Baboon, and for several bird species. Intermediate looking *Galago* were encountered in acacia-commiphora bushland at Gurar. Phenotypic and bioacoustics comparisons are planned to use the field data and museum data now in our databases.

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

Figure 1. Bright's Gazelle *Nanger notata,* east of Lake Turkana, northern Kenya.

INTRODUCTION

Northern Kenya lies within the Horn of Africa Biodiversity Hotspot due to its high number of endemic and threatened genera and species (Conservation International 2022). This is the least studied region in Eastern Africa as concerns the taxonomy, distribution, abundance, threats, and conservation status of its larger mammals. This hotspot includes at least five endemic species of antelope. Additional information on the larger mammals of northern Kenya is not only of considerable scientific interest but is also a prerequisite for setting priorities for their conservation.

There has been little research on the mammals of northern Kenya. Sixty years ago, Stewart and Stewart (1963) provided rough range 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 northern Kenya. Beyond that, there were 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). In addition, species were sometimes misidentified (*e.g.*, impala for hirola, and common warthog for desert warthog). Over the past 24 years, we have conducted research on antelopes, primates, warthogs, and other larger mammals over much of Kenya, including large parts of northern Kenya on both sides of Lake Turkana (Sibiloi NP and the Chalbi Desert in 2012, and Huri Hills and Mount Forole in 2013.

During February 2023 – January 2024, we completed the Northeast Kenya Antelope Survey, 'Phase One' of the 'Horn of Africa Antelope Survey' (Butynski and De Jong 2024), an understudied part of the Horn of Africa Biodiversity Hotspot. Phase One focused on northeastern Kenya (Butynski and De Jong 2024). As far as we are aware, no other ground surveys to assess the taxonomic status, distribution, abundance, and threats of the larger mammals for any part of northeastern Kenya have been conducted. This appears to be primarily due to the remoteness of the region, the aridity and scarcity of perennial water, and insecurity in the vicinity of the border with Somalia. Sufficient security allowed us, with great care, to conduct ground surveys by vehicle up to Wajir City and 90 km to the north of Wajir City at Saraman. Security issues beyond Saraman into extreme northeastern Kenya (Mandera and Malka Mari NP) meant that these area were not surveyed. Although the region has a high number of endemic and threatened species and subspecies (Conservation International 2022) it is also the most poorly known region in Eastern Africa as concerns the taxonomy, distribution, abundance, threats, and conservation status of its larger mammal fauna.

During Phase One, antelope species were nowhere common outside of protected areas. We collected data on 10 of the 15 species of antelope known to occur in northeastern Kenya, but also on many other threatened and/or poorly known species (*e.g.*, Grévy's Zebra *Equus grevyi*, Somali Warthog *Phacochoerus aethiopicus delamerei,* Somali Lesser Galago *Galago gallarum*, Pancake Tortoise *Malacochersus tornieri*, Short-toed Snake Eagle *Circaetus gallicus*, and White-headed Vulture *Trigonoceps occipitalis* (Butynski and De Jong 2024). During Phase One 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*) by 18,000 km² to the north and, most importantly, this almost certainly means that this species occurs in southern Ethiopia, making it a new large mammal for Ethiopia. Phenotypic descriptions and photographs obtained during this survey are not only important in fine-tuning the eastern limit of Smith's Dik-Dik and the western limit of Günther's Dik-Dik, but they are also important for detecting phenotypic clines and hybrid zones.

From June 2024 to March 2025, we completed 'Phase Two' of the 'Horn of Africa Antelope Survey'. Phase Two consisted of four fieldtrips in northern Kenya, covering as much of the land area as possible north of the Ewas N'jiro River, east of Lake Turkana, west of the Somali border, and south of the Ethiopia border (Figure 3).

Northern Kenya is generally flat, with most of the ground 100–800 metres above sea level. The highest site is Mount Nyiru at 2,780 metres above sea level. Northern Kenya lies in the 'Somalia *Acacia-Commiphora* Bushland and Thickets', 'Northern *Acacia-Commiphora* Bushlands and Thickets', and 'Masai Xeric Grasslands and Shrublands' Ecoregions. 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 400 mm, while mean annual temperatures range from 25°C to 30°C. July and August are the hottest months with temperatures as high as 38°C.

Figure 2. Dandu Hill, Mandera County, northern Kenya.

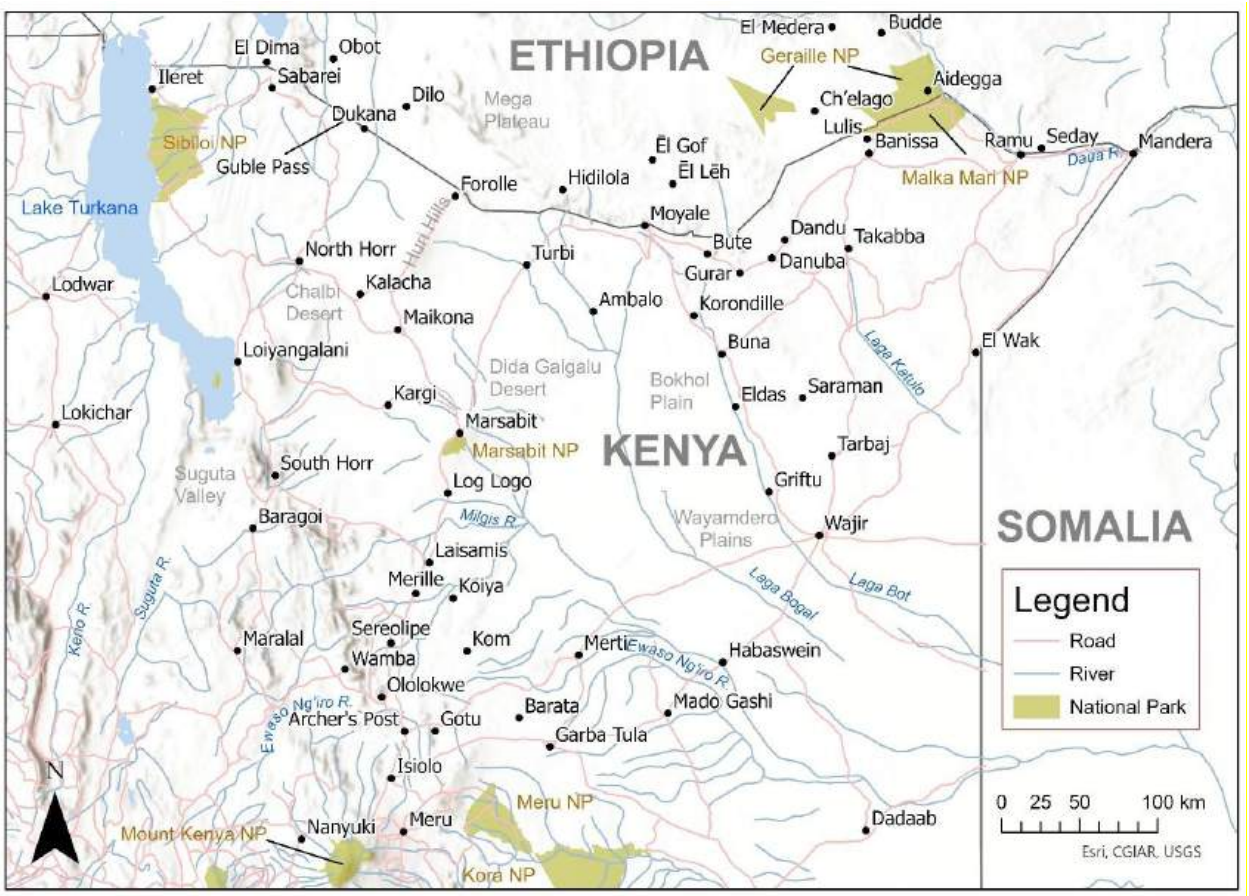

Figure 3. Northern Kenya with major roads depicted in red.

At least 18 species of antelope have been recorded historically for northern Kenya, two of which are 'Near Threatened' (Lesser Kudu, Gerenuk) and two are 'Endangered' (Beisa Oryx, Mountain Reedbuck) (Table 1; Stewart and Stewart 1963; Kingdon 1982a,b; Groves and Grubb 2011; Kingdon and Hoffmann 2013; IUCN 2025). One 'Vulnerable' species (Soemmerring's Gazelle) occurs in southeastern Ethiopia and 'might' occur in northeastern Kenya. Some Least Concern species are nationally threatened, such as Tiang *Damaliscus lunatus tiang*. This subspecies used to be abundant east of Lake Turkana [2,000 individuals (Steward and Steward 1963); 1,500 individuals (East 1988); 2,600 individuals (East 1999)], the only site in East Africa where Tiang occurs. During a survey in 2012 we encountered only one individual in Sibiloi NP. Considering the conservation threats throughout this vast region, and the fact that Sibiloi NP is the only protected area where this antelope occurs, Tiang might be extirpated from East Africa (De Jong and Butynski 2014). In addition to the antelopes, there are four 'Endangered' and three 'Vulnerable' species of larger mammals in northern Kenya (Table 2).

During Phase One we found that the main threats are habitat degradation and loss, poaching, drought, scarcity of perennial sources of water, charcoal production, and invasive species.

Table 1. Antelopes of northern Kenya (Stewart and Stewart 1963; Kingdon 1982a,b; Groves and Grubb 2011; Kingdon and Hoffmann 2013; IUCN 2025).

Antelope Species	IUCN Red List Status 2024	Subspecies and Notes
Bushbuck *Tragelaphus scriptus*	LC	*Tragelaphus scriptus delamerei* (NA). Given species status by Groves and Grubb (2011).
Lesser Kudu *Tragelaphus imberbis*	NT	*Tragelaphus imberbis australis* (NA). Given species status by Groves and Grubb (2011).
Greater Kudu *Tragelaphus strepsiceros*	LC	*Tragelaphus strepsiceros chora* (NA).Given species status by Groves and Grubb (2011).
Common Eland *Tragelaphus oryx*	LC	
Kirk's Dik-Dik *Madoqua kirkii*	LC	*Madoqua kirkii kirkii* (NA). Given species status by Groves and Grubb (2011).
Salt's Dik-Dik *Madoqua saltiana*	LC	*Madoqua saltiana swaynei* (NA). Given species status by Groves and Grubb (2011).
Günther's Dik-Dik *Madoqua guentheri*	LC	*Madoqua guentheri guentheri* (NA) and *Madoqua guentheri smithii* (NA). Given species status by Groves and Grubb (2011).
Mountain Reedbuck *Redunca fulvorufula*	EN	*Redunca fulvorufula chanleri* (VU).
Common Duiker *Sylvicapra grimmia*	LC	*Sylvicapra grimmia hindei* (NA).
Waterbuck *Kobus ellipsiprymnus*	LC	*Kobus ellipsiprymnus ellipsiprymnus* (LC) and *Kobus ellipsiprymnus defassa* (NT). Groves and Grubb (2011) treat these as species.
Klipspringer *Oreotragus oreotragus*	LC	*Oreotragus oreotragus aureus* (NA). In central Kenya. Given species status by Groves and Grubb (2011).
Impala *Aepyceros melampus*	LC	*Aepyceros melampus melampus* (LC)
Bright's Gazelle *Nanger notata*	LC	
Peters's Gazelle *Nanger petersii*	LC	
Topi *Damaliscus lunatus*	LC	*Damaliscus lunatus tiang* (LC). Nationally threatened
Gerenuk *Litocranius walleri*	NT	*Litocranius walleri walleri* (NA). Given species status by Groves and Grubb (2011).
Beisa Oryx *Oryx beisa*	EN	*Oryx beisa beisa* (EN). Given species status by Groves and Grubb (2011).
Hartebeest *Alcelaphus buselaphus*	LC	*Alcelaphus buselaphus cokii* (LC). Given species status by Groves and Grubb (2011).
Presence in northern Kenya requires confirmation		
Soemmerring's Gazelle *Nanger soemmerringi*	VU	*Nanger soemmerringi butteri* (NA). In southeastern Ethiopia. Kingdon (1982) suspects presence in northern Kenya.
Bohor Reedbuck *Redunca redunca*	LC	*Redunca redunca wardi* (NA). 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 surveyed in northern Kenya, all of which are Red Listed as 'threatened'.

Species	Current IUCN Red List Status 2022	Subspecies and Notes
Savanna Elephant *Loxodonta africana*	EN	
Reticulated Giraffe *Giraffa reticulata*	EN	
Grevy's Zebra *Equus grevyi*	EN	
Lion *Panthera leo*	VU	
Leopard *Panthera pardus*	VU	*Panthera pardus pardus* (NA)
Cheetah *Acinonyx jubatus*	VU	*Acinonyx jubatus raineyi* (NA)
Wild Dog Lycaon pictus	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 surveyed in northern Kenya.

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

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 Phase One attempted to answer as concerns the larger mammals of northern Kenya:

- Which species of antelope and other larger mammal are present in Malka Mari NP and in the vicinity of Mandera town?
- Is Soemmerring's Gazelle present? Kingdon (1982) suggests that this species might occur in extreme northeastern Kenya.
- Are Oribi *Ourebia ourebi*, Bohor Reedbuck *Redunca redunca* and/or Lelwel Hhartebeest *Alcelaphus buselaphus lelwel* present northeast of Lake Turkana?
- Is Bushbuck present around Mount Forole and across the border in Ethiopia? If so, what subspecies is it?
- Are Common Eland *Tragelaphus oryx,* Tiang *Damaliscus lunatus tiang,* and Beisa Oryx *Oryx beisa* still present in Sibiloi NP?
- 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* and Günther's Dik-Dik *Madoqua guentheri*.
- What are the limits of the geographic distributions of the two species 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?
- Are Greyish-White-Tailed Guereza *Colobus guereza poliurus,* Omo Vervet *Chlorocebus pygerythrus zavattarii* and Hamadryas Baboon *Papio hamadryas* present?
- Are Somali Lesser Galago *Galago gallarum* and Northern Lesser Galago *Galago senegalensis dunni* 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 subspecies of Northern Lesser Galago *Galago senegalensis*? Is there a phenotypic cline?
- What species of Warthog *Phacochoerus* occurs on Biliqo Bulesa Conservancy and the Merti Plains
- What is the geographic range of the Northern Warthog *Phacochoerus africanus africanus* and where does it meet the Eastern Warthog *P. a. massaicus*?
- Is the Desert Warthog present in Sibiloi NP? Are the two species of Warthog sympatric east of Lake Turkana?
- What is the distribution of Bush Hyrax and Rock Hyrax in northern Kenya and which subspecies occur.
- Is the phenotype of the Kori Bustard *Ardeotis kori* in the Huri Hills and its vicinity different from elsewhere in Kenya?

Goal and Objectives

The goal of The Horn of Africa Antelope Survey is to prevent the extirpation of additional species of antelope and other larger mammals from the Horn of Africa, and to significantly contribute towards the long-term survival of northern Kenya's large mammal fauna. Black Rhinoceros have already been extirpated, and African Buffalo probably now occur only in the extreme south and in Marsabit NP.

The objectives of Phase Two are to survey the 18 species of antelope known to occur in northern Kenya, as well as of 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 northern Kenya, using the antelopes as a flagship group.

Figure 4. Adult female Smith's Dik-Dik *Madoqua* (*guentheri*) *smithii*, Guble Pass, northern Kenya.

METHODS

Distances travelled

To assess presence and relative abundance of antelopes and other larger mammals (hereafter, focal species'; Tables 1, 2 and 3), and 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 northern Kenya, as well as the natural histories of the focal species, required that a variety of methods and approaches be employed.

Four field trips were conducted during Phase Two for a total of 42 days. We drove from central Kenya (Laikipia County) to northern Kenya. The total distance driven during Phase Two was 7,246 km, of which 6,294 km were survey kilometers (Table 4). This is close to the 6,300 km presented in our proposal. Figure 5 shows the survey area and the routes used during the four surveys of Phase Two.

Table 4. Survey distances travelled by vehicle and by foot during the Horn of Africa Antelope Survey (June 2024 – March 2025).

Period	Number of days	Distance vehicle diurnal (km)	Distance vehicle nocturnal (km)	Distance on foot diurnal (km)	Distance on foot nocturnal (km)
2 – 16 June 2024	15	2,088	10	9	9
11 – 23 July 2024	13	1,720	-	7	6
19 – 21 October 2024	3	355	-	2	2
27 February – 9 March 2025	11	2,121	-	4	4
Total	**42**	**6,284**	**10**	**22**	**21**

Diurnal surveys

Vehicle surveys were conducted on the most remote roads available with the aim of covering 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.

