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From the Gnusletter Editor...

Welcome to **GNUSLETTER** Vol 32, #2, a bit delayed but well worth the wait. We are pleased to pass along this volume which includes some excellent reporting on antelope and ungulate populations and various management and survey activities from the field. Thanks also to the authors who shared publications during the past year, and certainly for reports directly to GNUSLETTER.

On the ASG front the chairs have been active as always, and this volume includes several reports from David Mallon and a nice archive report for dibatag. Amongst other endeavors, Philippe Chardonnet has invested significant effort towards organizing the African buffalo group together including a symposium last fall in Paris. Stay tuned for more details from the meeting and focus on the African buffalo from the group.

We hope you enjoy this edition of GNUSLETTER and encourage you to share widely. Your future submissions are most welcome.

ASG News

IUCN SSC ASG Position Statement on the Intentional Genetic Manipulation of Antelopes

Ver. 1.0 (30 April 2015)

1. Introduction

The IUCN SSC Antelope Specialist Group (ASG) is concerned by the use of intentional genetic manipulation (IGM) of antelopes to create modified phenotypes such as novel coat patterns or enlarged horns, conducted for amenity, ecotourism, live trade and/or hunting purposes.

ASG fully supports the principle of sustainable use of wildlife and other natural resources, including appropriately managed game ranching and hunting, in accordance with:

- the Addis Ababa Principles and Guidelines of the Convention on Biological Diversity, 1992 (https://www.cbd.int/sustainable/addis.shtml);
- the Policy Statement on Sustainable Use of Wild Living Resources of IUCN, 2000 (http://povertyandconservation.info/en/biblio/b1391);
- the Guiding Principles on Trophy Hunting as a Tool for Creating Conservation Incentives of IUCN SSC, 2012 (http://cmsdata.iucn.org/downloads/iucn_ssc_guiding_principles_on_trophy_hunting_ver1_09aug2012.pdf);
- WCC Resolution 3.093, 2005: Application of the IUCN Sustainable Use Policy to sustainable consumptive use of wildlife and recreational hunting in southern Africa (https://cmsdata.iucn.org/downloads/wcc_res_rec_eng.pdf)

2. Definitions of IGM

IGM may comprise:

- Manipulations between taxa:
  - Hybridizing two different species, either indigenous or exotic;
  - Crossing two different subspecies or strains, either indig enous or exotic.
- Manipulations within taxa:
  - Selective inbreeding to exaggerate the prevalence of some characters;
  - Cloning;
- Combinations of manipulations.

3. Purpose and extent of IGM

- The purpose of IGM is to supply private collections, trophy hunting enterprises and other commercial operations and is expanding:
  - Growing in magnitude with a continuously increasing number of (i) facilities involved, (ii) number of antelope species and individuals subject to IGM & (iii) private and public sales;
  - Increasing diversity with a continuously growing number of newly created morphs.
- Antelopes modified by IGM are extensively spread:
  - Most modified antelopes are translocated to other wild life facilities in or out their original range country or range;
  - IGM antelopes are mostly held behind fences which cannot be regarded as 100% wildlife proof, with a risk of escapes to neighbouring areas including into the wild.

4. Impacts of IGM

The actual and potential impacts of IGM of antelopes comprise:

- Direct threat to biodiversity by risking the survival of indigenous taxa, i.e. genetic pollution by dilution of indigenous taxa;
- Distortion of natural processes of evolution;
- Homogenization of taxa at national or regional scale and globalization of taxa at the global scale;
- Weakened resilience or reduced adaptive capacity to environmental changes, such as health hazards, ecosystem transformation, or climate change;
- Reduced reproductive fitness;
- Other unknown impacts.

5. ASG Statement

The IUCN SSC Antelope Specialist Group:

- Considers that IGM of antelopes incorporates many risks and ignores the precautionary principle;
- States that IGM of antelopes for commercial or amenity purposes makes no contribution to the conservation of biodiversity at global, regional, national and local levels;
- Opposes all IGM of antelopes for commercial or amenity purposes, with particular reference to (i) hybridization of different species, (ii) crossing of different subspecies and (iii) selective inbreeding of a population.

- Philippe Chardonnet and David Mallon, Co-Chairs

New Research and Reports

Trade of ungulates in Moroccan markets for decoration and medicinal use.

Daniel Bergin and Vincent Nijman

Wild populations of bovids in Morocco are at a historic low and this is primarily due to hunting and habitat loss (Loggers et al., 1992, Cuzin et al., 2008). Boundaries of protected areas are rarely adequately marked and are not properly enforced (Loggers et al., 1992). Until recently, there were nine species of wild ungulates present in Morocco. Of these, only four remain – wild boar *Sus scrofa*, Barbary sheep *Ammotragus lervia*, dorcas gazelle *Gazella dorcas*, Cuiver's gazelle *Gazella cuvieri* (Cuzin et al., 2007) and extremely small numbers of reintroduced dama gazelle *Gazelle dama* (Mungall et al 2014). Hunting has been the driving factor behind the extirpation of the other ungulate species – hartebeest *Alcelaphus buselaphus* (most recent observation: 1925), Barbary stag *Cervus elaphus barbarous* (prior to 1932), addax *Addax nasomaculatus* (1963) and oryx *Oryx dammah* (1973) – in Morocco in the recent past (Loggers et al., 1992; Cuzin et al., 2008) and habitat loss continues to threaten the remaining species. As indicated by these local extinctions, hunting can be a significant barrier to the conservation of Moroccan ungulates, especially when left unregulated and unchecked. Although much of the hunting is for consumption of the meat, some animals such as the oryx are also hunted for their skins (Cuzin et al. 2007). Animal parts are a common sight in the markets of Morocco (Shipp, 2002; Bergin and Nijman, 2014a). They are often used as ingredients in traditional medicines and as decorations for herbalist – shops selling a variety of other goods but especially herbs, spices, oils and traditional medicines (Bergin and Nijman, 2014b).

During the months May – June 2013, May 2014 and December 2014, surveys of the markets of 22 cities were conducted by the first author with repeat surveys in many of them. Shops were surveyed exhaustively and all observed species of mammal and reptile and their parts were recorded. No specimens were purchased during the surveys to avoid fuelling the trade.

Dorcas gazelle Gazella dorcas and Barbary sheep Ammotragus lervia heads displayed in a herbalist in Marrakech during fieldwork in 2014.

Ungulate parts were observed for sale in 11 of the 22 cities surveyed (see table 1). The most commonly observed species was the dorcas gazelle (87%) with few examples of other ungulates. Allowing for pelts not sold between surveys but assuming that the pelts did not cross to non-adjacent shops between the two years, a conservative estimate of the minimum number of individual Dorcas gazelles represented in the two surveys is 98 animals. Goat skins (numbers of which were not recorded because of the likelihood that the pelts came from domesticated animals) were very common and were often painted to resemble both real and invented animal markings. These pelts were occasionally referred to as Berber lions, a reference to the Berber tribe who make up a large percentage of the Moroccan population. Horse skins painted with zebra stripes were also observed in the markets on several occasions and vendors were very open about the authenticity of these fakes. Almost all of the observed ungulate parts were being sold in herbalists, with the only exceptions being one zebra and one giraffe pelt sold in souvenir shops in Casablanca. Through observations and discussions with the vendors, it appears that the animal parts had two main functions: to be sold as decorative items and for use in traditional medicine. A potential further function is that they may be used to decorate shops in order to appear more exotic and attractive to tourists and to advertise the presence of traditional medicine in the shop. Of the extant species, Dorcas Gazelle and Cuvier's Gazelle are protected under the old and new Moroccan laws as are Dama Gazelles. However it is evident from the specimens, openly displayed in the markets, that this is not strictly enforced. For species such as the Dorcas gazelle, this is a concern because there are only 800 - 2000 left in the wild in Morocco (Cuzin et al., 2007). Therefore a minimum of between 5 - 12% of the country's population of gazelles were observed in the markets during these three surveys, provided the pelts were not imported. Also observed was a single dama gazelle, which because of its status as Critically Endangered and because they are likely no longer extant in Morocco is of great concern. Zebra and giraffe skins in the markets indicate an import network from western or southern Africa.

With initiatives such as the national Strategic Action Plan for the Conservation, Restoration and Management of Ungulates in Morocco (Cuzin et al., 2008), Morocco is moving in the right direction with its conservation. Bovid populations can rapidly expand if allowed to do so (Yom Tov and Ilani, 1987) and there has been some success in increasing populations of Aoudad and Dorcas Gazelle in the past. The trade in these animals is far from clandestine and the laws could therefore be enforced if the means were made available to the Eaux et Forets. Cuzin (2007) proposed a plan for helping Moroccan wild ungulates, giving several recommendations how best to increase their population numbers. It is recommended that putting a stop to the trade in these animals be added to the objective list as this trade operates outside of the law and provides profits for those that undermine the conservation efforts for these ungulates.

**No ungulate specimens were observed in the cities of Agadir, Oujda, Chefchaouen, Essaouira, Tanger, Tetouan in 2013 or Tanger, Tetouan, Kenitra, Fnideq, Ceuta, Beni Nsar or Melilla in 2014.*

City	GPS coordinates	Number of visits	Dorcas Gazelle	Dama Gazelle	Barbary Sheep	Barbary stag	Wild Boar	Zebra	Giraffe
Fez	34N -5W	4/1/1	5/9/6			2/0/1	0/1/1		
Meknes	33.9N -5.6W	4/2/1	8/2/2						
Rabat	34N -6.9W	4/2/1	7/5/7	1/0/0					
Salé	34N -6.8W	1/1	0/1			1/0			
Marrakech	31.6N -8W	3/1/1	32/9/9		0/4/2	0/0/1	4/2/0	0/0/2	
Casablanca	33.5N -7.6W	1/1	10/12/3			0/1		0/0/1	0/0/1
Safi	32.3N -9.2W	1/0	1/-						
Taroudant	30.5N -8.9W	1/1	1/3						
Asilah	35.5N -6W	1/0	2/-						
Taza	34.2N -4W	1/0	2/-						
Tanger	35.8N -5.8W	2/1/1	0/3/0						
Total			137	1	6	6	8	3	1

Table 1. Table of cities in which ungulate parts were observed showing coordinates of the city, number of repeat surveys in the markets for 2013/3014 and numbers of each species observed 2013/2014

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The Ungulate Community of upper Humla, North-Western Nepal

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INTRODUCTION

The dramatic increase of altitude in Nepal from the tropical lowlands in the south up the steep mountains of the Himalayan range to the rolling alpine grasslands of the trans-Himalayas on the Tibetan plateau in the north results in a variety of different habitats, which comprise a large diversity of flora and fauna. The Himalayan region is recognized as a global biodiversity hotspot (Myers et al. 2000). In the north-western corner of Nepal lies the remote district of Humla which borders the Tibetan Autonomous Region in China on the north and is situated in the south-western corner of the Tibetan plateau (MacNally 19986). Upper Humla contains trans-Himalayan habitats with its alpine grasslands being roamed by a diverse but little described ungulate community, which is the subject of this report.

We report the findings on ungulate species recorded in the area during research expeditions conducted in 2013 and 2014 for snow leopard *Panthera uncia* and grey wolf *Canis lupus* respectively. These expeditions have revealed the presence of many ungulate species of interest such as Tibetan gazelle *Procapra picticaudata*, argali *Ovis ammon*, kiang *Equus kiang*, and blue sheep *Pseudois nayaur* in this yet relatively intact alpine grassland ecosystem.

STUDY AREA

The study area is situated in the trans-Himalayan landscapes of Limi Village Development Committee (VDC) of Humla district in Nepal (Figure 1). Two study sites, *Ngin khola* and *Chyakpalung*, ranging in elevation from 4500m to 5200m above sea level, were explored during the early summer months of May-July in 2013 and 2014. The habitat is characterized by alpine steppe vegetation (Schaller 1998) and is home to a diverse high-altitude wildlife community including snow leopard, wolf, red fox *Vulpes vulpes,* Tibetan fox *Vulpes ferrilata*, Himalayan marmot *Marmota himalayana*, blue sheep and kiang (personal observations). The closest permanent settlements to the study area are Jhang and Halji village in Limi valley, and can be reached within 1-2 days of walking. A dirt road from Jhang to the Chinese border to the North has been in place for a few years, but traffic is extremely low (1-2 vehicles per day) and limited to the snow free summer months of June to August. No permanent human settlements are found in the study area due to the harsh climatic conditions, but nomadic pastoralists herd

their yaks and sheep in the area for 1-2 summer months. The people of Limi valley belong to the Tibetan ethnic group known as Lama and are closely tied to the Tibetan culture. For their livelihood they grow crops and keep livestock such as yaks *Bos grunniens*, horses *Equus ferus caballus*, sheep *Ovis aries* and goats *Capra aegagrus hircus*.

METHOD

The valleys of the area were frequently scanned by binoculars and a spotting scope from appropriate vantage points to search for ungulates. Observations were made for about half an hour at each vantage point. Once animals were sighted, information on herd size, demographics, habitat type, dominant topographic feature, direction and distance were noted, and the locations were marked with a GPS unit (Jackson and Hunter, 1996). In addition all opportunistic observations of ungulates were recorded in the same manner during the entire study periods.

RESULTS

Tibetan gazelle distribution update

Four individuals of Tibetan gazelle *Procapra picticaudata* were seen during June 2013 within a herd of kiang at location one (Figure 1). A group of six Tibetan gazelles were again encountered in the same area during June and July of 2014 on multiple occasions. In summary these sightings took place around two locations approximately 5km apart from each other (location one: 81.60652°E, 30.3804°N, elevation: 5017m above sea level; location two: 81.61273°E, 30.40163°N, elevation: 4950m above sea level). The Tibetan gazelles were often seen in proximity to kiang aggregations.

Tibetan Antelope: Historical presence

The historical presence of Tibetan antelope in the rolling grasslands of the *Chyakpalung* area has been reported by local people. Horns of Tibetan antelope have been observed in local houses in Halji village (Figure 4). The horns are used by the villagers while conducting a special worship for their land. However, reports regarding the current presence of the species in the area are lacking and also the research teams did not record the species in either year, which supports the possibility of their local extinction.

Other ungulates: argali, kiang and blue sheep

In the *Chyakpalung* area abundant kiang aggregations comprising around 571 individuals during 2013 and an estimated 800 individuals during 2014 were recorded. Other documented ungulate species in the *Chyakpalung* area were argali *Ovis ammon* and blue sheep. During July 2013 three adult female argali accompanied by two lambs were sighted in a rocky hillslope (Figure 5). During July 2014 again a single argali was seen almost at the same location in proximity to an aggregation of approximately 50 kiangs (Figure 6). In *Ngin khola* blue sheep was the main recorded ungulate during both years, with one single kiang recorded only during 2014.

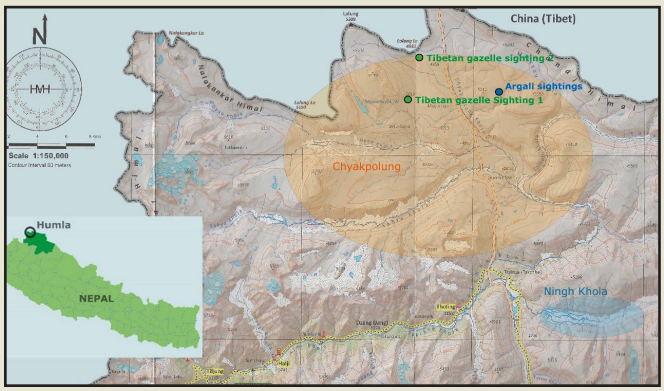

Figure 1. Study location in upper Humla with the sighting locations of Tibetan Gazelle indicated by green circles, and the sighting location of argali indicated by the blue circle. Kiang were observed within the entire Chyakpalung area which is indicated by the transparent orange eclipse, while for the second study site Ngin Khola, indicated by the blue transparent eclipse, blue sheep was the main observed ungulate species (Map modified from Himalayan Maphouse 2011 and Wikimedia 2014).

Figure 2 and 3. A group of six Tibetan gazelles at sighting location two during June 2014.

Figure 4. Horn of a Tibetan antelope in a local house in Halji village, Limi valley.

Figure 5. A group of three (only two visible) adult argali with two juveniles seen during July 2013. Sighting location at 81.6696°E, 30.3834°N, and 5033m above sea level.

DISCUSSION

Our documentation of Tibetan gazelle represents a distribution range update for the species in Nepal. Currently Nepal is not listed in the IUCN assessment as a range country for this species with conservation status 'Near Threatened' (Mallon and Bhatnagar 2008). However, the national red list series for Nepal reports the species from the central region of Nepal in *Korrala* and *Dhalung* in the Mustang district within the Annapurna Conservation Area (Jnawali et al. 2011).

Figure 6. One argali sighted in proximity to kiang in July 2014. Sighting location at 81.659695°E, 30.383391°N, and 5033m above sea level.

The Tibetan antelope is classified as 'Endangered' by the IUCN Red List with a decreasing population trend and expected regional extinction in Nepal (Mallon 2008). The lack of sighting reports from our study area during both research expeditions support the possibility of their regional extinction. However a more detailed study seems required to confirm this assumption.

The documentation of argali in this area also represents a distribution range update for the species in Nepal. The argali is IUCN red listed as 'Near Threatened' and the population size of argali in Nepal is unknown (Harris and Reading 2008). But the Nepalese population is assumed to be small with its presence only confirmed for the *Damodar Kunda* rangelands of Mustang district of Annapurna Conservation Area. The subspecies reported for this north-central region of Nepal is the Tibetan Argali Ovis ammon hodgsoni (Shrestha et al. 2005, Jnawali et al. 2011).