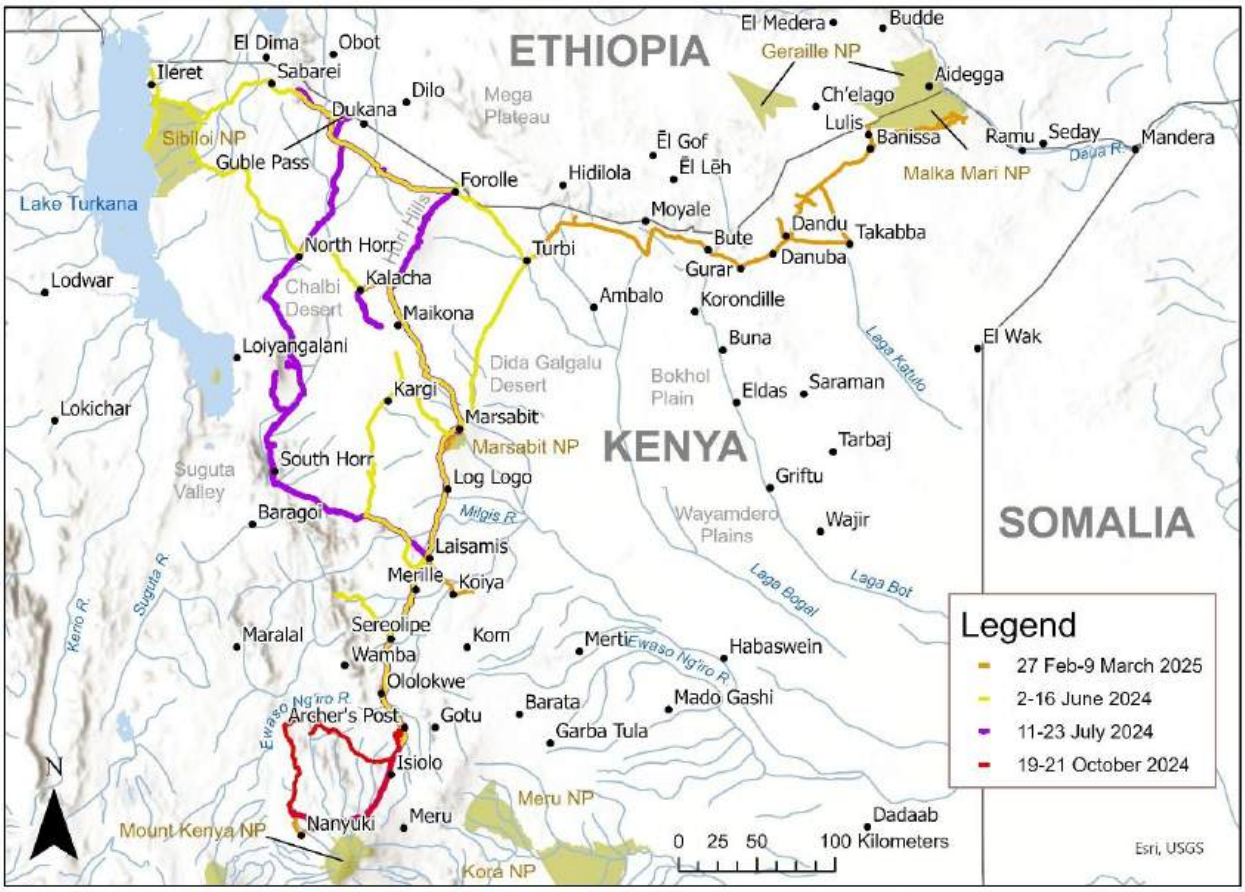

Figure 5. Study area for the Horn of Africa Antelope Survey and roads along which surveys were conducted during Phase 2 (June 2024 – March 2025). Some roads were surveyed up to three times, such as the tarmac highway from Nanyuki to Moyale.

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 times 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 focal taxa was obtained. Throughout the survey, notes on threats and human pressures were taken.

Nocturnal surveys

Presence of galagos, hyraxes, nightjars, owls, 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 calls, 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 6. Adult Somali Lesser Galago *Galago gallarum*, Marsabit, northern 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.

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.

Figure 7. Rosy-patched Bushshrike *Rhodophoneus cruentus*, Dukana, northern Kenya.

RESULTS

Ten of the 18 antelope species of northern Kenya were encountered during Phase Two (Table 5). The most frequently encountered species was Günther's Dik-Dik, followed by Bright's Gazelle. The least common were Common Waterbuck and Greater Kudu.

Table 5. Minimum numbers of antelopes encountered during Phase Two of the 'Horn of Africa Antelope Survey'.

Species	**June 2024**	**July 2024**	**October 2024**	**March 2025**	**Total**
Günther's Dik-Dik *Madoqua guentheri*	114	98	-	134	346
Bright's Gazelle *Nanger notata*	39	82	75	-	196
Beisa Oryx *Oryx beisa*	-	-	112	-	112
Southern Gerenuk *Litocranius walleri walleri*	7	18	9	36	70
Kirk's Dik-Dik *Madoqua kirkii kirkii*	12	11	-	39	62
Dik-Dik sp.? *Madoqua*	7	9	-	30	46
Common Impala *Aepyceros melampus melampus*	-	-	8 + 25 (est.)	-	33
Southern Lesser Kudu *Tragelaphus imberbis australis*	2	1	-	?	3
Masaai Bushbuck *Tragelaphus scriptus delamerei*	-	-	-	1	1
Common Waterbuck *Kobus ellipsiprymnus ellipsiprymnus*	-	-	1	-	1
Greater Kudu *Tragelaphus strepsiceros*	-	-	-	?	?
Total	**181**	**219**	**230**	**240**	**870**

A general description of each of the four surveys is given below. 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 and antelope conservation in northern Kenya. Finally, we present our conclusions. We end this report with notes on the non-antelope species encountered and present our next steps.

June 2024 Survey

The June survey (15 days) was conducted mostly in central northern Kenya, including the Matthews Range, Chalbi Desert, Marsabit NP, border with Ethiopia, Dukana, Guble Pass, Illeret, and Sibilioi NP (Figure 5).

July 2024 Survey

This survey (13 days) was also conducted in central northern Kenya, through Losai National Reserve, South Horr, Mount Nyeru, Chalbi Desert, North Horr, Dukana, Guble Pass, along the Ethiopian border, Huri Hills, Kalacha, Marsabit NP (Figure 5).

October 2024 Survey

This short survey (3 days) was conducted in Buffalo Springs National Reserve and northern Laikipia, along the southern bank of the Ewaso N'jiro River (Figure 5).

February – March 2025 Survey

This survey (9 days) was conducted along the Ethiopian border, eastward to Badissa and Malka Mari NP (Figure 5).

Figure 8. Malka Mari National Park, Mandera County, northern Kenya.

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

Abundance

At least 346 Günther's Dik-Dik *Madoqua* (*guentheri*) were seen during Phase Two. These encounters included 203 Smith's Dik-Dik *Madoqua* (*guentheri*) *smithii* (Figure 9) and 132 Günther's Dik-Dik *Madoqua* (*guentheri*) *guentheri*. Figure 10 shows the localities where individuals were confirmed during Phases One and Two. *Madoqua* (*guentheri*) a little east of Mount Forole were not identified as to species. Forty-six Dik-Dik were not identified to species level and are, therefore, not depicted in Figure 10. Groups of up to four individuals were observed, although encounters with one or two animals were far more frequent.

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 recognized 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 (2017a) 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.

Figure 9. Adult female Smith's Dik-Dik *Madoqua* (*guentheri*) *smithii*, Dukana, northern Kenya.

Distribution

Madoqua (*guentheri*) were observed between 580 m asl and 1,180 m asl. This is well within the known altitudinal range for this species group (0–2,100 m asl; IUCN/SSC Antelope Specialist Group 2016d; Figure 10). *Madoqua* (*g.*) *guentheri* and/or *Madoqua* (*g.*) *smithii* were encountered in four regions in northern Kenya during Phase Two. All were well within this species' known range:

1. *Madoqua* (*g.*) *smithii* in 'Central Kenya'. North of the Ewaso N'jiro River in central Kenya. This is an area well known for the species. Here this species is broadly sympatric with Kirk's Dik-Dik.
2. *Madoqua* (*g.*) *smithii* from 15 km northwest of Dukana westward to Sibiloi NP, east of Lake Turkana, and north, east, and south of Mount Kulal. South of Mount Kulal this species is parapatric or sympatric with Kirk's Dik-Dik.
3. *Madoqua* (*g.*) in the vicinity of Mount Forole and in the Huri Hills require identification to the species level. The western limit of this population reaches the lava plains 17 km west of Mount Forole.
4. *Madoqua* (*g.*) *guentheri* at Turbi is sympatric with Kirk's Dik-Dik. Both species were common here.
5. *Madoqua* (*g.*) *guentheri* was common along the Ethiopian border between Bute and Malka Mari NP. The eastern-most record for *Madoqua* (*g.*) *guentheri* was ~7 km west of the Daua River, which forms the border with Ethiopia. Up to ~50 km southwest of Banissa, this species is sympatric with Kirk's Dik-Dik. In this region of sympatry, Kirk's Dik-Dik was the less common species. No *Madoqua* (*g.*) *guentheri* were recorded between Turbi and Bute during Phase Two, although good densities were recorded in this region during Phase One (Figure 10).

The region between Turbi and Kargi is mainly covered by nearly treeless lava plains and other rocky volcanic soil types. This is a geographic barrier for Dik-Dik. It appears that *Madoqua* (*g.*) *smithii* is the species southwest of this geographic barrier and that *Madoqua* (*g.*) *guentheri* is northeast of this barrier. Further analysis of the many photographs of *Madoqua* (*g.*) across 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 (2017a, p. 11) 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.).* These 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 eastern limit of Smith's Dik-Dik and the western limit of Günther's Dik-Dik.

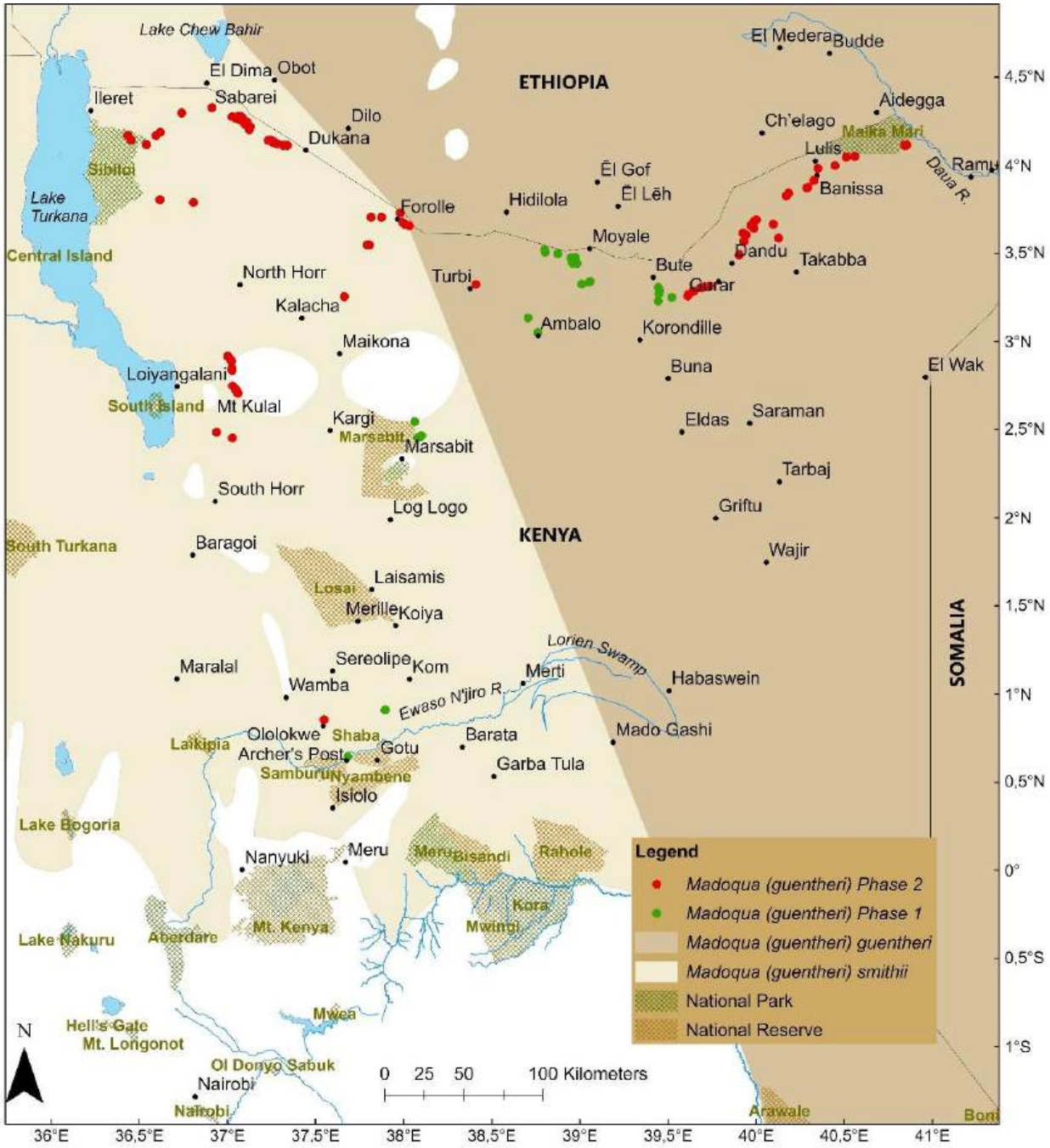

Figure 10. Encounters with *Madoqua* (*guentheri*) during Phase Two (Red) and Phase One (Green) of the 'Horn of Africa Antelope Survey'. Geographic ranges from IUCN/SSC Antelope Specialist Group (2016d), De Jong and Butynski (2017a), and Butynski and De Jong (2024).

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 our field surveys will be instrumental for 'fine-tuning' the geographic limits of the *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 occur, some even described and named as new taxa, such as Hodson's Dik-Dik *Madoqua hodsoni*, based on an aberrant individual collected on Mount Mega, southern Ethiopia. *Madoqua hodsoni* is and now considered a synonym of *M.* (*g.*) *guentheri*) (De Jong and Butynski 2017a).

Figure 11. Adult male Günther's Dik-Dik *Madoqua* (*guentheri*) *guentheri,* Malka Mari National Park, northeastern Kenya.

Madoqua (guentheri) are monogamous and territorial. They live in pairs with one or two of their offspring. Territorial boundaries are typically marked with scent from their preorbital and pedal glands (Figures 12 and 13), and by urine and dung middens. Both sexes mark their territory. Aggressive fighting by *Madoqua* (*g.*) is seldom observed. During hundreds of hours watching this species in the wild, we had never seen a highly aggressive encounter. In February 2025, during 'Phase Two' of our 'Horn of Africa Antelope Survey', we filmed two adult male *Madoqua* (*g.*) *smithii* fighting at Mount Ololokwe, central Kenya. This agonistic interaction lasted at least 3 minutes. The video can be viewed here: https://www.wildsolutions.nl/when-dik-diks-fight/

Figure 12. Adult male Smith's Dik-Dik *Madoqua (guentheri) smithii* marking his territory by rubbing secretions from the pre-orbital gland onto a grass stem, east of Sibiloi National Park, northern Kenya.

Figure 13. Adult female Smith's Dik-Dik *Madoqua (guentheri) smithii*, Guble Pass, northern Kenya. Note the moth on the secretions of the left pre-orbital gland.

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

Abundance

At least 196 Bright's Gazelle *Nanger notata* (Figure 14 and 15) were seen in 35 encounters during Phase Two. This species was the second most encountered antelope species in northern Kenya during Phase Two. Figure 15 depicts the localities where this species was confirmed. Up to at least 23 individuals were seen in a herd, although most herds comprised 2–3 animals.

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 14. Bright's Gazelle *Nanger notata,* north of North Horr, northern Kenya.

Distribution

Bright's Gazelle were encountered throughout northern Kenya. All observations were well within the known range (Siegismund *et al*. 2013; IUCN/SSC Antelope Specialist Group 2016f). Bright's Gazelle were found between 264–1,153 m asl. This is well within the reported range for this species (0–2,000 m asl; IUCN/SSC Antelope Specialist Group 2016f). This species was particularly common on the extensive plains north of North Horr.

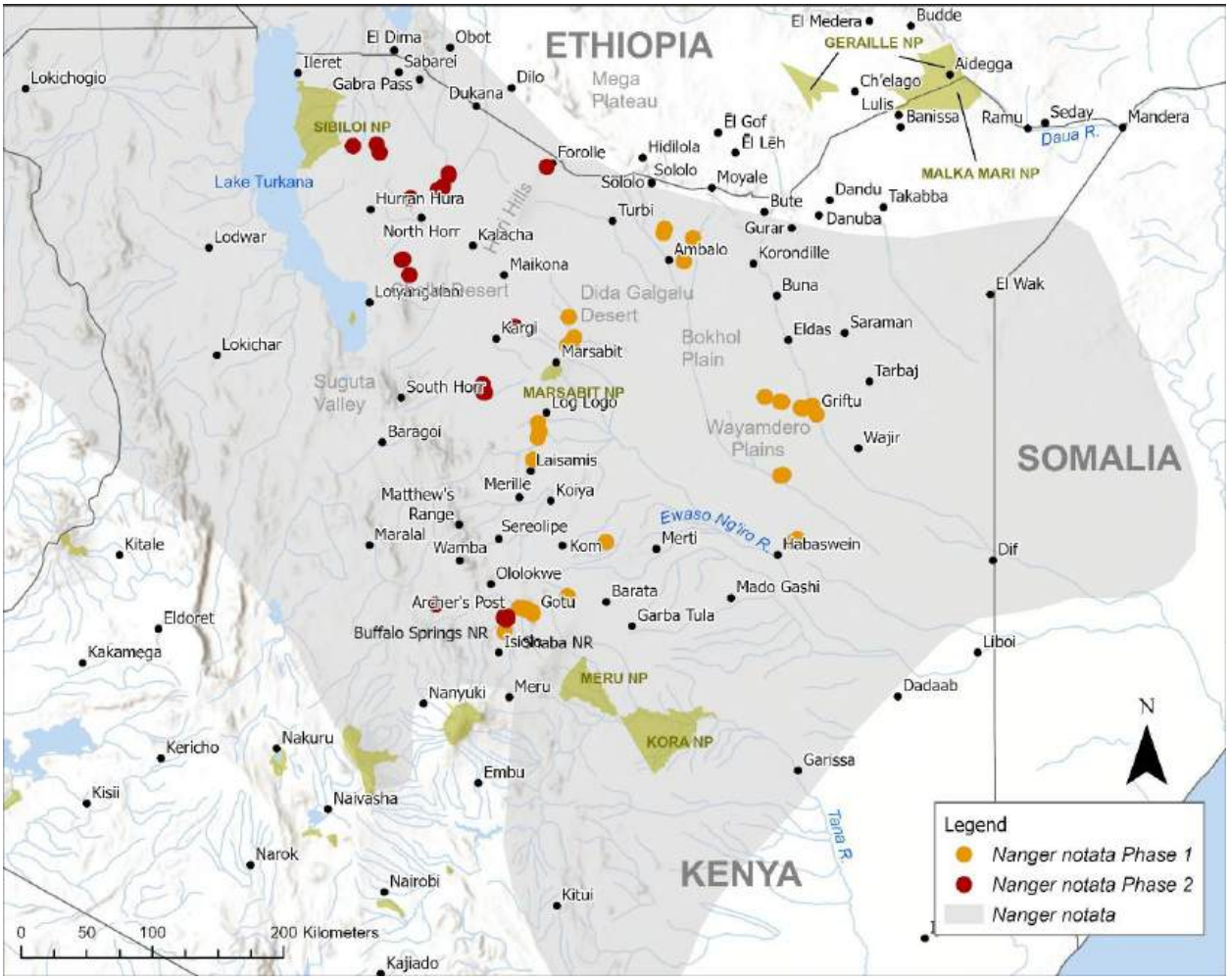

Figure 15. Encounters with Bright's Gazelle *Nanger notata* during Phase Two (red) and Phase One (orange) of the 'Horn of Africa Antelope Survey'. Geographic range from IUCN/SSC Antelope Specialist Group (2016f).

Figure 16. Bright's Gazelle *Nanger notata,* east of Sibiloi National Park, northern Kenya.

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

Abundance

At least 112 Beisa Oryx *Oryx beisa beisa* (Figures 17, 18 and 19) were observed in eight encounters during Phase Two. All were in Buffalo Springs National Reserve.

Taxonomic note

Ansell (1972) threated *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*, Buffalo Springs National Reserve, central Kenya.

Distribution

During Phase Two, Beisa Oryx were encountered only in Buffalo Springs National Reserve well within the species' known range (Wacher and Kingdon 2013; IUCN/SSC Antelope Specialist Group 2018). No evidence of Beisa Oryx was obtained north of Samburu County. Earlier aerial surveys did, however, confirm Beisa Oryx in Mandera County, south of Malka Mari NP (KWS 2021). Beisa Oryx were encountered between 867 m asl and 899 m asl, which is well within the known range for this species (0–1,700 m asl; IUCN/SSC Antelope Specialist Group 2018).

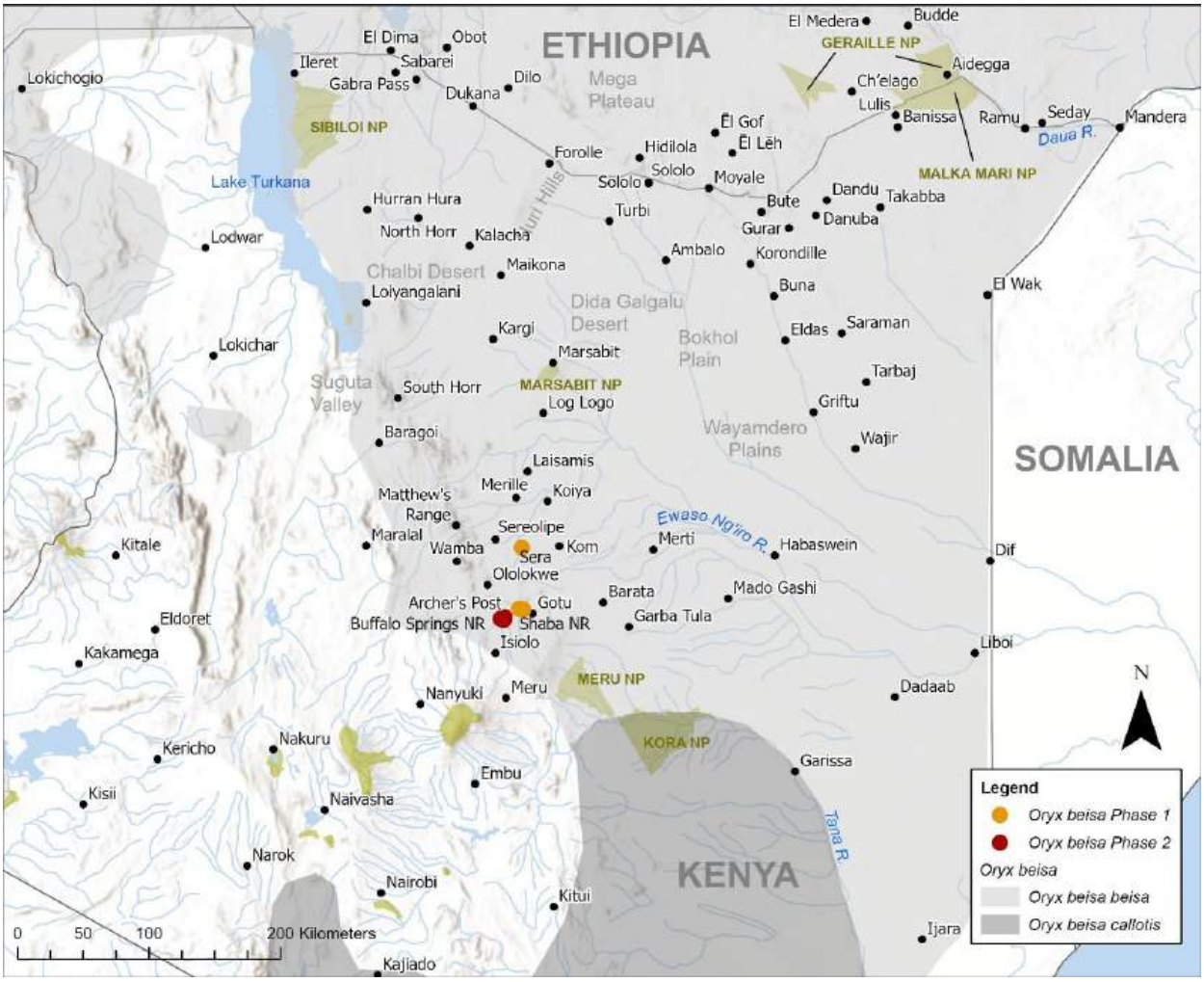

Figure 18. Encounters with Beisa Oryx *Oryx beisa beisa* Phase Two (red) and Phase One (orange) of the 'Horn of Africa Antelope Survey'. Geographic range from IUCN/SSC Antelope Specialist Group (2018).

Figure 19. Beisa Oryx *Oryx beisa beisa*, Buffalo Springs National Reserve, central Kenya.

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

Abundance

At least 70 Southern Gerenuk *Litocranius walleri walleri* (Figures 20, 21 and 22) were seen during 33 encounters during Phase Two. Up to 7 individuals were seen together, however, 1–2 individuals were most frequently encountered.

Figure 20. Adult male Southern Gerenuk *Litocranius walleri walleri* in *Acacia* woodland south of Banissa, northeastern Kenya.

Taxonomic note

We here provisionally follow the taxonomic arrangement of Grubb (2002), Leuthold (2013a), and the 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 were given species status by Groves and Grubb (2011).

Distribution

Figure 21 shows the localities where Southern Gerenuk were observed. This antelope was encountered between 504 m asl and 1,299 m asl. This is well within the known range for this species (0–1,600 m asl; IUCN/SSC Antelope Specialist Group 2016c). Southern Gerenuk were encountered throughout northern Kenya. All encounters were well within the known range for this species (IUCN/SSC Antelope Specialist Group 2016c).

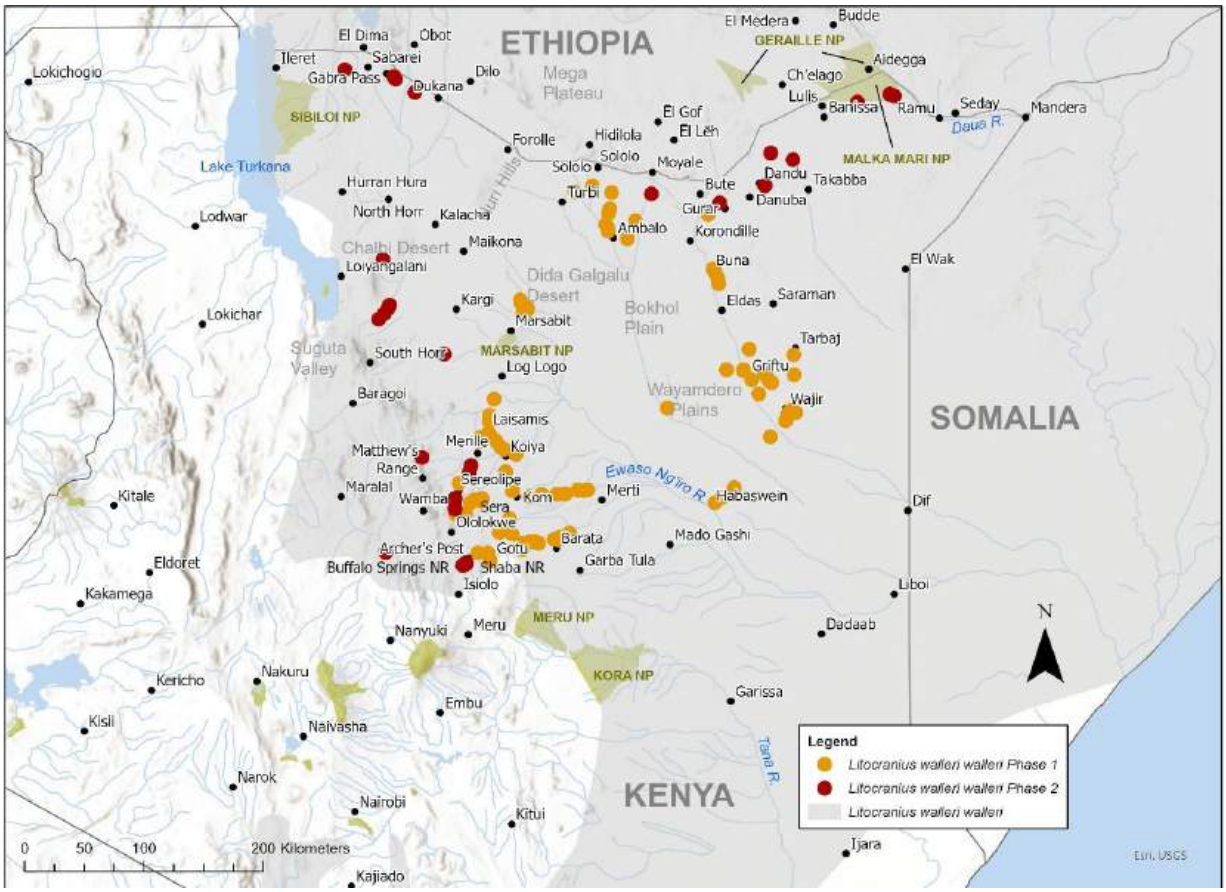

Figure 21. Encounters with Southern Gerenuk *Litocranius walleri walleri* during Phase Two (red) and Phase One (orange) of the 'Horn of Africa Antelope Survey'. Geographic range taken from IUCN/SSC Antelope Specialist Group (2016c).

Figure 22. Adult male Southern Gerenuk *Litocranius walleri walleri,* Guble Pass, northern Kenya.

Malka Mari National Park's poorly known biodiversity

Along the border with Ethiopia, on the Mandera Plateau, lies Malka Mari NP (Figure 25). Malka Mari NP (hereafter 'Malka Mari') was gazetted in 1989 and is situated southwest of the Daua (= Dawa) River in Mandera County. Rugged outcrops on both sides of the Daua River Valley are part of a limestone series known as the 'Daua Limestone' (Weir 1929; Ayers 1952). Erosion gullies deeply dissect the lower Daua Valley in northern and eastern Malka Mari, while part of the Awara Plains occur in southern Malka Mari. Contiguous with Malka Mari, across the Daua River in Ethiopia, lies Geraille (= Gerale) NP (386 km²; Figure 25) which was gazetted in 2006. Malka Mari is predominantly covered by acacia-commiphora bush and woodland with riparian vegetation along the Daua River. The altitude ranges from 279 m asl at the Daua River to 1,040 m asl in the west (SRTM, USGS.gov 2025). The mean annual rainfall range is 20–35 cm (WorldClim 2.1, Bioclimatic variable 12; Fick & Hijmans 2017). Rainfall over Malka Mari is generally scarce and irregular. Mean annual temperature ranges from 23°C in the west to 28°C at the Daua River (WorldClim 2.1, Bioclimatic variable 1; Fick & Hijmans 2017).

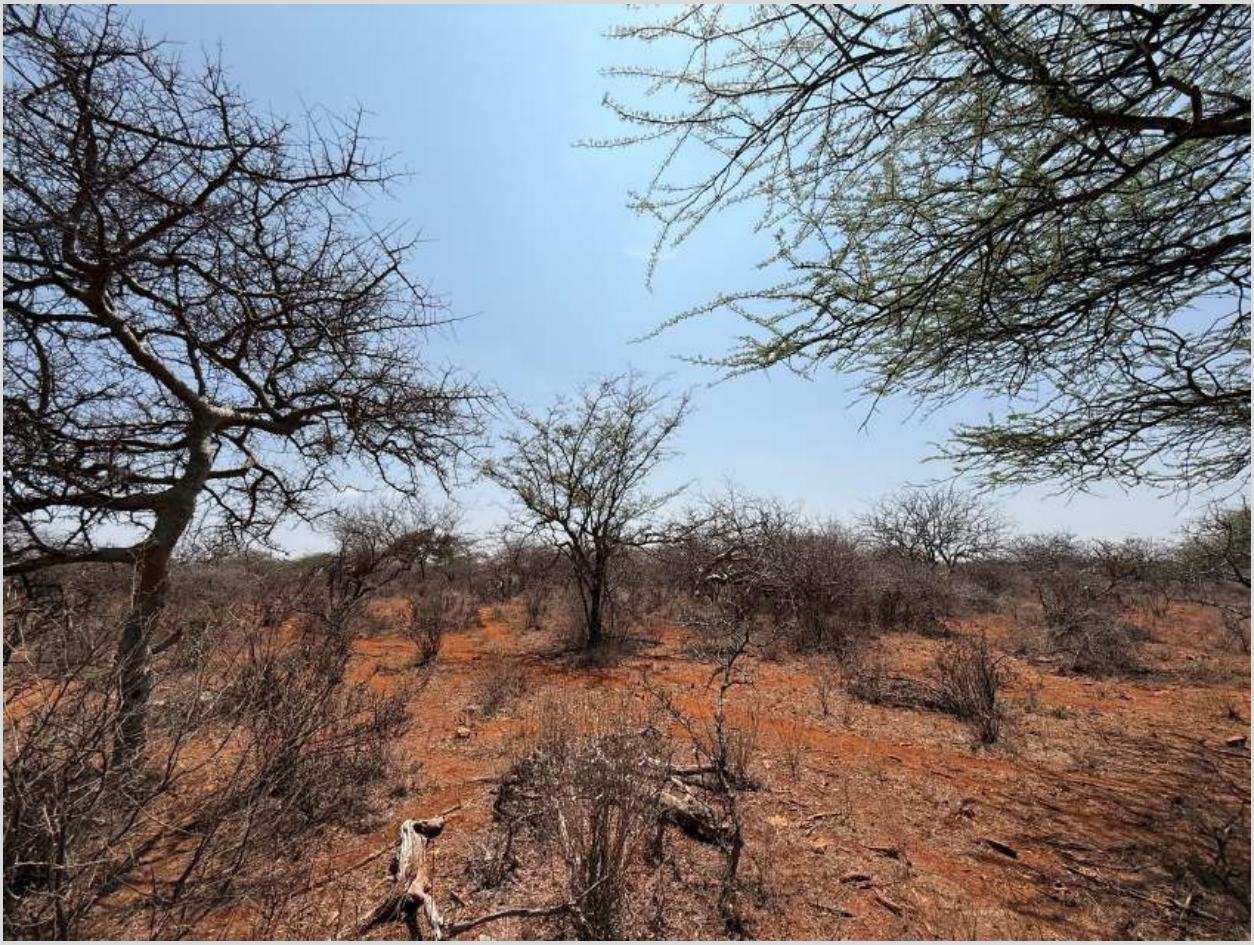

Figure 23. Degraded acacia-commiphora bushland, Malka Mari National Park, Mandera County, northeastern Kenya.

At 876 km², Malka Mari is Kenya's third biggest national park. Although this national park was gazetted 36 years ago, it remains without permanent Kenya Wildlife Service presence or infrastructure, receives no tourists, and its biodiversity remains largely undocumented. The primary reasons for this are its remoteness, poor access, lack of facilities, and the general insecurity associated with northeastern Kenya. Another reason that Malka Mari has never received much attention is that the largest of the large mammals have been extirpated, probably as a result of poaching. Several well-known late 19th century European explorers ran at least five major expeditions through this region—along the Daua River from Dolo to Mandera to Ramu, and then west away from the river to the wells of Banissa (Figure 25). They found the region rich in wildlife, including numerous black rhinoceros *Diceros bicornis* (Linnaeus, 1758) and savanna elephant *Loxodonta africana* Blumenbach, 1797 (Brown 1989). These two species, as well as reticulated giraffe *Giraffa reticulata* de Winton, 1899, no longer occur (KWS 2021; Osman Abidi and Mohamed Dube, pers. comm. 2025). It is not known which other large mammals have been extirpated from Malka Mari. Very little is known about the antelopes currently (but also historically) present in the park. Kenya Wildlife Service rangers stationed in Banissa state that Lesser Kudu, Waterbuck, Bushbuck, Gerenuk, and Dik-Dik are there. In addition, they report Baboon, Vervet Monkey, and Warthog (Osman Abidi and Mohamed Dube pers. comm. 2025).

Figure 24. Adult female Southern Gerenuk *Litocranius walleri walleri,* Malka Mari National Park, northeastern Kenya.