And finally also documentation of kiang represents a species distribution update for Nepal. Kiang are IUCN red listed as 'Least Concern' (Shah et al. 2008), but in Nepal they have been up to date documented only from Mustang district (Jnawali et al. 2011).

The entire *Chyakpalung* area contains an intact high-altitude alpine grasslands ecosystem which is inhabited by a diverse and specialized herbivore community and contains a rich flora. These facts combined with the absence of permanent human settlements render the area as of great potential for developing into a protected area in the future.

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The Antelope Community of the Deng Deng National Park, Cameroon

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Deng Deng National Park (DDNP) was officially created in 2010 in central Cameroon in the context of two major infrastructure projects: the Chad-Cameroon oil pipeline (CCOP) and the Lom-Pangar Hydropower Dam (LPHD). The construction of the 1,070 km long CCOP was completed in 2003; it transports crude oils from three fields in southwestern Chad to a floating facility 11 km off the Cameroon coast. In the late 1990, an environmental impact assessment (EIA) survey of the proposed pipeline route was carried out and it covered the Deng Deng Forest Reserve, gazetted in 1971 and located roughly halfway along the pipeline, in the center of Cameroon. This area is made up of rainforest and forest-savannah mosaic. The EIA survey noted the presence of significant populations of large mammals, in particular apes, elephants and large antelopes, in and around the Deng Deng Forest. A first formal survey carried out in 2002 by the Wildlife Conservation Society (WCS) confirmed the presence of large mammals. Several additional surveys carried out in mid 2000s in the framework of the EIA of the proposed LPHD provided additional data on the wildlife and highlighted the significance of the area in terms of biodiversity conservation. As a result, DDNP was proclaimed in March 2002 over an area of 523 km². The park was enlarged in April 2013 to include the Belabo Communal Forest to the south, bringing its current size to 682 km² (Fig.1). A small corridor was also proclaimed to connect the park with the adjacent logging concession (UFA 10-065). Technical assistance to the park was provided (under French Development Agency funding) by WCS from 2008 to 2013 and by BRLi consulting company (France) from 2014 onwards.

The park is located in the forest-savannah ecotone: 18 habitat types are recognized, from closed canopy forest to open savannah. The Lom River bisects the park and represents a major change in vegetation types: the southern sector of the park is extensively covered with rainforest while the forest encounters the savannah in the northern sector. Part of the forest of the former Belabo Communal Forest is old secondary forest. Comparison of forest cover over time (based on satellite images) has shown that the savannah is being colonized by young forest in the northern sector of the park.

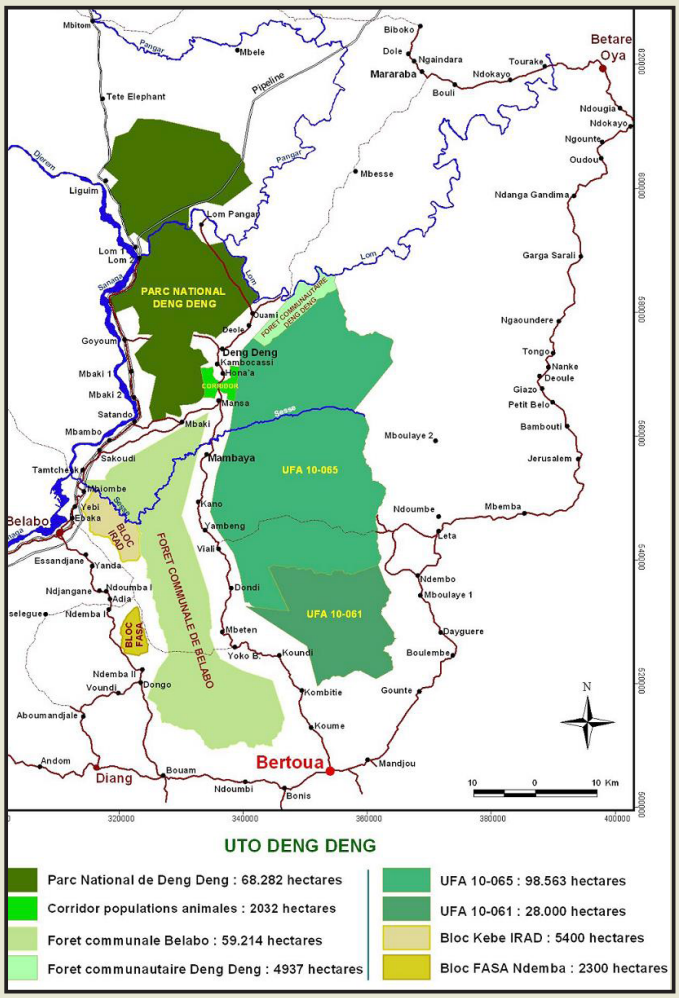

Fig. 1. Map of Deng Deng National park and adjacent land use unit (UFA = logging concession) (Source: WCS)

Fig. 2. The red-flanked duiker is found only in the northern sector of the park, in the forest-savannah mosaic. (Copyright: V. Rodriguez)

Formal large and medium size surveys were conducted by WCS in 2008 (287 km of transects), 2010 (131.5 km) and 2012 (59 km) in southern sector the park and northern sector of the logging concession (the northern sector of the park has been ignored so far because of the absence of gorillas). These surveys have shown that the antelope community is made up of four duiker species (*Cephalophus dorsalis, C. monticola, C. silvicultor and C. rufilatus*), three Bovinae species (*Tragelaphus spekei, T. scriptus, T. euryceros*) and the small forest species (*Neotragus batesi*) and water chevrotain (*Hyemoschus aquaticus*). The ungulate community also includes three Suidae species (*Phacochoerus africanus, Potamochoerus por-*

cus, Hylochoerus meinertzhageni). The red –flanked duiker *C. rufilatus* is represented in the PNDD by one of its southernmost area of occurrence in Cameroon (Fig. 2). The buffalo (*Syncerus caffer*) has not been observed during the surveys but informal information suggests that it might occur in the park's northern sector. Tracks and dung were found 10km east to the park boundary in 2005 (Montfort et al., 2005).

Fig. 3 and Fig. 4. The bongo is found throughout the park; it seems relatively common in its northern sector (north of the Lom river). These photos were taken in September 2014. (Copyright: V. Rodriguez)

Transect surveys have shown that antelope densities are generally low. All species combined, on average 0.7 antelope dung pellets per km was found in 2010 and 0.9 pellets per km in 2012. Encounter rates are generally higher in the park than in the adjacent logging concession. It is noteworthy that all the wildlife surveys have been conducted in the park's southern sector. Field visits suggest that the abundance of large and medium-sized mammals, including antelopes, is much higher in the remote northern sector of the park. In September 2014, a bongo antelope was observed for 30 minutes on the road that follows the border of that sector (Fig. 3 & 4). Other ungulates and monkey species with no sign of wariness are regularly observed on that road, suggesting that the hunting pressure is low.

Overall, poaching pressure in and around the park is high. In 2012, encounter rate of specific hunting signs in the park was 0.5 per km (0.6/ km in 2010). In December 2014, no less than 25 shotgun shells were collected over a 23.5 km of recce in the park. Poaching is made mainly with 12-bore shotguns and cable snares (Fig. 5). A total of 1,410 and 3,000 kg of bushmeat were confiscated in 2012 and 2013, respectively, by the park's anti-poaching team through vehicle control (bushmeat transport is made mainly by motor cycle). Monkeys, small-sized antelopes and medium-sized antelopes accounted for 42%, 19% and 14%, respectively of the total number of confiscated animals (Fig. 6).

Fig. 5. Bushmeat hunting is made mainly with traditional 12 bore shotguns and cable snares. (Copyright: V. Rodriguez)

Fig. 6. Monkeys and duikers account for the bulk of bushmeat confiscated. (Copyright: V. Rodriguez)

Law enforcement activities are carried out by a team of 11 guards under the supervision of the park manager. In the framework of the development of the first park's management plan, an anti-poaching strategy is being developed to improve the efficiency of anti-poaching team. In the coming year, new biodiversity surveys are scheduled, in particular in the PNDD 's northern sector, an area somewhat overlooked to date.

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The Red-fronted gazelle (Eudorcas rufifrons) in the Boundou Community Nature Reserve, Senegal.

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The Red-fronted gazelle (*Eudorcas rufifrons*) is a Sahelian migratory species which occurs in grasslands and open savannas, from Senegal to Sudan. This gazelle is listed as Vulnerable in the IUCN Red List, threatened by habitat degradation, competition with domestic livestock and poaching (UICN, 2008).

However, we are concerned that its conservation assessment as Vulnerable may be too optimistic. A continuing decline in their populations has been reported since the last assessment in 2008 and this trend has been confirmed recently in Niger and Chad (Ahmat Brahim Siam, Director of the Protected Areas in Chad, Hamissou Halilou Malam Garba, Head of Protected areas unit in Niger; personal communication, 2015). As a result, the Convention on Migratory Species has recently decided to include the red-fronted gazelle on CMS Appendix I (IUCN, 2014). Despite the rising concern of the scientific community for this species, there are still very few data and studies to help reassessing the red-fronted gazelle status and taking appropriate conservation measures.