Due to security restrictions, we only spent 2 days (one night; March 2025) surveying Malka Mari. We encountered Günther's Dik-Dik *Madoqua* (*g.*) *guentheri* and Southern Gerenuk in the park and glimpsed Greater Kudu. We observed Hamadryas Baboon *Papio hamadryas.* These are

the first records of *P. hamadryas* for Kenya and, thus, for East Africa (De Jong and Butynski in press; see p. 65). Further surveys are needed to determine which other primates are present. We predict that the following additional three species of primate occur in Malka Mari: Northeastern Vervet Monkey *Chlorocebus pygerythrus arenaria* (Heller, 1913), Ethiopia Lesser Galago *Galago senegalensis dunni* Dollman, 1910, and Somali Lesser Galago *Galago gallarum* Thomas, 1901 (De Jong and Butynski 2023).

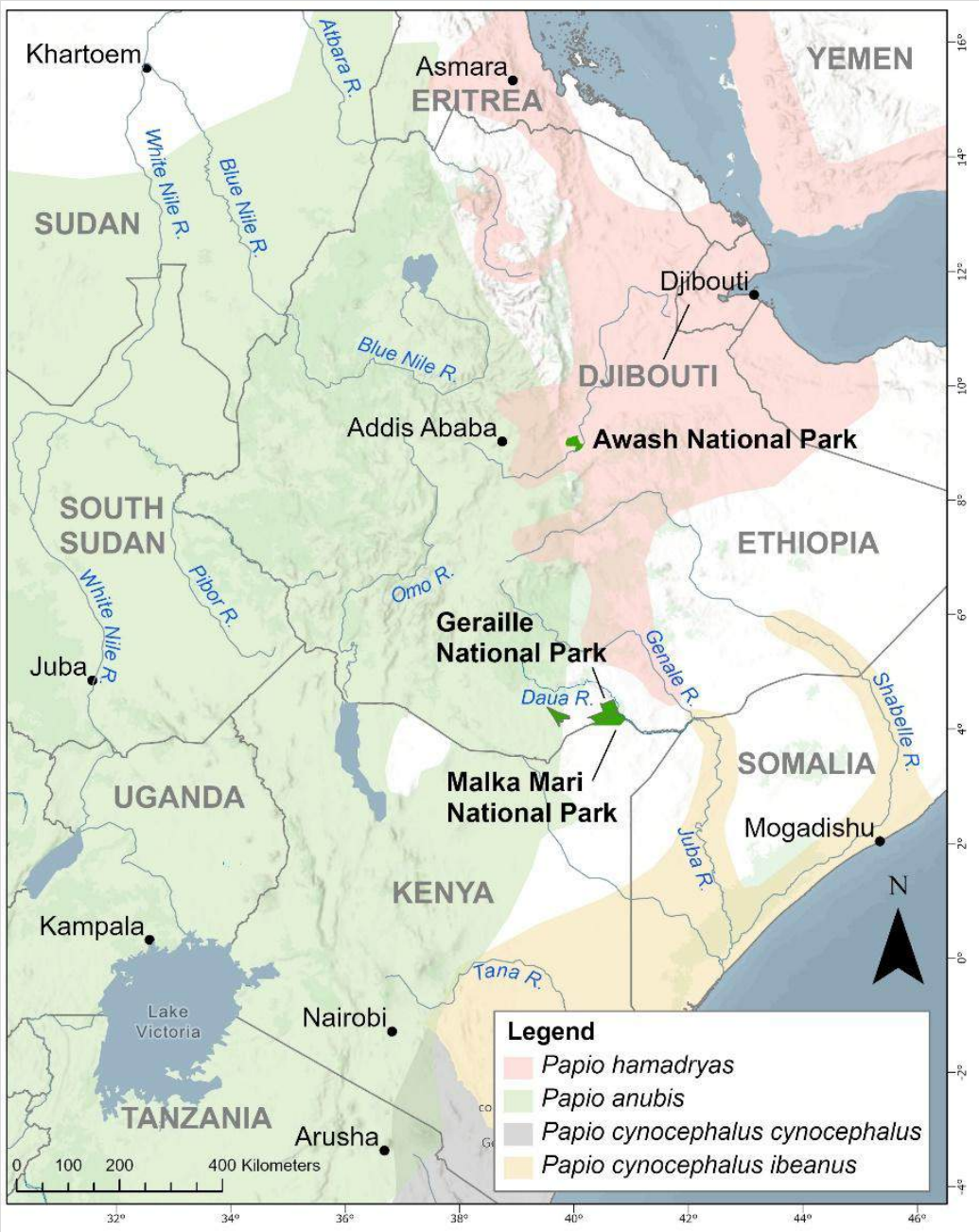

Figure 25. Baboon *Papio* species geographic distributions in Eastern Africa. The distribution for Hamadryas Baboon *Papio hamadryas* is mostly based on Zinner *et al.* (2001) and modified by Butynski and De Jong (2022). The distributions for Olive Baboon *Papio anubis* and Yellow Baboon *Papio cynocephalus* are taken from De Jong and Butynski (2023).

At present, Malka Mari holds large numbers of people, sheep, goats, cattle, camels, and donkeys, several schools, a clinic, and a government administrative centre (KWS, 2021). This has led to the unsustainable use of the wildlife, natural vegetation, and soils of Malka Mari and, as a result, considerable environmental degradation.

Figure 26. Degraded acacia-commiphora woodland, Malka Mari National Park, Mandera County, northeastern Kenya.

A priority for conservation action in Malka Mari is an assessment of its biodiversity, in particular the determination of which species of large mammal remain and their abundance. Biological surveys should also be undertaken to assess for which species Malka Mari is of special importance for their long-term conservation, as well as which species have the most potential to attract tourists. For example, *P. hamadryas,* White-winged Collared Dove *Streptopelia reichenowi* (Erlanger, 1902), and Black-billed Woodhoopoe *Phoeniculus somaliensis* Ogilve-Grant, 1901, are among those species not known to occur in East Africa beyond this region. Based on the findings of biological, habitat, and socio-economic surveys, a management plan should be prepared in collaboration with the local people and then effectively implemented.

Madoqua* (*kirkii*) *kirkii (Günther, 1880) Least Concern

Abundance

At least 62 Kirk's Dik-Dik *Madoqua* (*kirkii*) *kirkii* were encountered during Phase Two (Figures 27, 28 and 29). Figure 28 shows the localities where individuals were confirmed, including a range extension of about 100 km to the northeast. Forty-six Dik-Dik were not identified to species-level and, therefore, are not included on this map. Up to four individuals were seen together, although 1 or 2 individuals were most commonly encountered.

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) and Groves and Grubb (2011), which was also applied by De Jong and Butynski (2017a). The taxonomic arrangement of *Madoqua* requires a thorough review. The observations and photographic material collected during this survey will be instrumental in that review.

Figure 27. Adult male Kirk's Dik-Dik *Madoqua* (*kirkii*) *kirkii,* near Takabba, northeastern Kenya.

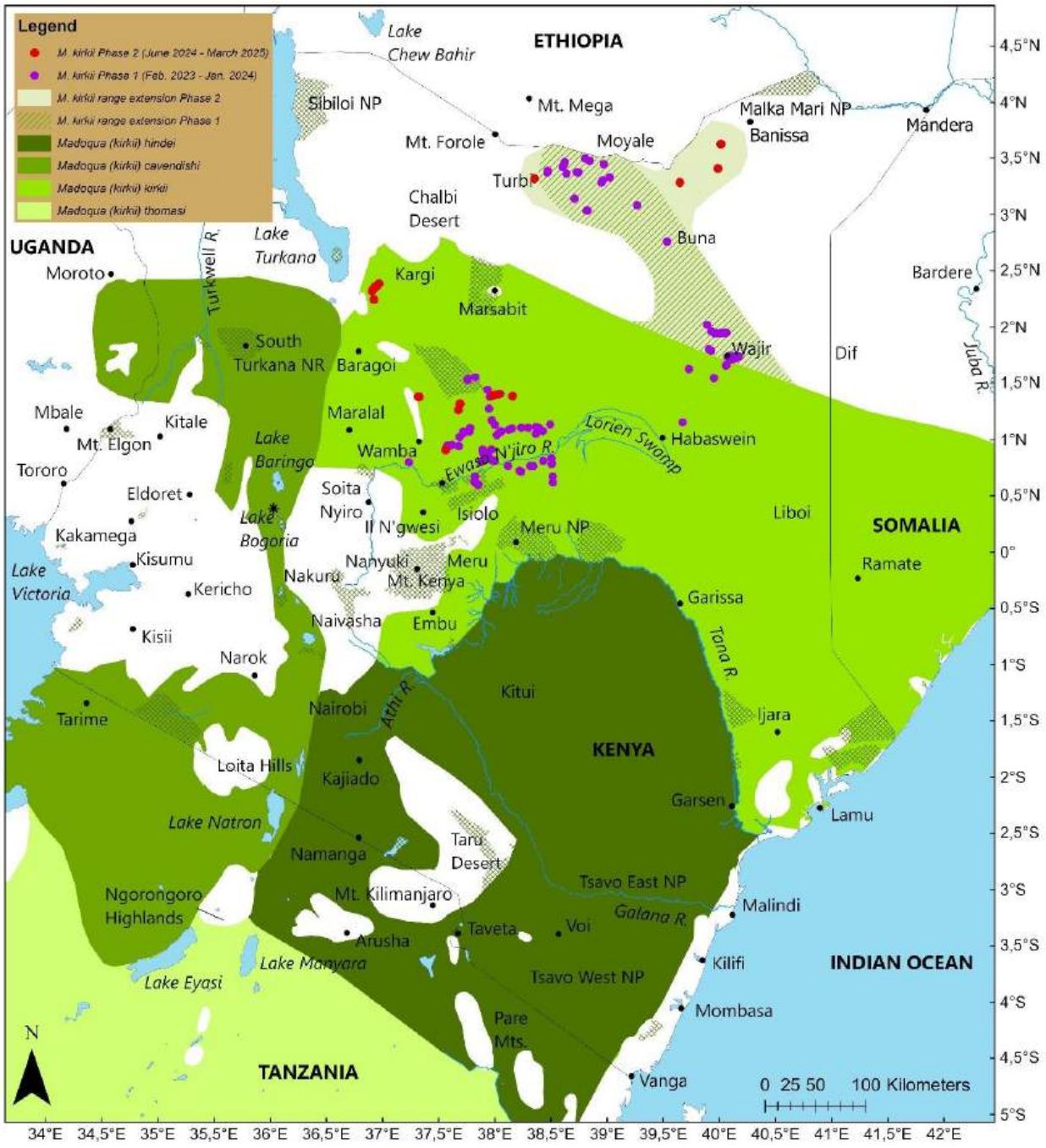

Figure 28. Encounters with Kirk's Dik-Dik *Madoqua kirkii* during Phase Two (red) and Phase One (purple) of the 'Horn of Africa Antelope Survey'. Geographic range of *M. kirkii* from IUCN/SSC Antelope Specialist Group (2016e) and De Jong and Butynski (2017a).

Distribution

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

1. 'Central Kenya'. North of the Ewaso N'jiro River, an area well known for this species. Kirk's Dik-Dik were often encountered during Phase One in this part of their range.

2. 'Mount Nyiro'. Kirk's Dik-Dik were encountered northeast of Mount Nyiro, an area well known for this species. In this part of their range, Kirk's Dik-Dik is parapatric or sympatric with Günther's Dik-Dik which occurs north, east and south of Mount Kulal.
3. 'Turbi'. Kirk's Dik-Dik were encountered 3.3 km northeast of Turbi. This extends the known range 10 km to the west.
4. 'West Malka Mari'. Between Bute and Malka Mari NP, Kirk's Dik-Dik were found to be sympatric with Günther's Dik-Dik. The northeastern-most record of Kirk's Dik-Dik was ~50 km southwest of Banissa. These records extend the range ~100 km to the northeast compared to the records of Phase One and ~300 km to the northeast compared to the maps in IUCN/SSC Antelope Specialist Group (2016e) and De Jong and Butynski (2017a). We speculate that this species occurs farther to the east approaching the range of Salt's Dik-Dik *Madoqua saltiana*. Security was not sufficient for us to survey the region between Malka Mari NP and Mandera.

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 Kirk's Dik-Dik populations at Marsabit and Turbi-Dandu, 130 km apart, are probably not connected, or only marginally connected. The Turbi-Dandu population is likely connected to the Wajir population through the Buna area. The Wajir population is probably connected to Kirk's Dik-dik in central Kenya through the vast bushlands to the north and south of the Ewaso N'jiro River and around the vast Lorien Swamp into which this river flows. This swamp does not have habitat for Dik-Dik.

The altitudinal range of these encounters was 542–947 m asl. This is well within the known altitudinal range for this species (0–2,000 m asl; IUCN/SSC Antelope Specialist Group 2016e).

Sympatry

Kirk's Dik-Dik is now known to be sympatric with Smith's Dik-Dik over an area of ~70,000 km² in central Kenya, and with Günther's Dik-Dik in central eastern Kenya over an area of ~110,000 km² (Figure 18 in De Jong and Butynski 2017a). With the range extensions of 300 km to the northeast, obtained in Phase One and Phase Two (Figure 28), the known area of sympatry with Günther's Dik-Dik is now ~140,000 km². The geographic range of Günther's Dik-Dik might, however, be less extensive than currently mapped. We note that in the northeast of their range, Kirk's Dik-Dik is less common and typically flightier than Günther's Dik-Dik.

Figure 29. Adult female Kirk's Dik-Dik *Madoqua* (*kirkii*) *kirkii,* west of Malka Mari National Park, northeastern Kenya. This is the northeastern-most record for Kirk's Dik-Dik.

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

Abundance

At least 33 Common Impala *Aepyceros melampus melampus* (Figure 30 and 31) were seen in five encounters during Phase Two. One herd held at least 25 individuals, but herds of 2–3 individuals were most common.

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

During Phase Two, all encounters with Common Impala were in Buffalo Springs NR. This is well within the known geographic range for this species (Figure 31; Fritz and Bourgarel 2013; IUCN/SSC Antelope Specialist Group 2016a).

Figure 30. Adult male Common Impala *Aepyceros melampus melampus*, Shaba National Reserve, central Kenya.

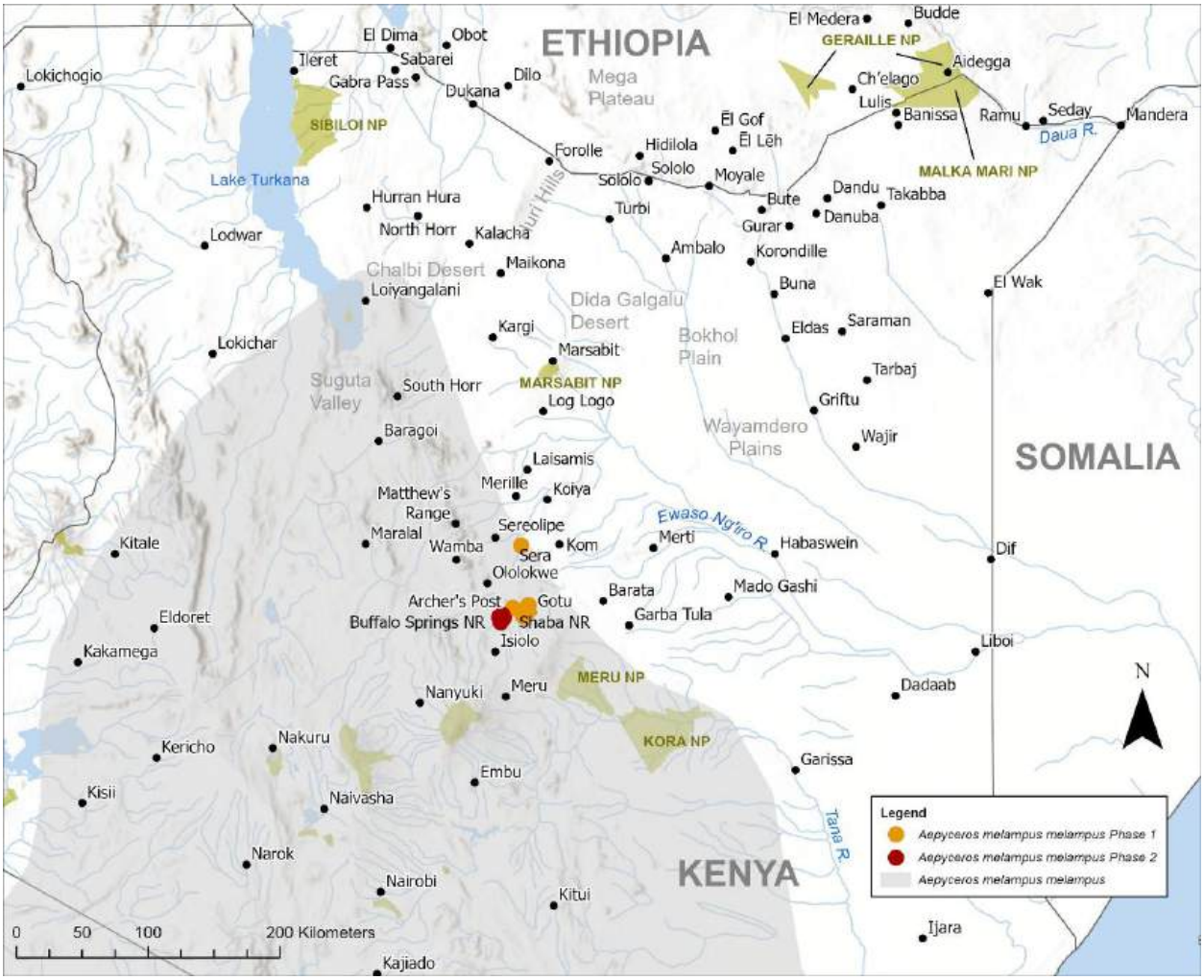

Figure 31. Encounters with Common Impala *Aepyceros melampus melampus* during Phase Two (red) and Phase One (orange) of the 'Horn of Africa Antelope Survey'. Geographic range from IUCN/SSC Antelope Specialist Group (2016a).