In Senegal, the red-fronted gazelle is present in the Boundou Community Nature Reserve, a 1,200 km² protected area located in Eastern Senegal, between the Ferlo Reserve and Niokolo Koba National Park. In this Sahelo-Sudanian environment, the other ungulate species observed are mainly the common warthog (*Phacochoerus africanus*), common duiker (*Sylvicapra grimmia*), oribi (*Ourebia ourebi*) and roan antelope (*Hippotragus equinus*). The most frequent carnivores are spotted hyena (*Crocuta crocuta*) and common jackal (*Canis aureus*). Some felids are also present but rare, such as serval (*Leptailurus serval*), caracal (*Caracal caracal)*, lion (*Panthera leo*) and leopard (*Panthera pardus*).

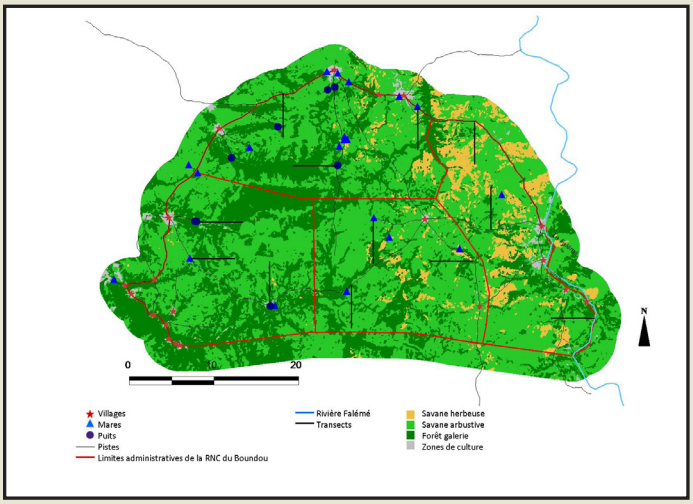
The Boundou Reserve, officially recognized as a Community Nature Reserve in 2009 by conversion of a tourist hunting area, is managed by local communities through an association (CORENA) with the support of the General Council of Isere (France) and the regional technical services. A technical team hired by the CORENA and a local eco-guards network are working together, implementing the area surveillance, wildlife monitoring and conservation actions. For several years, the red-fronted gazelle has benefited from closer attention to its status as it has been identified as an umbrella species for this reserve. A first survey of *Eudorcas rufifrons* based on foot transects was carried out in 2011, and this initiative developed subsequently into more general large mammal monitoring.

Currently, the survey is based on 12 foot transects of 5 km spread across the reserve. The transects were set up according to the different types of vegetation and the main water sources of the reserve in order to get a representative sample of the main habitats. This protocol is implemented with limited resources but is easily replicated 3 times a year (hot, rainy and cool seasons). The foot survey is conducted by local rangers, known as eco-guards, and technical advisers from CORENA. In 2014, the survey was carried out twice, once during the hot season (May) and once in the rainy season (July). Two camera-traps were also used in an opportunistic way during the dry season, but unfortunately one of them was destroyed by a spotted hyena. Finally, during the transects, fecal samples of red-fronted gazelle were collected and sent to the WildGenes Laboratory of the Royal Zoological Society of Scotland, for genetic analysis in order to assess the taxonomy of the different red-fronted gazelle subspecies.

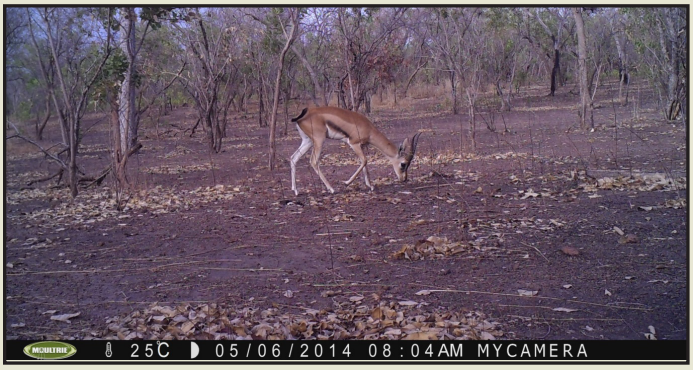
The preliminary results from last year's transect survey provided positive news about the local gazelle population. Results in 2014 indicate that the red-fronted gazelle is well distributed all over the reserve during the hot and the rainy seasons. The contact rate per kilometer is higher in the hot season than in the rainy season (1.97 indirect observations/km in May against 1.07 in July), and the species distribution pattern is different between these two seasons. In the dry season, *Eudorcas rufifrons* is located in every area of the reserve, even very far from the river Falémé, the only water source at this time of the year. In addition, these results emphasize the red-fronted gazelle distribution is largely independent of standing water, which conforms with observations in the W National Park, Niger (Rabeil, 2003). During the rainy season, the gazelles seem to avoid the center of the reserve, which is a denser savannah.

Compared to other antelopes, the red-fronted gazelle has been the most frequently recorded species (182 observations in 120 km) followed by the roan antelope (108 observations). These records were mainly indirect observations (98%). In addition, one camera-trap during a 25 day-period has given some additional promising results (see pictures below): one female with a juvenile and one male were photographed at the same place, between 6 and 8 a.m. A total of 6 events (a sampled 'event' is defined as any sequence of photos of one species at one site occurring within a half hour interval) was recorded on 25 days which is a good evidence that a larger camera array may be productive.

In conclusion, the preliminary results of this ecological monitoring has provided encouraging information about the red-fronted gazelle population in the Boundou Reserve, which can be considered a hotspot for the conservation of this species in Senegal and therefore also for the extreme west of the species range. More foot surveys will be carried out in 2015, and we aim to set up a grid of camera traps in order to establish the consistency of gazelle presence across the reserve derived from presence/absence matrices, and provide further information on time of the day activity pattern. Camera-traps would also give us some relevant data about the presence of nocturnal and/or rare species, which has still not be confirmed so far, as the honey badger (*Mellivora capensis*) or the aardvark (*Orycteropus afer*).



Localization of the 12 foot transects in the Boundou Community Nature Reserve, Sénégal.



A red-fronted gazelle (male) taken by a camera trap in the Boundou Reserve, Senegal

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Two red-fronted gazelles (1 female and 1 juvenile) taken by a camera trap in the Boundou Reserve, Senegal

Latest news of Cuvier's gazelle *Gazella cuvieri* (Ogilby, 1841) in northern Algeria

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Summary

Cuvier's gazelle is a species endemic to hilly areas of the Maghreb. It once reached the Mediterranean and Atlantic coasts in certain localities. The species is listed as Endangered on the IUCN Red List with a global population less than 2000 individuals. In Algeria, its historic distribution extended from the slopes of the Tell ranges in the north towards the more meridional ranges formed by the Saharan Atlas (De Smet, 1991).

A study of the distribution and population at the end of the 1980s, carried out by questionnaires and surveys, estimated the population at 445 individuals (Sellami et al. 1990). De Smet (1991) estimated 560 individuals, of which 235 were in the Tell Atlas, 140 in the Saharan Atlas, 135 in the east and 50 in the central group in Mergueb.

The first studies of the distribution and ecology de *Gazella cuvieri* were by Bourdjeli (1989), Sellami & Bourdjeli (1991), Bensafia (1998) and Sellami (1999) who identified the existing population in Mergueb Nature Reserve in the wilaya of M'sila. General information on the status, distribution, and natural habitats was compiled by Kowalski & Kowlaska (1990) and De Smet (1991).

The first information on the distribution and structure of Cuvier's gazelle populations living in the heart of the *wilaya* of Tiaret, situated in north-west Algeria (Figure, 1) were presented by Bounaceur *et al*. (2012, 2013).

This study reports the results of a survey mainly based on direct observations of Cuvier's gazelle in natural habitats in the Tiaret region, while setting out to:

-Track fluctuations and population structure of Cuvier's gazelle;

- Establish its distribution in the Tiaret region;

- Contribute to a conservation plan for this species, with a view to improving management of the species in our study area.

Results are based on analysis of data collected during forest conservation since 2006, and our information gathered between 2012 and 2013, and use analysis of photographs taken regularly of these populations in their natural habitats, supplemented by a survey conducted among local people.

First results

This survey shows that an important population of Cuvier's gazelle is found in the region of Tiaret and occupies nearly 38% of the communes of this *wilaya*, mostly located in the north and

north-west of the wilaya, except for a population which lives in the southern part of the massif of Nadhora.

Table 1: Number and percentage of age classes observed in *G. cuvieri* from 2006 to 2013

Age Classes	Number	Percentage
Young	9	4.76
Sub-Adults	14	7.40
Males	19	10.05
Females	54	28.57
Indeterminate	93	49.20

The population structure was established by synthesizing 8 years of data. The analysis showed almost 50% of unidentified mixed populations, followed by 29% females, 10% males, 7.4% sub- adults and only 4.76 % young.

A map of localities where this gazelle was recorded in the wilaya of Tiaret was developed, showing the main sites occupied, frequency of occurrence and population density. The main communes were identified and are mainly located in the north and west parts of the wilaya, in order of importance: Rahouia, Guertoufa, Oued Lili, Djillali Ben Ammar, Tachermart, Tagdamet, Macheaaar Es sefa, Frenda, Madroussa, Nadhora, Meghila, Dahmouni, Mahdia.

The geomorphology of Tiaret is varied; there is a mountainous zone in the north; high plains in the centre and semi-arid areas in the south. The *wilaya* undergoes two main sharply contrasting seasons during the year: A severe winter with frequent snowfall and a hot and very dry summer. The Tiaret region is classified as bioclimatically as semi-arid with a cold winter.

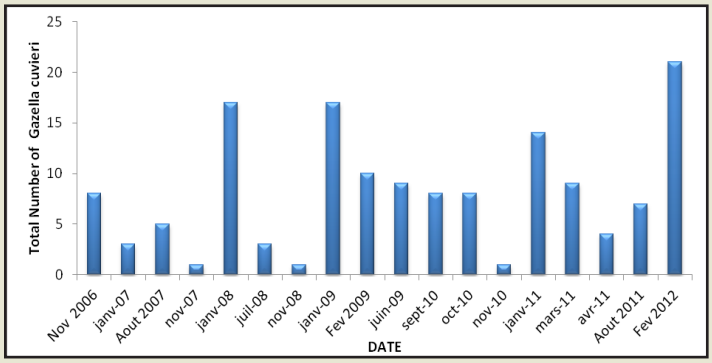

Figure 1: Overall analysis of the population structure of Gazella cuvieri *in the NE of Tiaret* wilaya.

Conservation measures are proposed to strengthen the conservation This is certain to be a long process, but could begin by prohibiting poaching and the study of urban development where Cuvier's gazelle could still live. Such development (roads, settlements) can become real obstacles with negative consequences for fauna and flora, causing:

- Direct mortality: loss of habitat through road construction and collision with vehicles.

- Fragmentation of range: when a road is constructed, the area of available habitat is reduced not only by the road itself, but also by disturbance (noise). When several linear obstacles are created, the habitat is reduced to smaller and smaller pieces. If the mesh becomes too tight, habitat patches become too small for the gazelle population to survive.

-Impossibility of exchange between populations: with increasing isolation, there is less movement of individuals between subpopulations and less genetic exchange, loss of genetic diversity leading to problems linked to inbreeding and weakening or even loss of subpopulations.

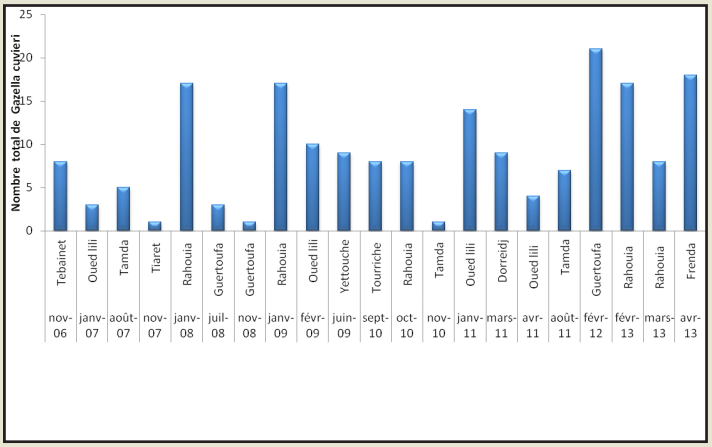

Figure 2: Distribution of populations of Gazella cuvieri *in terms of communes frequented*

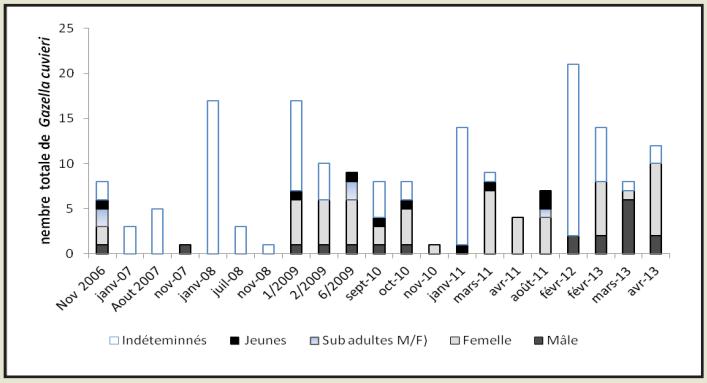

Figure 3: Population structure of G. cuvieri *established from the conservation data from 2006 to 2007 in the Tiaret region.*

It would be interesting to conduct systematic monitoring of Cuvier's gazelle populations in all communes and establish some demographic and eco-ethological parameters that have not been addressed here, and also to establish its geographic distribution in the rest of western Algeria, and to get better insight into the sustainable management of this species for the conservation of which our country bears a big responsibility in the short and medium term.

Female with a broken horn followed since 2006 (Photo: Sellami, M).

07 individuals surprised by our photo (Photo: Sellami, M).

4 G. cuvieri in a cereal field (Photo: Sellai.M).

17 G. cuvieri in a ploughed agricultural field (Photo: Sellami. M).

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Eritrea Reconnaissance

D. Mallon

1. Introduction

A short reconnaissance visit was made to Eritrea 13-21 September 2013 to meet staff of the Forestry and Wildlife Authority (FWA), discuss cooperation on antelope conservation planning and redlisting, and obtain recent information on antelope status. The visit consisted of a series of formal and informal meetings with FWA, a field visit to Semenawi Bahri National Park and Buri Biodiversity Conservation Area plus visitsto Asmara Zoo and the National Museum. Appendix 1 contains the detailed itinerary. The visit was funded by Zoo Landau, Germany and IUCN Antelope Specialist Group.

2. Field trip

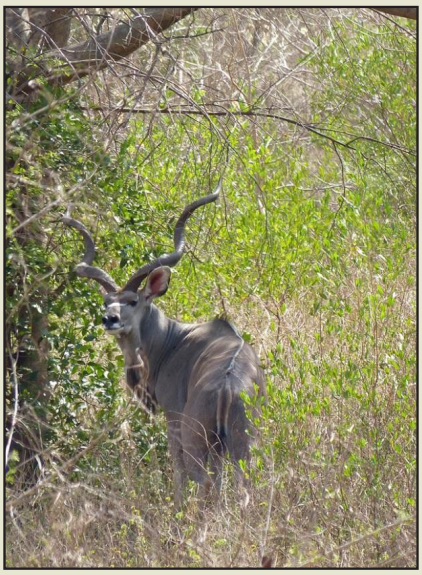
This consisted of a short visit to the two main protected areas containing antelopes within reach of Asmara (Fig. 1.). Participants were Sami Mesghina (FWA), DM, and Omar Ibrahim (driver).

14 September. From Asmara we drove north through an undulating, mainly farmed landscape before turning eastto the top of the escarpment and the entrance to Semenawi Bahri proposed National Park. The escarpment drops steeply from about 2700 m to the coastal plain. At the top there are some remnant fragments of montane juniper *Juniperus procera* woodland with hanging lichens and species of *Aloe*. Below is dense woodland dominated by *Olea africana* then mixed *Combretum-Anogeissus-Terminalia* communities.

At Filfil (an established picnic and bird watching stop) we hiked along a dry river bed lined with tall *Ficus*, *Rhus* and other trees. One adult male Greater Kudu was seen here, resting beneath a large fig tree and again later in dense *Olea* and *Rosa* scrub on the slopes above. According to FWA staff and local rangers, the species is regularly seen here. Below Filfil the road descended very steeply through increasingly dry woodland to *Acacia-Commiphora* dominated plains and thence to the port of Massawa.

From Massawa, we followed a rough track south-south-east along the coast, driving through a mosaic of gravel plains with *Acacia* and barren black basalt fields, round the Gulf of Zula to the village of Gale'allo at the base of the Buri Peninsula in the northern Danakil. Buri Peninsula lies within the Buri Biodiversity Conservation Area.

Male Soemmerring's Gazelles on Buri Peninsula



Male Greater Kudu at Filfil

Accompanied by the local ranger, Mohammed Salim, we surveyed Herai Gera (Rhino Plain) on Buri Peninsula.