All encounters between 860 m asl and 916 m asl. This is well within the known altitudinal range of for this species (0–1,700 m asl; IUCN/SSC Antelope Specialist Group 2016a).

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

Abundance

At least three Southern Lesser Kudu *Tragelaphus imberbis australis* (Figures 32, 33 and 34) were seen in two encounters during Phase Two. An encounter near Gurar remains unidentified as to species of Kudu. Up to two individuals were seen together.

Taxonomic note

Two subspecies of *Tragelaphus imberbis* are recognized by Leuthold (2013b) 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 (2013b).

Figure 32. Adult female Southern Lesser Kudu *Tragelaphus imberbis australis*, Kalepo Conservancy, central Kenya.

Distribution

Southern Lesser Kudu were encountered within the known geographic range (Figure 33; Leuthold 2013b; IUCN/SSC Antelope Specialist Group 2016h). Southern Lesser Kudu were encountered between 792 m asl and 816 m asl. This is well within the known altitudinal range of this species (<1,740 m asl; IUCN/SSC Antelope Specialist Group 2016h).

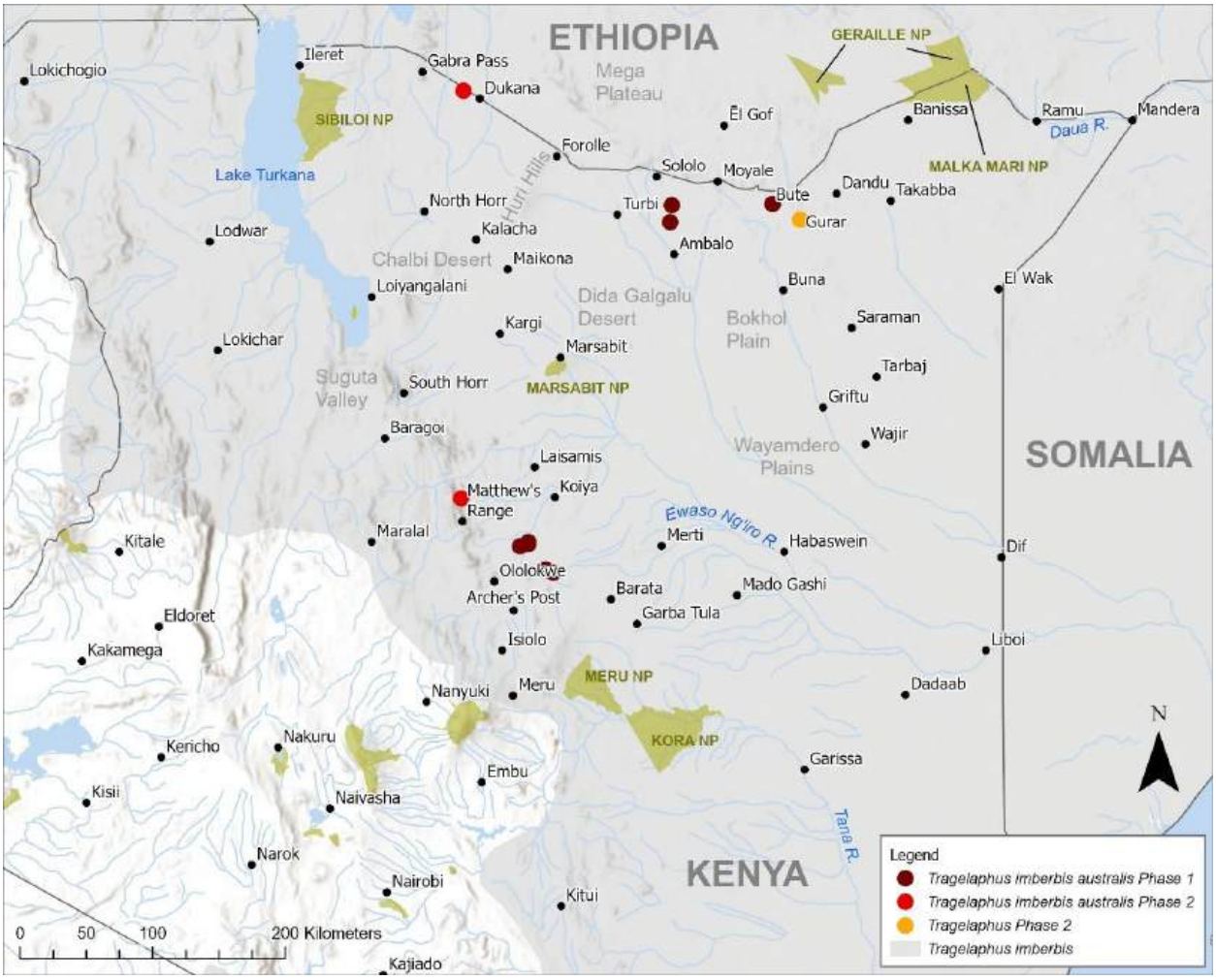

Figure 33. Encounters with Southern Lesser Kudu *Tragelaphus imberbis australis* during Phase Two and Phase One of the 'Horn of Africa Antelope Survey'. Geographic range from IUCN/SSC Antelope Specialist Group (2016h).

Figure 34. Adult male Southern Lesser Kudu *Tragelaphus imberbis australis*, north of Dukana, northern Kenya.

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

Abundance

One Bushbuck *Tragelaphus scriptus* (Figures 35 and 36) was seen during Phase Two. This encounter was in Marsabit NP (Figure 36). 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).

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 (2016j) recognizes but one. Here we follow Plumptre and Wronski (2013) and IUCN/SSC Antelope Specialist Group (2016j) who recognize 11 subspecies of Bushbuck.

Figure 35. Subadult male Maasai Bushbuck *Tragelaphus scriptus delamerei,* Marsabit National Park, northern Kenya.

Distribution

The one Maasai Bushbuck encountered during Phase Two was in Marsabit NP (Figure 36). During Phase One of the Horn of Africa Antelope Survey this antelope was encountered only in Marsabit NP (Figure 36). This site is on the northeastern edge of the distribution of this species in Kenya (Plumptre and Wronski 2013; IUCN/SSC Antelope Specialist Group 2016j). This is likely an extremely isolated population---much more so than depicted on the map presented by IUCN/SSC Antelope Specialist Group (2016j).

The one Maasai Bushbuck was encountered at 1,470 m asl, which is well within the known altitudinal range for this species (0–4,000 m asl; IUCN/SSC Antelope Specialist Group 2016j).

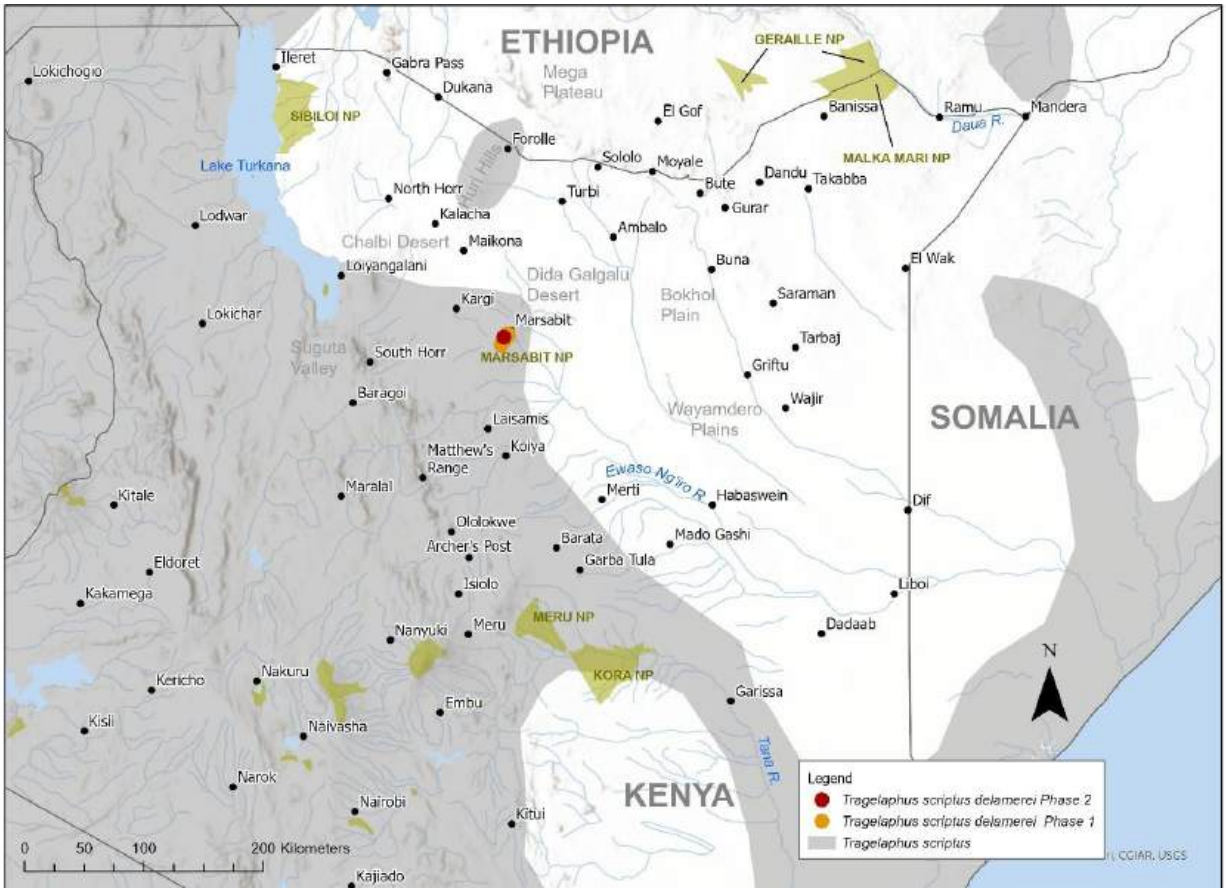

Figure 36. Encounters with Maasai Bushbuck *Tragelaphus scriptus delamerei* during Phase Two and Phase One of the 'Horn of Africa Antelope Survey'. Geographic range from IUCN/SSC Antelope Specialist Group (2016j).

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

Abundance

One Waterbuck *Kobus ellipsiprymnus* (Figures 37 and 38) was encountered during Phase Two in Buffalo Springs NR at 860 m asl. This is within the known altitudinal range for this species (0–3,000 m asl; IUCN/SSC Antelope Specialist Group 2016b).

Two subspecies of Waterbuck 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), and IUCN/SSC Antelope Specialist Group (2016b).

Distribution

Buffalo Springs NR is well within the known geographic range of *K. ellipsiprymnus* (IUCN/SSC Antelope Specialist Group 2016b). The reserve is within an intermediate-zone between the two subspecies of Waterbuck. Preliminary findings by De Jong and Butynski (2017b) indicate that this intermediate zone in central Kenya is narrow and lies in southern Samburu County and probably extending southward across the Ewaso N'jiro River into western Isiolo County. More about this intermediate zone can be found at: https://www.wildsolutions.nl/waterbuck-kobus-ellipsiprymnus-laikipia-county).

Maps presented by Spinage (2013) and IUCN/SSC Antelope Specialist Group (2016b)(Figure 37) are 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 on their maps, the habitat is far from suitable for Common Waterbuck.

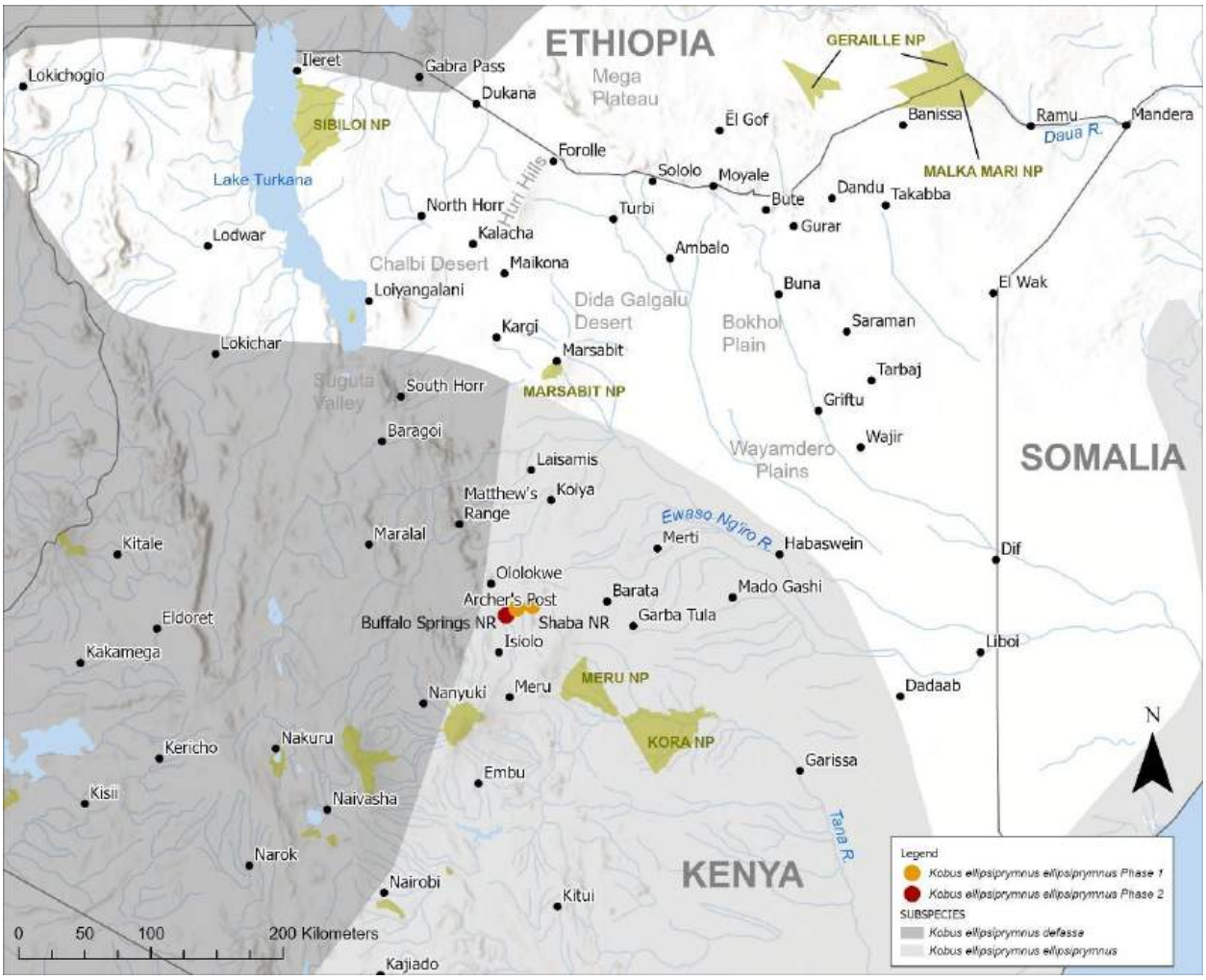

Figure 37. Encounters with Common Waterbuck *Kobus ellipsiprymnus ellipsiprymnus* during Phase Two and Phase One of the 'Horn of Africa Antelope Survey'. Geographic range from IUCN/SSC Antelope Specialist Group (2016b).

Figure 38. Adult male Common Waterbuck *Kobus ellipsiprymnus ellipsiprymnus*, Buffalo Springs National Reserve, central Kenya.

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

Abundance

One Greater Kudu *Tragelaphus strepsiceros* (Figure 39 and 40) was encountered during Phase Two. One encounter near Gurar remains unidentified as to species.

Taxonomic note

Three subspecies of *Tragelaphus strepsiceros* are recognized by Kingdon (1997), but 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 individual was in Malka Mari NP at 625 m asl (Figure 39). This is well within the known geographic range and altitudinal range of this species (0–2,400 m asl; Owen-Smith 2013; IUCN/SSC Antelope Specialist Group 2020).