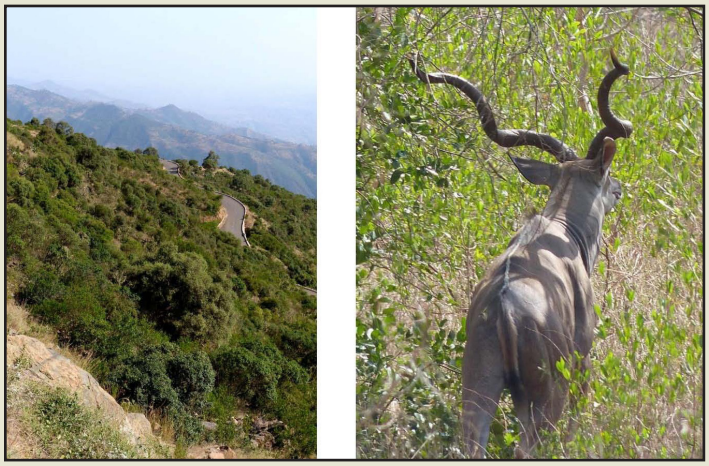
The terrain is low and flat and contains a mix of sandy, gravel-covered and saline patches. Also sparse clumps of trees, mainly *Acacia* and *Balanites* and others with grass tussocks. Five groups of Soemmerring's Gazelles were seen, totalling 26 animals (3, 2 males, a mixed group of 17, a female with one young, and 2 more males). Nine Dorcas Gazelles were also seen (3 males, 1, 1, 1, 3) as well as around 50 Somali Ostriches, Golden Jackal (*Canis aureus*) and Cape Hare (*Lepus capensis*).
Overnight in Gale'allo.

15 September: In the early morning we drove to a different part of Buri BCA with a broadly similarlandscape. Fourteen Soemmerring's Gazelles were seen, a bachelor group of 10 males and a mixed group of 4 (1 male, 2 females and a young). Thirty Dorcas Gazelles were also seen, in 7 groups (3 + 6 + 6 + 8 + 1 + 5 + 1). The groups of 6-8 were rather unusual, as this species is more often seen in small groups of 1-3.

According to the FWA and the local ranger, at this time of year the gazelles are dispersed widely over the area, while in winter they congregate in higher numbers in the Buri area to feed on green vegetation following the rains, when 50 or more can be seen at one time.

From Gale'allo we headed inland towards Burea to visit the Wongobo area that has been proposed as a protected area. Wongobo is a flat plain surrounded by low rocky hills and is covered in fairly dense *Acacia*.Soemmerring's Gazelles are reported to be present but none were seen on this visit. Return to Asmara by the main road up the escarpment, via Ghinda.

Aloes at the top of the escarpment



Escarpment at Semenawi Bahari Greater Kudu at Filfil

Map of Eritrea showing route of the field trip (red line)

3. Forestry and Wildlife Authority (FWA)
FWA previously formed part of the Ministry of Agriculture. It was recently established as an independent agency, reporting directly to the President's office, following the recognition by the government that forestry and wildlife represent important national assets. FWA is still based within the Ministry of Agriculture and works closely with it. The General Manager is Abraha Garza. It has three divisions: Wildlife (Director: Hagos Yohannes), Forestry and Wildlife Inspectors (Director: Ghebreghergis Siyum) and Forestry. The Wildlife Conservation Division has a Deputy Director (Futsum Hagos) and two other staff. Apart from Hagos & Futsum all staff in the Wildlife Division have not received training in wildlife management.

Eritrea has been severely affected by a long war of liberation that ended with independence in 1991, followed by war with Ethiopia 1998-2000. Sanctions imposed since 2009 have inflicted further damage on the economy. As a result, FWA is under-resourced in terms of staff, funding and equipment. One important source of support is IUCN Equid Specialist Group.

Field surveys are hindered by the limited availability of transport from the government pool and cost of fuel. There is no central database or GIS mapping resources for recording antelopes and other species. The available information is fragmentary and several important reports are unpublished and not easily available.

Protected areas: There are four important protected areas containing antelopes, each of which has inspectors (rangers) who patrol on foot or by camel and have the power of arrest.

Dahlak Marine National Park (2658 km^2) includes Dahlak Kebir Island which contains a largepopulation of Soemmerring's Gazelle.

Buri Biodiversity Conservation Area (BCA) covers about 2500 km^2 in the northern Danakil and contains good populations of Soemmerring's and Dorcas Gazelles. It includes the Wongobo area. Since 2013 this has been renamed as Buri–Irrori-Hawakil Protected Area and extends up to the Bada area, 90 km south-west of Ghelalo.

Kerkebet area is also endowed with good numbers of Sommerring's and Dorcas Gazelles and the area also harbours some Red-fronted Gazelles

Semenawi Bahri National Park is situated on the escarpment north of Asmara and protects the only substantial remaining area of mixed subtropical evergreen woodland in Eritrea. The size is unclear, but the Important Bird Area (IBA) of the same name covers 1300 km^2 (Coulthard 2001). It harbours Greater Kudu, Bushbuck and Klipspringer.

There is little information available on the current status of Gash-Setit Wildlife Reserve (709km^2), Nakfa WR (1639 km^2) and Yob WR (2658 km^2). The Gash-Setit Elephant Corridor (c. 120 km in length) has been proposed for protected area status.

Qoahito Cultural Landscape (32 km^2) in the southern Danakil is on the tentative list of World Heritage Sites. Buri and Semenawi Bahri are also being considered for proposal as World Heritage sites.

At the FWA. Left to right: Hagos Yohannes, Futsum Hagos, David Mallon, Abraha Garza, General Manager

4. Other institutions and resources

The National Museum has a collection of zoological specimens. Unfortunately, the museum was undergoing renovation at the time of the visit so it was not possible to see most of the specimens or the cataloguing system.

The Ministry of Agriculture has a small Zoological Museum. This is currently more of a storage facility and specimens are not all clearly displayed and labelled.

Asmara Zoo is a very small facility and does not contain any antelopes. The cages are also small and primitive and conditions for the few animals in the collection are very poor.

5. Current status of antelopes

The status of antelopes in Eritrea was summarised by Hillman (1988) and East (1999). Yohannes (1993) and Butynski (1995) also provided reports but these are unpublished and not easily obtainable. The most detailed study carried out in Eritrea so far is on the Soemmerring's Gazelles of Dahlak Kebir island (Yohannes 2004).

Field surveys have been limited in recent years by a series of factors, including lack of capacity, equipment, transport, civil war, economy and sanctions. The gazelles on the Buri Peninsula in the northern Danakil are the best known antelope populations. There have been only limitedrecent surveys in Gash Barkain south-west Eritrea and Kerkebet in the north-west. Both areas formerly contained important antelope populations. The summaries below are based on discussions with FWA staff, in particular Hagos Yohannes and Futsum Hagos.

Soemmerring's Gazelle *Nanger soemmerringi* (Tigrinya -telbedu;Afar – bis-adu) Soemmerring's gazelle was formerly distributed widely across Eritrea. It is still present in the Danakil (Dankalia) region, especially Buri Peninsula, on the Dahlak Islands, and in other areas. Numbers on DahlakKebir are estimated at perhaps 4000-4500, but there is no overall estimate for the country. On the mainland, FWA considers that the largest population is in Buri Biodiversity Conservation Area, including Wongobo. Numbers are probably stable in places, though may fluctuate depending on rainfall in January-March: when the rains are adequate, all females can give birth, but occasionally there is little or no rain so few females give birth. The Soemmerring's gazelle population on Dahlak Kebir must be the largest single population anywhere in the global range and Eritrea is likely to be the stronghold for this species.

The Dahlak gazelles are smaller than those on the mainland. A recent study measured 35 skulls and showed that they were clearly smaller and different in shape to those of other forms of this species (Chiozzi et al. 2014). According to villagers, Soemmerring's gazelles have been on the island 'since time immemorial' and they were reported by travellers in the 1820s. It is not known if their presence results from anearly introduction, or they colonised at a much earlier time of lower seas levels.

The environment is harsh and there is no permanent fresh water on the island. Post-rains flush of green growth occurs in most years and some acacia trees provide shade. The gazelles will eat leaves of mangroves and may be seen foraging with goats. In very hot conditions they are seen on beaches and sometimes wade into the sea up to knee-depth. The local people protect the gazelles, despite the fact that they gain nothing in return.

Dorcas Gazelle *Gazella dorcas pelzelni* (Tigrinya -erab; Afar -wa'edheri) Widely distributed (see e.g. East 1999).The stronghold remains the Buri Peninsula. Dorcas gazelles are also found at Kerkebet in the north-west. Regarded as not uncommon in Buri, but no overall population estimate is available.

Red-fronted (Heuglin's) Gazelle *Eudorcas rufifrons tilonura* This gazelle is considered to be a full species, *E. tilonura,* by some authors, including Mammals of Africa (Kingdon & Hoffmann 2013). In Eritrea, it probably now occurs only in small numbers around Kerkebet in the north-west, but there is little recent information. Local people use the same word for this species and for dorcas gazelle. This species/subspecies has a restricted global range on the eastern side of the Blue Nile, in Eritrea, NW Ethiopia and adjacent areas of Sudan, where it now occurs in low numbers and in small isolated patches of remaining habitat (Hashim 2013).

Greater Kudu *Tragelaphus strepciseros* (Tigrinya -agazen) Formerly distributed all along the escarpment and is still present at Semenawi Bahari, north of Asmara, where it is regularly seen by visitors at Filfil. This may be the most northerly current locality in the species'entire range. In the 1940s-1950s, Semenawi Bahri may have held the highest concentration of greater kudu in East Africa.

Tora Hartebeest *Alcelpahus buselaphus tora* (Tigrinya -wedumbi) This subspecies is restricted to western and south-western Eritrea, north-west Ethiopia and bordering areas of Sudan. There have been no recent records in Eritrea, and when Hagos Yohannes showed photographs of the animal to local people in Gash Barka, they did not recognise it. A hartebeest head in the National Museum of Er-

itrea appears to be a specimen of tora on the basis of its red-brown colour and horn shape, but is labelled 'kongoni', the name applied to *A. b. cokii* from southern Kenya-northern Tanzania. No photos are allowed in the Museum, which was undergoing renovation work so it was not possible to obtain further details. Tora hartebeest was regarded as possibly extinct in Sudan by East (1999) and no evidence was obtained on a preliminary survey of Alatish NP and other parts of NW Ethiopia by Heckel et al. (2007). Given the lack of records from its former range, it is very possible that tora hartebeest is now extinct.

Klipspringer *Oreotragus oreotragus* (Tigrinya -sesaha) Occur along the escarpment.

Salt's Dikdik *Madoqua saltiana* (Tigrinya – enshu; Afar –sigro, sigheri) Not seen in the northern Danakil during the field trip despite the habitat appearing suitable. According to Hagos Yohannes, this species is not very common in Eritrea.

Bushbuck *Tragelaphus scriptus* Reported at Semenawi Bahri and possibly occurs elsewhere, including Gash Barka.

Beisa Oryx *Oryx beisa* Mapped in northern Eritrea by Hillman (1988) but there are no recent records. FWA has very little evidence of its occurrence and believe it may have become extinct during the 1960s.

Waterbuck *Kobus ellipsiprymnus* and Bohor Reedbuck *Redunca redunca* Formerly present in Gash Barka. There is no information on their present status.

6. Conclusions

Eritrea has an important role in antelope conservation since it contains:

• the largest population of Soemmerring'sGazelle anywhere within the global range;
• a significant part of the range of Heuglin's Gazelle *E. [r] tilonura*;
• an important population of Dorcas Gazelle;
• the last known locations for Tora Hartebeest;
• isolated populations of Greater Kudu and Klipspringer.

Senior staff within FWA are highly committed and experienced, but they are few in number. There is an urgent need to provide the other staff with appropriate training in wildlife management; to expand their numbers where possible; and to increase the capacity of FWA to carry out field surveys, assessments, and strategic planning by training in the most up-to-date methodologies and techniques and provision of essential equipment.

This will require a central recording programme and database, linked to GIS, standard recording protocols and data forms and a nation-wide recording scheme, based on the existing zobas.

From the Archives

.Short historical accounts of antelopes. The Dibatag is one the least well-known of all antelopes; this extract contains some interesting details on its behaviour.

List of mammals from Somaliland obtained by the museum's East African Expedition.

by D. G. Elliot, F. R. S. E.
Field Columbian Museum Publication 19. Zoological Series. Vol. 1, No. 6. June, 1897.

***Ammodorcas clarkei* Clarke's gazelle**

"This rare species is only met with in the country south of Toyo Plain, and then eastward to the land of the Dolbahanta. It does not seem to be very numerous even in the localities it frequents, at least that was our experience, and we found it to be the most wary and difficult of approach, of all the animals we hunted. It is not easily seen among the bushes, and it has the habit of concealing its body behind some bush, and looking at you over the top, which its long neck readily enables it to do. The neck is so slender and the head so small and pointed, and its peculiar purplish-gray glossy coat matches the high grass so well, that the animals are almost invisible, and it takes one quite a little while at times to distinguish them. Then they know at once when you discover them, and are off, and present so small a mark that they are very difficult to hit. At a distance when they stand facing one, the neck does not look wider than a twig, and one has to shoot very straight indeed to secure a specimen of this wary, active species.

v

Although very different in appearance from Waller's Gazelles (*Litocranius walleri*) when brought close to each other, yet at a distance it is not always easy to distinguish them if not in motion. But the moment a Dibatag starts to run there is no mistaking the species to which it belongs, its movements being so entirely different. Instead of the low, slouching gait of Waller's Gazelle, the Dibatag bounds away with head and tail well up, the former inclining slightly towards the latter, clearing the bushes at every jump in the manner of the Lesser Koodoo (*S. imberbis*). I have never seen it carry its head and tail when running so that they nearly touched each other, as some writers have described, but on the contrary the tail is carried straight up in the air, and this alone, from its length, would at

once distinguish the Dibatag from the Gerenuk at any distance. It has the long neck and peculiar physiognomy of the Gerenuk, both considerably giraffe-like, and the two species inhabit the same kind of country, but I have never seen them associated together.

As mentioned by Swayne, it frequents the jungle of the umbrella mimosa, and glades of dur- grass, often taking refuge in dense high patches of this last, especially when wounded. The horns of the male are peculiar and shaped more like those of a reedbuck, and measure from 8 to 11 inches along the curve. The female is without horns. The Dibatag is a gracefully formed, beautifully colored animal, and possesses more sporting qualities than any antelope we met with, unless it might be the two species of Koodoo, particularly the lesser Koodoo.

Roof of cranial cavity convex from rear of pedicles to supraoccipital, the slope being very considerable from anterior to lambdoidal suture to the posterior extremity of the skull. Interparietal rather large; facial portion flat, descending rapidly at the posterior part of the orbits, and retaining its width to the posterior edge of first molar, when it narrows rapidly to the premaxillae. Orbital vacuity considerable, pointed posteriorly and rounded anteriorly. Lachrymal fossa deep and occupying the surface of the lachrymal, its length being about one-halt the diameter of the orbit. Nasals flat on top, slightly rounded at the sides, and pointed both anteriorly and posteriorly. Premaxillae very long, rather broad, curved upwards at their posterior end, and joining the nasals, where the articulation is very broad. Pedicles only moderately high, the base of the horns elevated slightly above the plane of the skull. Orbits very large. Paroccipital process long, curved inward at tip, and hanging well away from and below the auditory bullae. These last are only moderately large, the extreme width equal to one-half the length, and oval in form. External auditory meatus prominent, tubular. Pterygoids rather short, broad above, ending below in a hamular process projecting backwards. Palatine of moderate extent, posteriorly deeply notched, this last beginning with a narrow slit and widening towards the pterygoids. Mandible long and slender, in this respect resembling that of Lithocranius walleri; the condyle is broad and flat, the coronoid process long and narrow, and curved backwards, angle partially rounded extending considerably beyond the condyle and coronoid process. Tooth row extending over one-half the length of upper line of mandible, premolars small, molars large, occupying more than twice the space of premolars. Horns in shape like those of the reedbuck, deeply annulated on lower half, graduating to a point, which tends upward and slightly forward".

Recent Publications

The northern coastal forests of Kenya are nationally and globally important for the conservation of Aders' duiker *Cephalophus adersi* and other antelope species

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Abstract
Aders' duiker *Cephalophus adersi* is a critically endangered small antelope endemic to the coastal forests of east Africa. Threatened by habitat loss and hunting, the species was until recently known to persist only on Zanzibar, Tanzania, and in the Ara¬buko-Sokoke National Reserve, Kenya. However, more recent observations, have con¬firmed the occurrence of Aders' duiker in Kenyan coastal forests north of the Tana River. This paper reports systematic camera trapping results for three sites in the Boni–Dodori coastal forest system north of the Tana and the only other known mainland site for Aders' duiker, the Arabuko-Sokoke forest. From a total survey effort of 5,723 camera trap days, we demonstrated that the known area of occurrence for Aders' duiker has more than doubled with occupancy values at or close to 100 % for all three northern sites. An index of relative abundance for Aders' duiker was also one to two orders of magnitude greater at these sites compared to Arabuko-Sokoke. Application of a replicate count N-mixture model to camera trap data from Boni National Reserve resulted in an estimate of 7.3 Aders' duikers/km^2 (95 % CI 4.5–10.1/km^2). The results also indicate higher densities of suni Nesotragus moschatus and Harvey's duiker *Cephalophus harveyi* in the northern forests relative to Arabuko-Sokoke. Blue duiker *Philantomba monticola* was recorded at low density in Arabuko-Sokoke forest but not detected at the northern sites. These findings significantly improve the conservation prospects for Aders' duiker and highlight the global importance of the northern coastal forests of Kenya.

Keywords
Aders' duiker . Arabuko-Sokoke National Reserve . Boni–Dodori forest . Camera-trap . Harvey's duiker . Suni

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Camera trap images of Aders' duiker at one location in Boni National Reserve labelled by date and time. Adult female and calf (left) and adult male (right). Note established scent mark (dark patch just below the fork on the sapling), effect of infrared illumination on duiker appearance (lower images) and role of spot pattern on legs for individual recognition.