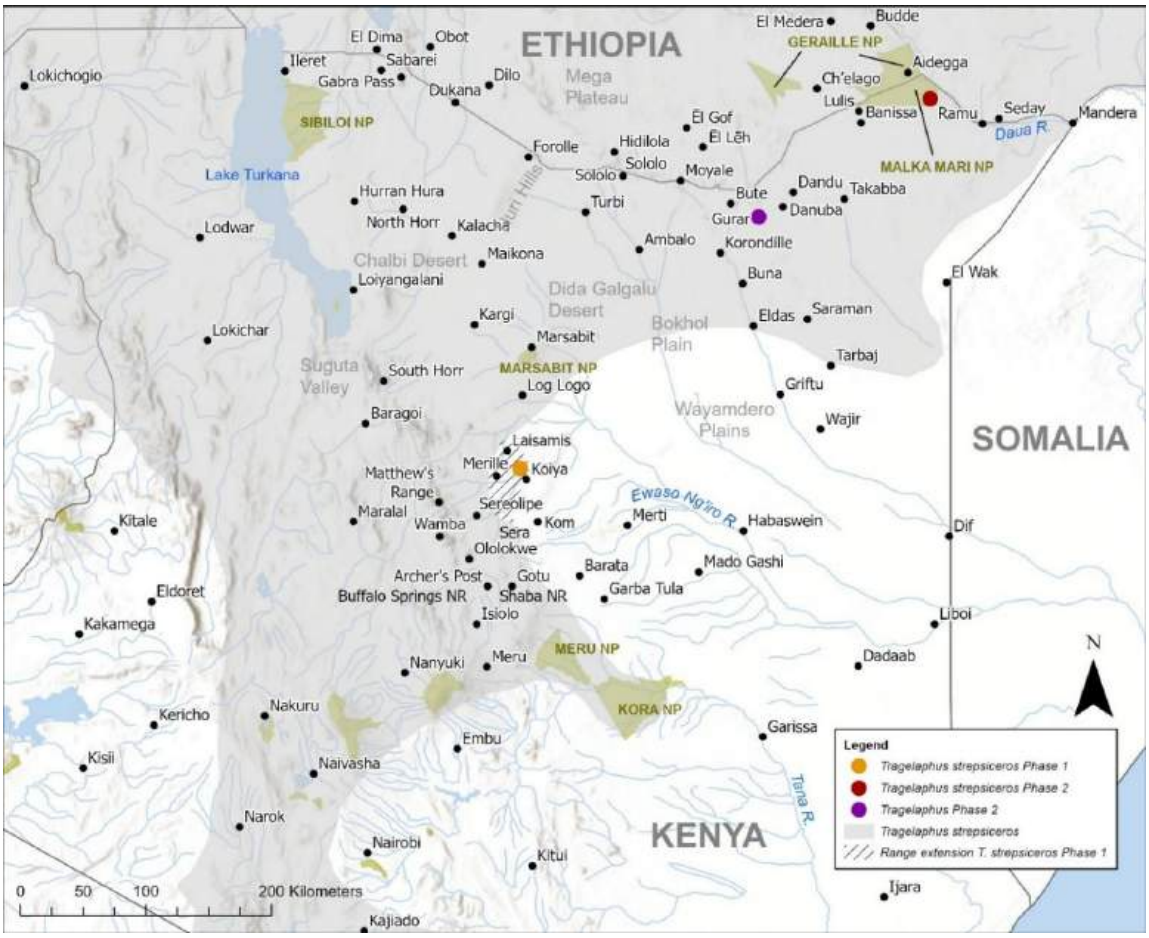

Figure 39. Encounters with Greater Kudu *Tragelaphus strepsiceros* during Phase Two and Phase One of the 'Horn of Africa Antelope Survey'. Geographic range from IUCN/SSC Antelope Specialist Group (2020).

Figure 40. Adult male Greater Kudu *Tragelaphus strepsiceros*, Suyian Ranch, Laikipia County, central Kenya. Photograph taken during an earlier survey (January 2021).

Antelope species not encountered

Eight of the 18 antelope species which we expected to occur in the study area, or in its vicinity, were not encountered during either Phase One or Phase Two of this survey; Common Eland, Mountain Reedbuck, Klipspringer, Salt's Dik-Dik, Common Duiker, Peter's Gazelle, Tiang, and Coke's Hartebeest. Some of these species have been reported to occur only at the very edge of the study area or just outside (Table 1). Tiang was surprisingly absent.

- Common Eland: This is one of the focal species of Northern Rangeland Trust (NRT). The Sera Conservancy, at the northern limit of the geographic range of this species, had a stable population until 2019 (Wandera *et al*. 2020). Common Eland is absent from deserts and dense forests, favoring savannas and open woodlands. The only area north of Sera Conservancy which is known to support this antelope is west and east of the northern end of Lake Turkana, including Sibiloi NP.
- Tiang: Only occurs in the extreme northwest of the study area, including Sibiloi NP.
- Coke's Hartebeest: Only expected to occur at the extreme southwest of the study area.
- Salt's Dik-Dik: Might be present in the Mandera region at what would be the southern limit of its geographic range. Yalden *et al*. (1984) indicate that Salt's Dik-Dik is present in Ethiopia just north of the northeastern corner of Kenya. We speculated that this species might be present in Malka Mari NP and in the vicinity of Mandera town. During this survey, security in extreme northeastern Kenya was considered to be poor. During our 2-day visit to Malka Mari NP we did not encounter Salt's Dik-Dik. We did, however, find Günther's Dik-dik in Malka Mari NP. We might fly to Mandera and, with the help of the Kenya Wildlife Service, survey this region.
- Common Duiker: Expected to occur in the extreme south of the study area (*e.g*., Sera Conservancy, Shaba National Reserve).
- Peter's Gazelle: During Phase Two we did reach the southeastern 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 eastern 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 these two taxa in this region.
- Mountain Reedbuck: Occurs east of Lake Turkana, including Sibiloi NP and Mt Kulal. Relies on ridges and hillsides in broken rocky country and high-altitude grasslands (often with some tree or bush cover) from 1,500-5,000 m (East 1999; Avenant 2013).
- Klipspringer: Locally present throughout the western part of the study area.

Soemmerring's Gazelle and Bohor Reedbuck, for which confirmation is required for their presence in northeastern Kenya (Table 1), were not encountered during this survey.

Sibiloi National Park's 'Empty Park Syndrome'

Sibiloi NP, on the northeastern shore of Lake Turkana in northern Kenya, is the northwestern limit of the 'Phase Two' study area and is close to the border with Ethiopia. This national park (1,570 km²) was gazetted in 1973 and designated as a UNESCO World Heritage Site in 1997. In 2018, however, it was placed on the UNESCO World Heritage Site in Danger list (Avery 2018, UNESCO 2025). Sibiloi NP is globally renowned for the paleoanthropological research at Koobi Fora. The fossil deposits include the remains of early hominins such as *Australopithecus* and *Homo* species.

The arid and semi-desert vegetation, volcanic formations, open plains, and eastern lake shore of Lake Turkana, until recently, support an abundance of antelopes (Beisa Oryx, Tiang, Lesser Kudu, Bright's Gazelle), Common Zebra, Black Rhinoceros, African Buffalo, Elephant, various carnivores, including Lion, Cheetah, and Wild Dog). This is no longer the case because of poaching and habitat degradation.

Figure 41. Striated Heron *Butorides striata,* Koobi Fora, Sibiloi National Park, northern Kenya.

When we surveyed northern Sibiloi NP for 2 days in June 2024, large numbers of livestock and people were observed deep within the park. The long-term presence of people with their livestock was unmistakable as no medium- or large-sized wild mammals were encountered. Shockingly, we encountered more livestock inside the park boundaries than outside, and we found more wildlife outside the park then inside. We did not visit the southern half of Sibiloi NP during this survey. The four KWS rangers whom we spoke with confirmed the absence of wildlife, including the nationally threatened Tiang for which Sibilio NP was once the stronghold. It may be that this subspecies will soon be extirpated from Kenya.

Figure 42. Tom Butynski in 2012 at Sibiloi National Park, northern Kenya.

Figure 43. Bright's Gazelles off the eastern side of Sibiloi National Park, northern Kenya.

Illegal harvesting of wood products, fishing, human encroachment, livestock grazing and browsing, poaching, and fire are all treats to this national park and its biodiversity (KWS 2015). In addition, climate change is probably impacting the park. Most, if not all, medium and large

mammals historically present in the park have declined, some of which have been extirpated. Another threat is that the Omo River, which accounts for 80–90% of Lake Turkana's inflow (Avery 2018), has recently been dammed in Ethiopia (Gibe Dams). This, together with large-scale irrigation in Ethiopia, is affecting the water levels of Lake Turkana and, thereby, the ecology both lake and the national park.

Figure 44. Northern Carmine Bee-Eater *Merops nubicus* and sheep in Sibiloi National Park, northern Kenya.

During June 2024, the water level of Lake Turkana was extremely high. This seriously impacted the already limited infrastructure of Sibiloi NP. Security issues, together with the remoteness and poor infrastructure of this national park, seriously hinders its management.

In conclusion, Sibiloi NP faces a complex set of threats, from hydrological disruptions and climate change to insecurity, human encroachment, and the illegal exploitation of resources, including poaching. Addressing these challenges requires a multifaceted approach that combines law enforcement, scientific research, community engagement, and transboundary cooperation.

Figure 45. Hairy Slit-faced Bat *Nycteris hispida,* Koobi Fora, Sibiloi National Park, northern Kenya

ANTELOPE CONSERVATION IN NORTHERN KENYA

During Phase Two, antelope species were nowhere common in northern Kenya outside of protected areas. As in Phase One, the most common antelope species were water-independent species (*i.e.,* Günther's Dik-Dik, Bright's Gazelle, Southern Gerenuk, Kirk's Dik-Dik,).

Eight of the 18 antelope species which are historically known for the study area, or in its vicinity, were not encountered during this survey; Common Eland, Mountain Reedbuck, Klipspringer, Salt's Dik-Dik, Common Duiker, Peter's Gazelle, Tiang, and Coke's Hartebeest. Some of these species were expected to occur only at the edge of the study area or just outside. We now suspect that these species are still present, with some widespread but rare, and some restricted to protected areas (*e.g.*, Common Waterbuck, Beisa Oryx, Common Impala). Their low abundance is probably due to population declines during the 3–5-year drought, which ended in 2023, 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 abundance all across this region. With average to above average annual rainfall, most of these species are expected to recover at least somewhat and to persist in this region, albeit at low densities. Without effective anti-poaching measures put into place, it is unlikely that any of these species will, once again, become common.

Competition with livestock for food and/or water, habitat degradation, loss and fragmentation, as well as poaching, threaten all species of antelope across northern Kenya. This vast region is too arid for large-scale agriculture or even large-scale ranching. It appears that the antelope species most vulnerable in northern Kenya at this time are Beisa Oryx, Tiang, Klipspringer, Mountain Reedbuck, Common Eland, and Greater Kudu. Common Impala, Common Waterbuck, Maasai Bushbuck, and Coke's Hartebeest have, historically, only occurred in northern 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 in some areas (*e.g.*, presence of food crops, more open ground, absence of large predators).

Bright's Gazelle were the second most encountered species during Phase Two. Despite suitable habitat, the species was not encountered within Sibiloi NP. This national park is, however, part of its historic range and we expect this species to be present at low abundance (see page 51). Bright's Gazelle were sometimes seen near large herds of livestock, people, and villages during Phase One and Phase Two.

The 'Endangered' Beisa Oryx was the third most encountered species during Phase Two. At least 112 Beisa Oryx were seen during eight encounters. All of northern Kenya falls within the historic range of Beisa Oryx. Nonetheless, as in Phase One, none were encountered outside protected areas. During Phase Two, all were in Buffalo Springs NR at the southern limit of the study area. Aerial survey prior to the 3–5-year drought indicate that small, unprotected, herds occurred over much of northern Kenya in 2021 (KWS 2021). The Beisa Oryx population in northern Kenya appears to be highly vulnerable. On Sera Conservancy, in the southwestern part

of the study area, there is a (170 km²) 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 (*e.g.*, private wildlife conservancies in Laikipia County) have the potential to reestablish these species over a large part of northern Kenya. Based on Phase One and Phase Two, Buffalo Springs NR, Shaba NR, and Sera Conservancy are essential for the conservation of Beisa Oryx. Based on earlier surveys, Samburu NR and the neighboring community conservancies (*e.g.,* Kalama, West Gate, Leparua), which are contiguous with Buffalo Springs NR and Shaba NR, hold many Beisa Oryx (Y. de Jong and T. Butynski unpubl. data; iNaturalist.org 2025).

Southern Gerenuk has not been assessed for the IUCN Red List of Threatened Species. The species is, however, 'Near Threatened'. Southern Gerenuk was the fourth most frequently encountered antelope and is present over much of the survey area. Despite suitable habitat, Southern Gerenuk were not encountered in Sibiloi NP. Poaching, 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). These threats are, however, localized across northern Kenya. Over its range, ~10% of Gerenuk occur in protected areas (East 1999). This percentage is likely greater in northern Kenya due to the presence of community conservancies.

Figure 46. Bright's Gazelle *Nanger notata*, north of Kargi, southeast of the Chalbi Desert, northern Kenya.

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

The 'Nearly Threatened' Southern Lesser Kudu was present throughout northern Kenya, but we found it to be rare. 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 2016h). Southern Lesser Kudu are solitary or in small herds and are often difficult to locate. As a result, it is likely that a good number of individuals along our survey routes went undetected.

The 'Least Concern' Greater Kudu are historically absent from the southern part of the study area (Figure 39; 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 herds in dense vegetation and are often difficult to detect. It is likely that some individuals along our survey routes went undetected.

The 'Least Concern' Common Elands are large, adaptable, antelopes which are primarily browsers with a large home range. The species was not encountered during our surveys. It is historically only marginally present in the study area. We suspect this species is still present at low numbers throughout its historic range in northern Kenya (including Sibiloi NP, Mount Nyiru, Ndoto Range, and Matthews Range) but this needs to be confirmed. Habitat loss and poaching have resulted in a considerable decline across it historic range (IUCN SSC Antelope Specialist Group 2016i).

The 'Vulnerable' Chanler's Mountain Reedbuck was not encountered during either Phase One or Phase Two. This subspecies was historically distributed throughout the western part of the study area. The subspecies is predominantly a grazer and relies on ridges and hillsides in broken rocky country and high-altitude grasslands. Water is required. This is likely one of the most vulnerable species within the study area based on its need for high-altitude grasslands and water. High altitude grassland is only sparsely distributed in northern Kenya and is under great threats. Threats to Chanler's Mountain Reedbuck include competition and disturbance by people and livestock, poaching, and dogs, and expansion of human settlements (Avenant 2013, IUCN SSC Antelope Specialist Group 2017).

The 'Least Concern' Klipspringer was not encountered during either Phase One or Phase Two. This species, primarily a browser, is patchy distributed in the western part of the study area. Klipspringers occupy rocky and mountainous terrains (Roberts 2013). As they do not rely on free-standing water and their habitat is of no particular value to humans, there are no obvious serious threats to Klipspringers in most parts of their range (IUCN SSC Antelope Specialist Group 2016g). We suspect that this species still occurs over much of its historic range in northern Kenya (including Mount Kulal, Mount Nyiru, Ndotos Range, and Matthews Range).

The nationally threatened Tiang occurs on floodplains and other grasslands near water. Historically only present in the study area off the northeastern corner of Lake Turkana in what is now Sibiloi NP. The species was not encountered during this survey, but we found one individual in Sibiloi NP in October 2012 (De Jong and Butynski 2014) and Malte Sommerlatte encountered four individuals in this national park in October 2024 (M. Sommerlatte pers. comm. 2024). With the serious threats facing Sibiloi NP (see p. 52), the only legally protected area with

Tiang in East Africa, it appears that this species may soon be extirpated from East Africa (also De Jong and Butynski 2014).

Northern Kenya has a human population that is lower than elsewhere in Kenya (Kenya National Census 2019). There are relatively few roads and vehicles in northern Kenya. Most roads are in poor condition, and, during wet periods, many are impassable, isolating large areas, some with sizeable towns.

As mentioned above, people and their livestock are both in direct and indirect competition with antelopes and other wildlife over some parts of northern Kenya. Man-made perennial water sources in the form of dams are scattered across this region providing water to people and livestock during all or most of the year. Some of these dams are poorly maintained and unlikely to persist due to lack of maintenance and, apparently, theft of infrastructure such as pumps and fences. These water sources are often 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 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 northern 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 water-independent species require.

Lagas (seasonal streams and rivers) are an extremely important geological feature in northern Kenya. They maintain plant and animal communities not found elsewhere and support 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 the more remote parts of northern Kenya.

NOTES ON OTHER MAMMALS

Other than antelopes, 28 mammal species were encountered during this survey, three of which were not identified to species level (Hare, Genet, Dwarf Mongoose). Four of the species are 'threatened' (Vulnerable, Endangered, or Critically Endangered) according to the IUCN Red List of Threatened Species (Table 6; 2025), and one is listed as Data Deficient (Omo Vervet Monkey). Phase Two revealed the presence of three primate taxa new for Kenya and East Africa; Ethiopia Lesser Galago in Kenya (see p. 63), Hamadryas Baboon (see p. 65), and Omo Vervet Monkey (see p. 68).

We encountered four of the seven 'Endangered' species listed in Table 2. Eight of the nine focal species, other than antelopes, were encountered (Table 3). Below, we highlight six of the non-antelope taxa that we observed.

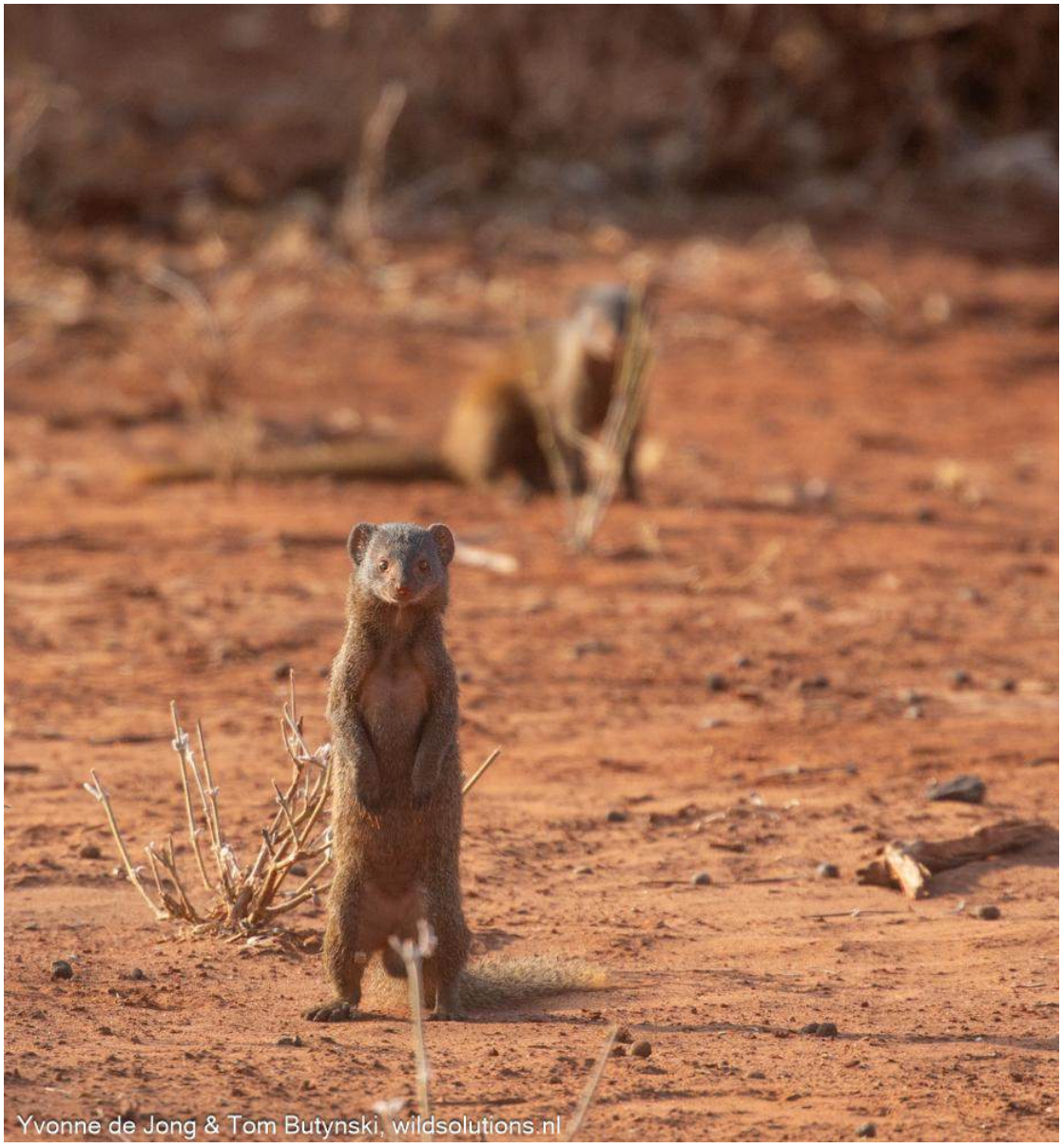

Figure 47. Adult Somali Dwarf Mongoose *Helogale hirtula,* Banissa, northeastern Kenya.

Table 6. Species of mammal, other than antelopes, encountered during Phase Two of the 'Horn of Africa Antelope Survey'.

Non-antelope Species	IUCN Red List Status 2024	Locality (or Vicinity) Encountered
Savanna Elephant *Loxodonta africana*	EN	Samburu County, vicinity South Horr, Longopito
African Buffalo *Syncerus caffer*	NT	Marsabit NP
Reticulated Giraffe *Giraffa reticulata*	EN	Kalepo Conservancy, Buffalo Springs NR
Grévy's Zebra *Equus grevyi*	EN	Buffalo Springs NR, Marsabit NP
Plains Zebra *Equus quagga*	LC	Buffalo Springs NR
Desert (Somali) Warthog *Phacochoerus aethiopicus delamerei*	LC	Buffalo Springs NR
Northern Crested Porcupine *Hystrix cristata*	LC	Kubihalo
Hamadryas Baboon *Papio hamadryas*	LC	Malka Mari NP. First record for Kenya and East Africa.
Olive Baboon *Papio anubis*	LC	Over much of the study area. Range extensions in the northeast. Absent from the vast lava plains and deserts.
Northeastern Vervet Monkey *Chlorocebus pygerythrus arenaria*	LC	Kalepo Conservancy, Mount Ololokwe, Merille, South Horr and vicinity, Marsabit NP, Buffalo Springs NR, Gurar, Timau
Omo Vervet Monkey *Chlorocebus pygerythrus zavattarii*	DD	El Yibo Wells. First record for Kenya and East Africa.
Somali Lesser Galago *Galago gallarum*	LC	Kalepo Conservancy, Mount Ololokwe, Turbi, Dukana, Guble Pass, Mount Kulal, El Yibo Wells, Buffalo Springs NR, Marsabit, Gurar, Kubihalo, Sololo
Kenya Lesser Galago *Galago senegalensis braccatus*	LC	Mount Ololokwe
Ethiopia Lesser Galago *Galago senegalensis dunni*	LC	Gurar
Rock Hyrax *Procavia capensis*	LC	South Horr, Mount Ololokwe
Bush Hyrax *Heterohyrax brucei*	LC	Kalepo Conservancy, South Horr, El Yibo Wells
Unstriped Ground Squirrel *Xerus rutilus*	LC	Over much of the study area.
Ochre Bush Squirrel *Paraxerus ochraceus*	LC	Kalepo Conservancy
Genet *Genetta* species?	LC	Over much of the study area.
Dwarf Mongoose *Helogale* species?	-	Buffalo Springs NR
Somali Dwarf Mongoose *Helogale hirtula*	LC	Guble Pass, Banissa, Gurar
Slender Mongoose *Herpestes sanguineus*	LC	Banissa
White-tailed Mongoose *Ichneumia albicauda*	LC	Gurar, Takabba
Black-backed Jackal *Canis mesomelas*	LC	Mount Kulal, Buffalo Springs NR, Samburu County,

African Golden Wolf *Canis lupaster*	LC	Southeastern Huri Hills, North Horr and vicinity, Dukana, Turbi
Spotted Hyaena *Crocuta crocuta*	LC	Over much of the study area.
Leopard *Panthera pardus*	VU	Kalepo Conservancy, Mount Kulal
Hare *Lepus* species?	-	Dukana, Sibiloi NP, between Dukana and Sibiloi NP, North Horr, El Yibo Wells, Guble Pass
Naked Mole Rat *Heterocephalus glaber*	LC	Along northeastern Kenya-Ethiopia border.

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

Figure 48. Adult Ochre Bush Squirrel *Paraxerus ochraceus*, Kalepo Conservancy, central Kenya.

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

During Phase Two, we identified 14 localities for the poorly known Somali Lesser Galago *Galago gallarum* Thomas, 1901. Most of these records fill large gaps in the known geographic range, one (Mount Nyiru) of which represents a range extension of ~25 km to the west towards Lake Turkana (De Jong and Butynski 2023; Figure 50). It remains to be determined if this species occurs in Sibiloi NP. One Somali Lesser Galago was encountered in in Buffalo Springs NR in a tall Mesquite tree *Neltuma juliflora* (formerly *Prosopsis juliflora*), an invasive tree species. Although expected, this is the first survey to confirm that the Somali Lesser Galago occurs in this national reserve were Lesser Galagos are uncommon.

At Gurar, intermediate looking lesser galagos were observed in acacia-commiphora bushland. These had phenotypic characters of both Somali Lesser Galago and Ethiopia Lesser Galago *Galago senegalensis dunni* Dollman, 1910, and vocalizations of both species were recorded. The southern limit of the geographic range of the Ethiopia Lesser Galago is poorly known. Butynski and De Jong (2019) and De Jong and Butynski (2023) speculated that the Ethiopia Lesser Galago occurs in extreme northeastern Kenya. Until now, however, there was no evidence of this subspecies for Kenya, either from field surveys or museum collections. Phenotypic and bioacoustics comparisons with data from both species in our database of live individuals and museum specimen are planned. Additional surveys are needed in order to collect additional data on these two taxa from other sites in extreme northeastern Kenya.

Figure 49. Adult Lesser Galago *Galago* at Gurar, northeastern Kenya. The colouration and pattern of the pelage of this individual most resemble that of the Somali Lesser Galago *Galago gallarum,* but the grey on the forehead, grey ears, less distinctive black eye-rings, and absence of black on the hands suggest that it is intermediate with the Ethiopia Lesser Galago *Galago senegalensis dunni*.

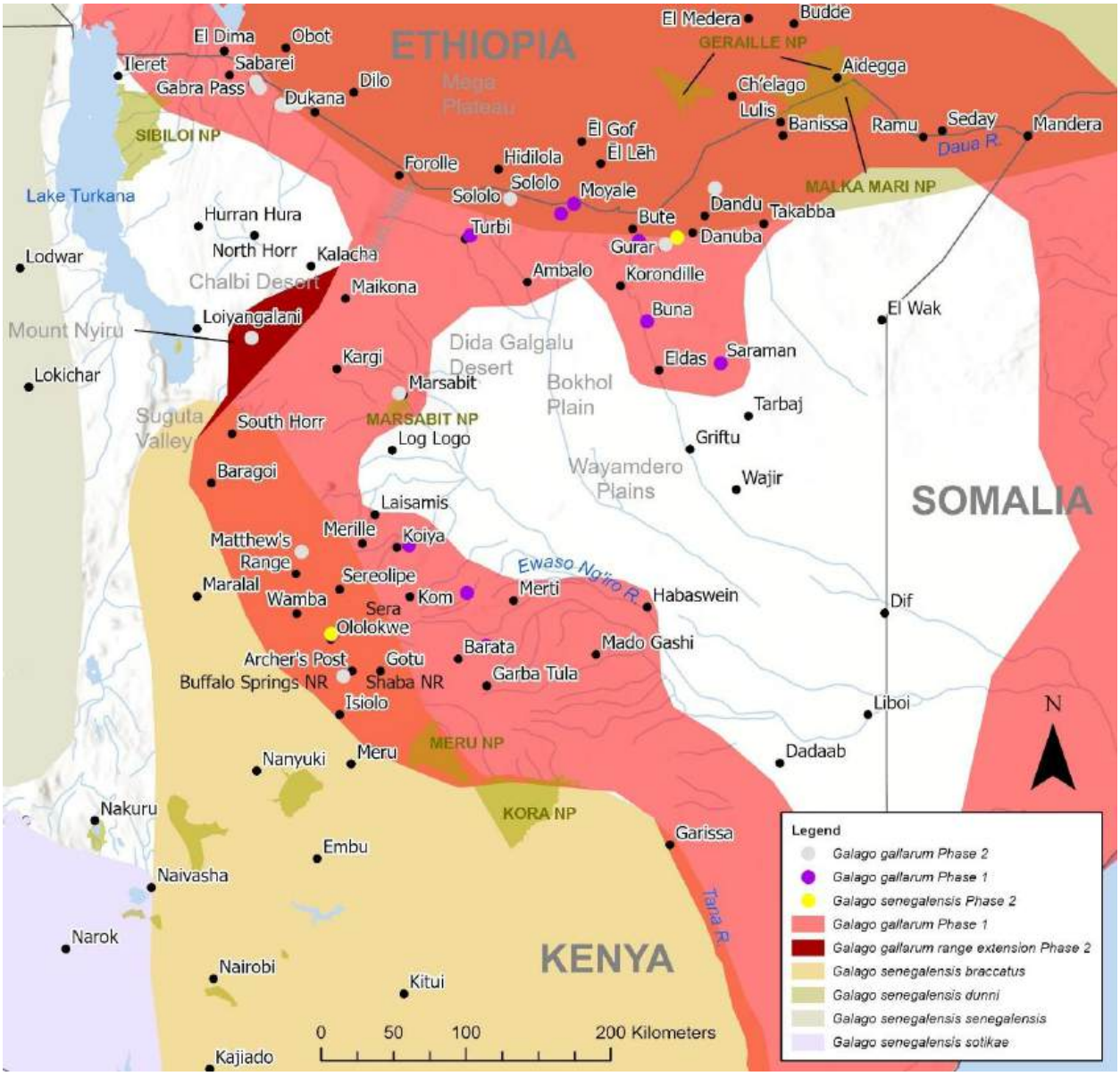

Figure 50. Encounters with Lesser Galago *Galago* spp. during Phase Two (grey) and Phase One (purple) of the 'Horn of Africa Antelope Survey'. Geographic ranges adopted from Butynski and De Jong (2019), De Jong and Butynski (2023) and Butynski and De Jong (2024).

Hamadryas Baboon *Papio hamadryas* (Linnaeus, 1758) Least Concern

During the fourth survey of Phase Two (1–9 March 2025), Hamadryas Baboon *Papio hamadryas* was encountered in Malka Mari NP (Figures 51 and 52). These are the first records of *P. hamadryas* for Kenya and, thus, for East Africa. A manuscript about this additional large primate species for Kenya is in press at the Journal of East African Natural History. See the abstract below.

Figure 51. Adult male Hamadryas Baboon *Papio hamadryas*, Malka Mari National Park, northeastern Kenya. Note the silvery-grey pelage, long mane, pinkish-grey face, short-haired hind legs, arched tail with slight tuft at the tip, and large reddish callosities.

A NEW LARGE PRIMATE FOR KENYA: HAMADRYAS BABOON *PAPIO HAMADRYAS* (PRIMATES: CERCOPITHECIDAE)

Yvonne A. de Jong & Thomas M. Butynski
Journal of East African Natural History

ABSTRACT: The hamadryas baboon *Papio hamadryas* is a large, terrestrial primate endemic to the Arabian Peninsula and Northeast Africa. There are no records of this primate in Kenya. From February 2023 through April 2025, we conducted eight surveys across northern Kenya, from the eastern shore of Lake Turkana eastward to Malka Mari National Park and Wajir. We encountered 37 groups of baboons *Papio* between Marsabit and Malka Mari National Park, 32 of which were

olive baboons *Papio anubis,* extending the known geographic distribution of this monkey in northeastern Kenya ~50 km to the east. At least four groups of *P. hamadryas* were observed in Malka Mari National Park between 655 m asl and 680 m asl. These records are ~75 km southeast of the known *P. hamadryas* range in southern Ethiopia, ~100 km northeast of the easternmost *P. anubis* group, and ~125 km west of the documented range of the Northern Yellow Baboon *Papio cynocephalus ibeanus.* These are the first records of *P. hamadryas* for Kenya and, thus, for East Africa. We speculate that the range of *P. hamadryas* extends from Malka Mari National Park northward into Ethiopia along the Daua River, eastward along the Daua River on the Kenya-Ethiopia border to Ramu, and westward to Lulis, just beyond the southwestern corner of Malka Mari National Park. With this addition, Kenya's primate community comprises three *Papio* species and four *Papio* taxa, and a total non-human primate community of 11 genera, 19 species, and 34 taxa.

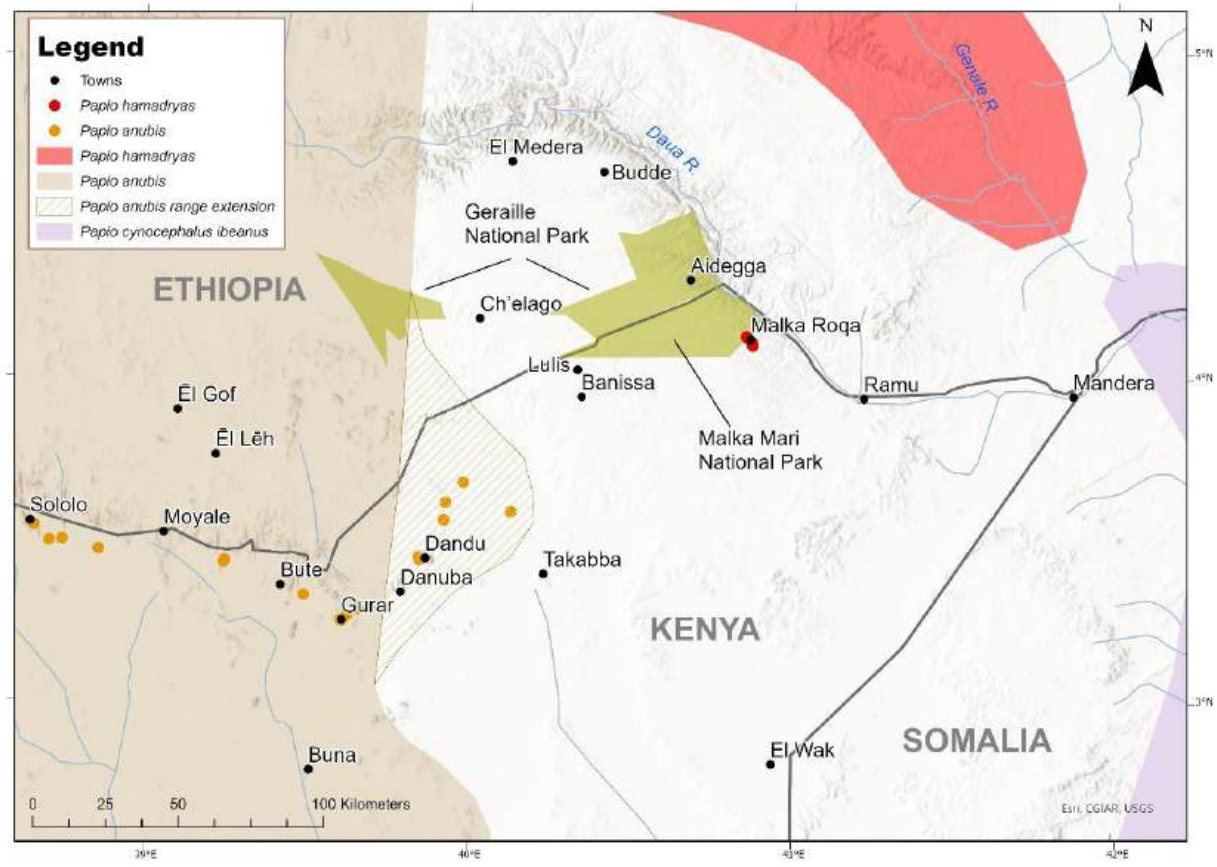

Figure 52. Hamadryas Baboon *Papio hamadryas* records in Malka Mari National Park, northeastern Kenya. The eastward range extension for Olive Baboon *Papio anubis* in northeastern Kenya is depicted by the diagonal lines.

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

During Phase Two (1–9 March 2025), we encountered 32 groups of Olive Baboon *Papio anubis* between Marsabit and Malka Mari. Seven of these groups were east of the previously recorded geographic range of this species (De Jong and Butynski 2023; Figure 52). These records extend the range of this monkey in northeastern Kenya ~50 km to the east, to ~25 km northwest of Takabba. At Lulis, off the southwestern corner of Malka Mari, we found *Papio* footprints, but the species was not confirmed. These results are included in a manuscript in press at the *Journal of East African Natural History* in which we report the Hamadryas Baboon *Papio hamadryas* in Malka Mari NP (see p. 65).

Figure 53. Adult male Olive Baboon *Papio anubis*, Gurar, northeastern Kenya, ~175 southwest of where Hamadryas Baboon *Papio hamadryas* were observed in Malka Mari National Park. Note the olive-brown pelage, medium length of the mane, rounded top of the head, blackish ears and muzzle, arched tail with but a slight tuft at the tip, and medium-size dark grey callosities.

Vervet Monkey *Chlorocebus pygerythrus* (F. Cuvier, 1821) Least Concern

During Phase Two, we encountered 26 groups of Vervet Monkey *Chlorocebus pygerythrus*, belonging to three subspecies. These records include (1) a new subspecies for Kenya and East Africa (Omo Vervet Monkey *Chlorocebus pygerythrus zavattarii)*, (2) the first photographs of live Northeastern Vervet Monkey *Chlorocebus pygerythrus arenaria* at Merille, the type locality for this taxon, and (3) the first record for our database of *Chlorocebus pygerythrus arenaria* at Mount Marsabit.

During 17–18 July 2024, we encountered at least two groups of Omo Vervet Monkey *Chlorocebus pygerythrus zavattarii* (de Beaux, 1943) at El Yibo Wells, northwest of Dukana, central northern Kenya (Figure 54–58). The geographic range limits of *C. p. zavattarii* are poorly understood. Until now, *C. p. zavattarii* was considered to be endemic to southwestern Ethiopia. Its known range is from Murle (Omo River, north of Lake Turkana) northward to Mago NP, eastward to Nech Sar NP (south of Lake Abaya and northeast of Lake Chamo), with an altitudinal range of 400–1,500 m asl (De Beaux 1943; Hill 1966; Dandelot and Prevost 1972; Dandelot 1974 Yalden *et al.* 1977; Napier 1981; Gippoliti 2020; Butynski and De Jong 2022).

The finding of *C. p. zavattarii* at El Yibo Wells represents the first record for this subspecies for Kenya and East Africa. Groups at El Yibo Wells were in tall Acacia [*Vachellia*]-*Salvadora persica* woodland along Lugga Bulal (also referred to as Lugga Jibisa), a seasonal river at 690 m asl, ~8 km south of the Ethiopia border. El Yibo Wells represent a permanent source of water for people and livestock. The water in these wells is accessible to some species of wildlife, including *C. p. zavattarii* and *P. anubis.*

Figure 54. Adult male Omo Vervet *Chlorocebus pygerythrus zavattarri,* El Yibo Wells, northwest Dukana, central northern Kenya.

Figure 55. Adult female Omo Vervet *Chlorocebus pygerythrus zavattarri,* El Yibo Wells, northwest Dukana, central northern Kenya.

Figure 56. Adult Omo Vervet *Chlorocebus pygerythrus zavattarri,* El Yibo Wells, northwest Dukana, central northern Kenya.

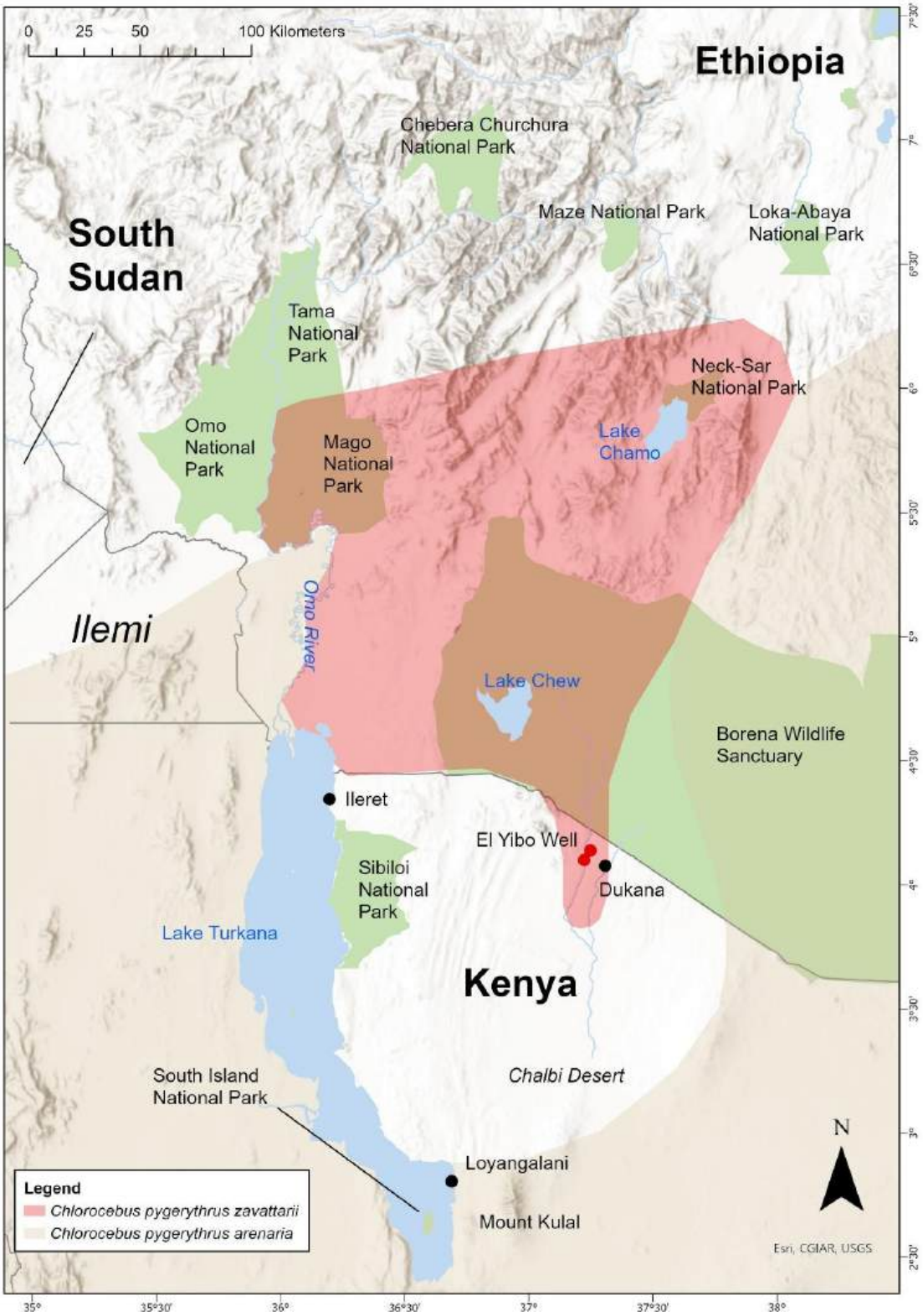

Figure 57. Geographic range of Omo Vervet *Chlorocebus pygerythrus zavattarii*. Location of *C. p. zavattarii* at El Yibo Wells is depicted in red. Map based on Butynski and De Jong (2022).

Chlorocebus p. zavattarii is assessed as 'Data Deficient' on *The IUCN Red List of Threatened Species* due to its small and poorly understood geographic range (Butynski and De Jong 2025). This monkey is presumably patchily distributed, locally common, but, presumably, in decline. As for other taxa of *Chlorocebus*, habitat loss, degradation, and fragmentation, the result of a rapid growing human population, are probably threatening the long-term survival of this subspecies. Hybridization with *C. aethiops* might be another threat. Additional field surveys are required to determine its geographic distribution, abundance, extent of hybridization, threats, priorities for conservation action, and to assign *C. p. zavattarii* a category of threat on the IUCN Red List of Threatened Species. In addition, further taxonomic research is required to assess the validity *C. p. zavattarii*.

Figure 58. Northeastern Vervet *Chlorocebus pygerythrus arenaria,* Marsabit National Park, northern Kenya.

BIRDS OF NORTHERN KENYA

During Phase One and Phase Two we, each day in the field, listed all bird species that we encountered. We aim to produce bird lists once all birds are identified. Some of the notable bird species we encountered include:

- African Wood Owl *Strix woodfordii* was heard in Marsabit NP, north of the known range (Stevenson and Fanshawe 2020). Recording and locality: https://www.inaturalist.org/observations/232522754
- Northern White-faced Owl *Ptilopsis leucotis* was heard near Dukana, east of Sibiloi NP, and at Gurar. The species is not reported by Stevenson and Fanshawe (2020) to occur east of Lake Turkana. Recording and locality: https://www.inaturalist.org/observations/228187082
- First record of the Ovambo Sparrowhawk *Accipiter ovampensis* in northern Kenya (Figure 59). Photograph and locality: https://www.inaturalist.org/observations/227335478

Figure 59. Ovambo Sparrowhawk *Accipiter ovampensis*, Guble Pass, northern Kenya.

- Range extension for Brown Snake-Eagle *Circaetus cinereus*. Photograph and location: https://www.inaturalist.org/observations/227335472
- First records of African Hawk-Eagle *Aquila spilogaster* on iNaturalist for northern Kenya: https://www.inaturalist.org/observations?subview=map&taxon_id=144468
- Rare audio recordings and photographs (Figure 60) of what we believe is the male courtship display of Heuglin's Bustard *Neotis heuglinii*.
- Range extension for African Pygmy Kingfisher *Ispidina picta.* Encountered in the Guble Pass in northern Kenya (Figure 61). Photograph: https://www.inaturalist.org/observations/227331354
- Banded Parisoma *Sylvia boehmi* seen at Banissa, northeastern Kenya: https://www.inaturalist.org/observations/265175370
- Red-naped Bushshrike *Laniarius ruficeps* seen and heard at several sites in Guble Pass and Takabba (Figure 62). These are considerable range extensions according to Stevenson and Fanshawe (2020). Photographs, audio recordings, and localities: https://www.inaturalist.org/observations?subview=map&taxon_id=8216&user_id=dejong&verifiable=any

Figure 60. Courtship display by an adult male Heuglin's Bustard *Neotis heuglinii,* east of Sibiloi National Park, northern Kenya.

Figure 61. African Pygmy Kingfisher *Ispidina picta*, Guble Pass, northern Kenya.

Figure 62. Red-naped Bushshrike *Laniarius ruficeps*, Guble Pass, northern Kenya.

First record of the Gallmann's Sand Frog *Tomopterna gallmanni* in northern Kenya (Figure 63). Photograph and locality: https://www.inaturalist.org/observations/226644904. Identification requires confirmation.

Figure 63. Gallmann's Sand Frog *Tomopterna gallmanni*, Guble Pass, northern Kenya. Identification requires confirmation.

SCORPIONS OF NORTHERN KENYA

Four species of Scorpions were encountered in northern Kenya:

- Pallid Thicktail Scorpion *Parabuthus pallidus* (Figure 64)
- Black-Tipped Thicktail Scorpion *Parabuthus maximus*
- Eastern Nomad Scorpion *Hottentotta trilineatus*
- Turkana Ridge-Backed Scorpion *Hottentotta mazuchi*

All records and photographs are on iNaturalist.org.

Figure 64. Pallid Thicktail Scorpion *Parabuthus pallidus,* Malka Mari National Park, northern Kenya.

CONCLUSIONS

Ten of the 18 antelope species known to occur in northern Kenya were encountered during during Phase Two of the 'Horn of Africa Antelope Survey'. The most common species of antelope encountered was Günther's Dik-Dik, followed by Bright's Gazelle. Neither species is dependent on drinking water. Those species not encountered (Common Eland, Mountain Reedbuck, Klipspringer, Salt's Dik-Dik, Common Duiker, Peter's Gazelle, Tiang, Coke's Hartebeest), either occur only at the very edge of the study area or are dependent on green grass and surface water.

Range extensions for Kirk's Dik-Dik were obtained during Phase Two. This species was encountered between Bute and Malka Mari NP, thereby further extending its range ~100 km to the northeast compared to Phase One, and ~300 km to the northeast compared to IUCN/SSC Antelope Specialist Group (2016e) and De Jong and Butynski (2017a). We suspect that Kirk's Dik-Dik occurs even farther to the east---approaching the range of Salt's Dik-Dik *Madoqua saltiana*. Security was not sufficient for us to survey the region between Malka Mari NP and Mandera. These findings support the suggestion that we made upon completion of Phase One---that Kirk's Dik-Dik almost certainly occurs in southern Ethiopia. If indeed so, this is a large new mammal for Ethiopia.

West of Malka Mari NP the two species of Dik-Dik are sympatric. With the Kirk's Dik-Dik range extensions obtained in Phase One and Phase Two the known area of sympatry with Günther's Dik-Dik is ~140,000 km².

A brief survey in the remote Malka Mari NP during Phase Two is the first biodiversity survey for this national park. Malka Mari NP and its vicinity suffers from security issues. Human settlements and livestock occur in this national park, and no large mammals were found here during a 2021 aerial survey by (KWS 2021). We found Günther's Dik-Dik, Southern Gerenuk, and Greater Kudu in Malka Mari NP at low densities. In addition, *P. hamadryas* was found here---a new large species of primate/mammal for Kenya and East Africa.

Figure 65. Adult male Günther's Dik-Dik *Madoqua* (*guentheri*) *guentheri,* Malka Mari National Park, northeastern 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 northern Kenya. These threats become particularly severe during prolonged droughts. Most of northern Kenya is too arid for large scale agriculture, including livestock ranching. It appears that the antelope species most vulnerable in northern Kenya are Mountain Reedbuck, Beisa Oryx, Common Eland, Greater Kudu, Southern Lesser Kudu, Maasai Bushbuck, Common Impala, Klipspringer, Tiang, and Common Waterbuck.

Most of the antelope species historically present in northern Kenya are probably still present and widespread, but uncommon.

In addition to rivers, lakes, and lagas, man-made perennial water sources (dams) provide water to antelopes and other wildlife in northern Kenya. Many of these water sources are, however, often fenced and/or occupied by people, livestock, and dogs. The vegetation in and around settlements is typically severely degraded by livestock. In northern Kenya, however, the human population is relatively small, there are few roads, and the roads that exists an often in poor condition or impassable. One result is that large parts of northern Kenya are little affected by people because they lack perennial water sources.

Twenty-eight mammal species, other than antelopes, were encountered during this survey, four of which are 'threatened' (Vulnerable, Endangered, Critically Endangered (IUCN 2025; Table 6). We encountered five of the seven 'Endangered' species listed in Table 2. Seven of the nine non-antelope focal species were also encountered (Table 3). Below we highlight a few of these species.

During this survey we found three new primate taxa for Kenya and East Africa, Hamadryas Baboon, Omo Vervet, and Ethiopian Lesser Galago. We also obtained altitudinal range extensions, geographic range extensions, and natural history data for Somali Lesser Galago and Olive Baboon, and for several bird species. Intermediate looking *Galago* were encountered in acacia-commiphora bushland at Gurar. Phenotypic and bioacoustics comparisons are planned to use the field data and museum data now in our database.

More than 10,000 photographs were taken in RAW format during Phase One, mostly of antelopes, primates, warthogs, and birds, but also of reptiles, amphibians, insects, scorpions, plants, and habitats. Most of the more important and interesting 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 are 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] and used in future research.

Figure 66. African Wolf *Canis lupaster*, Chalbi Desert, northern Kenya.

NEXT STEPS

As in the Phase One report of the 'Horn of Africa Antelope Survey' (Butynski and De Jong 2024), we made use of the antelope range 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 range maps, and those of some other taxa, based on the following:

1. During Phase One and Phase Two we obtained range extensions for Kirk's Dik-Dik, Greater Kudu, Olive Baboon, Hamadryas Baboon, Omo Vervet, Northeastern Vervet, and Ethiopian Lesser Galago. The shapefiles for these species, and others, will be updated using ArcGIS.
2. Extensive areas of unsuitable habitat are included in most of the current antelope range maps (2013 *Mammals of Africa*, IUCN.org) but also in range maps of other species such as Reticulated Giraffe and Olive Baboon. For example, the extensive lava fields in northern Kenya are geographic barriers for many 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 in northern Kenya from the antelope rangen maps.

3. A manuscript concerning the discovery of the Hamadryas Baboon in Kenya is in press by the *Journal of East African Natural History*.
4. A manuscript concerning the discovery of the Omo Vervet in Kenya is now in preparation and will be submitted to *African Primates*.
5. An ongoing biogeography study of the lesser galagos of northern Kenya is on-going. Phenotypic comparisons and bioacoustic data collected during Phase One and Phase Two will be used.
6. During our 25 years of surveys in East Africa, we compiled a large database of locality records. We will use these records to fine-tune the limits of the geographic ranges of all nine antelope species and some of the other taxa encountered during this survey. We will communicate the range 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 elsewhere in 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.
7. We will submit a third grant proposal to ZGAP in support of our 'Horn of Africa Antelope Survey' (Phase Three). We aim to undertake Phase Three during September 2025–August 2026; three 2-week surveys totaling at least 42 field days. These surveys will be conducted along ~7,000 km of road and include foot-surveys in the vicinity of at least 42 nights camps. The methods applied will be the same as used in Phase One and Phase Two of the 'Horn of Africa Antelope Survey'. Phase Three will focus on northwestern Kenya, west of Lake Turkana and Suguta Valley, north of Kainuk, with the Uganda border as the western limit and the Elemi Triangle as the northern limit (Figure 67). In addition, we will revisit Malka Mari NP in the northeast and the Merti Plains in central Kenya.

Figure 67. 'Phase Three' study area of the 'Horn of Africa Antelope Survey' with major roads depicted in red.

Antelopes will again be the main focus of 'Phase Three', in particular the newly discovered geographic range 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 northern Kenya or Ethiopia. Yalden *et al.* (1984) indicate that Salt's Dik-Dik (*i.e.*, Swayne's Dik-Dik *Madoqua saltiana swaynei*) is present in Ethiopia just north of the northeastern 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 68. Helmeted terrapin *Pelomedusa subrufa*, Lulis, northeastern Kenya.