The polyphyly of Neotragus - Results from genetic and morphometric analyses Mammal. Biol. (2014)

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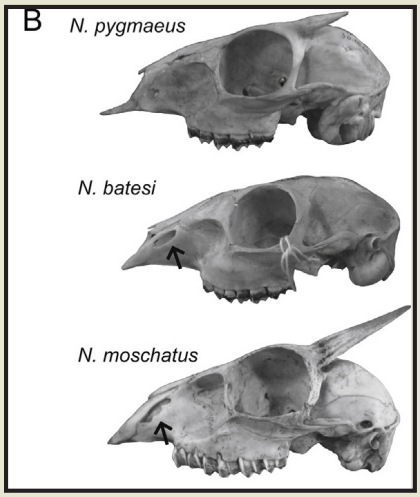
Abstract
Dwarf antelope species were commonly united in the tribe "Neotragini" (Bovidae, Mammalia) due to their general morphological appearance. However, phylogenetic analyses have shown that not all dwarf antelopes are closely related, so it was suggested to restrict the name Neotragini to the type genus *Neotragus*. In our study we use mitochondrial cytochrome *b* sequences and linear skull measurements to further investigate the similarity of all three *Neotragus*species. Our analyses support the close relationship of *N. moschatus* and *N. batesi.* However, *N. pygmaeus* – the type species, which was never before included in phylogenetic analyses – is not closely related. It might share a most recent common ancestor with another "dwarf antelope", the Klipspringer *Oreotragus oreotragus*, and the duikers in the taxon Cephalophini. Hence, we suggest resurrecting the genus *Nesotragus* von Dueben, 1846 for *Nesotragus moschatus* and *N. batesi*.



Keywords
Neotragus; Cytochrome *b*; Principal component analysis; Discriminant analysis; Skull morphology

Distribution and genetic diversity of the Endangered Abbott's duiker *Cephalophus spadix* in the Udzungwa Mountains, Tanzania

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Online at: http://www.int-res.com/abstracts/esr/v24/n2/p105-114/

Astract
Abbott's duiker *Cephalophus spadix* is a forest antelope endemic to a very few highland forests in Tanzania. Apparently extinct over much of its historical range, the species is listed as Endangered by the International Union for Conservation of Nature based on its rarity and its known current distribution in only 5 isolated upland areas: Kilimanjaro, Southern Highlands, West Usambara, Rubeho and Udzungwa Mountains. In contrast to the situation in the rest of its range, Abbott's duiker is relatively well documented and locally abundant in parts of the Udzungwa Mountains, which may now be the only stronghold for the species. We review the distribution of Abbott's duiker within the Udzungwa Mountains and present new information based on the non-invasive genetic identification of dung piles collected from the majority of forest blocks between 2006 and 2010 (73 confirmed dung samples).

Cephalophus spadix. Abbott's duiker photographed in Mwanihana, Udzungwa Mountains National Park, Tanzania

Our results include new records from outlying forest blocks where the presence of Abbott's duiker was previously unknown. Moreover, we present the first population-level analysis of genetic structure and diversity in this endangered species based on nuclear microsatellites and mitochondrial sequence data. While these genetic results are limited due to small sample sizes, they indicate differentiation from other Abbott's duiker populations, as well as low genetic diversity relative to sympatric antelope species. Finally, we discuss threats to Abbott's duiker and identify broad trends within the differently managed Udzungwa Mountain forests, and elsewhere, that suggest potentially successful conservation strategies for this neglected species.
Keywords
Eastern Arc Mountains · Faecal DNA · Phylogeny · Camera-traps · Duikers

Genetic identification of endangered North African ungulates using noninvasive sampling

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Abstract
North African ungulates include several threatened and emblematic species, yet are poorly studied mainly due to their remoteness and elusiveness. Noninvasive sampling provides a useful approach to obtain ecological and genetic information essential to guide conservation actions. The very first and most important step in conservation planning is to accurately identify species, and molecular genetics has been proved to be a useful tool. Several molecular genetics protocols are available for species identification, even for samples with poor quality DNA, such as faeces, hairs or bones. Most of these protocols use mitochondrial DNA for barcoding despite this marker being especially prone to problems, including mtDNA introgression, nuclear insert copies, high intraspecific diversity or heteroplasmy. In this work, we developed a molecular method based on polymorphisms in small fragments of the mitochondrial cytochrome b (cytb, mtDNA) and the nuclear kappa casein genes (KCAS, nDNA) for identifying endangered North African ungulates. These fragments revealed polymorphisms, including species-specific variation, which allowed species identification of nine ungulate species that co-occur in North Africa. The method was validated across more than 400 samples, including different types of noninvasive samples collected in the field. The simplicity, high reliability and relative low cost of the described method make it a promising tool to improve ecological studies of the North African ungulates and consequently, the implementation of more efficient management and conservation plans for these endangered ungulates.
Keywords
Conservation genetics, cytochrome b, deserts, gazelles, kappa casein, molecular method, species ID

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Observations on dry season grazing by eland in a Magaliesberg Nature Reserve, South Africa

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Article can by found online: http://onlinelibrary.wiley.com/doi/10.1111/aje.12164/abstract

Introduction

Eland(*Taurotragus oryx*) have been described as browsers or mixed feeders (Lamprey, 1963; Kerr, Wilson & Roth, 1970; Field, 1975; Nge'the&Box, 1976; Watson& Owen-Smith, 2000; Cerling, Harris & Passey, 2003; Codron *et al*., 2005; Wallington *et al*., 2007). In southern Africa, they are described as browsers during the dry season, switching to grazing only on new growth grasses after the rains (Kerr, Wilson&Roth, 1970; Buys, 1990; Fabricius& Mentis, 1990; Watson & Owen-Smith, 2000). However, Gagnon & Chew (2000) reported annual diet of eland in East Africa to contain up to 50% of monocotyledons, and other authors suggest that eland switch from browsing to grazing year round depending on local food availability (Hofmann, 1989). It has therefore being suggested that diet composition may vary between different eland popu¬lations in different geographic regions, with east African populations consuming a larger annual amount of grasses than southern African populations (Sponheimer *et al*., 2003; Codron *et al.*, 2007), and within each geographic range vary due to local area vegetation composition and forage availability (Wallington *et al.*, 2007).

Contrary to the previous studies carried out in South Africa, eland in the Kgaswane Mountain Reserve have been observed grazing during the dry season. Hence, the aim of this note is to quantify the relative use of grass and browse during a period when potential competition with grazers over limiting resources is at its highest.

Eland select for plants with the highest available protein/fibre or leaf/stem ratios (Kerr, Wilson & Roth, 1970; Watson & Owen-Smith, 2000; Jessen, Laubscher & Kölling, 2004a) and therefore were expected to feed on the greenest forage available. We therefore expected to observe mostly browsing events, but here we report on eland that included grass species in their dry season diet.

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Does Supplemental Feeding Affect Behaviour and Foragingof Critically Endangered Western Giant Eland in an *ex situ* Conservation Site?

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Abstract

The western giant eland (*Tragelaphus derbianus derbianus*) needs appropriate management for its survival. We measured the effects of supplemental food on activity and browsing patterns during seasons of scarce natural food resources in 2008 and 2009 for a herd of six animals in the Fathala Reserve (Senegal). In response to the provision of high-quality pods of *Acacia albida*, animals reduced foraging time in 2008 and allocated it to resting. This pattern corresponds to the animals' behaviour in captivity without foraging *versus* vigilance trade-offs and with predictable (in time and space) access to food. In 2009, supplemental feeding had no effect on behaviour and was associated with increased foraging and ruminating times than in 2008, suggesting more limited natural food resources in 2009.We recorded high species diversity in the animals' natural diet. Supplemental food did not induce changes in browsing pattern at the plant species level, probably due to small individual effect on total nutrient and energy intake. Food supplementation, however, facilitates the animals overcoming unfavourable conditions or alleviates stress with additional rest, and could therefore assist as a conservation intervention to enhance fitness.
Key words: diet composition, large herbivore, *Tragelaphus derbianus*, West Africa, wildlife management.

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Resource use and the nutritional status of sable antelope in the Okavango Delta region of northern Botswana

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Abstract
The resource-use patterns and nutritional status of sable antelope herds were investigated in the Okavango Delta region of northern Botswana for comparison with those documented for declining sable antelope populations elsewhere in southern Africa. GPS collars recorded the relative use of floodplain, upland and wooded grassland habitats by the sable herds while VHF beacons facilitated locating the herds for direct observations on feeding Surprisingly, the sable herds made greatest use of upland grasslands, rather than the floodplain grasslands exposed after floodwater had receded, during the dry season months. In the upland grasslands, they exploited tall, fibrous grass species that retained quite high levels of greenness through the dry season. This ability, together with partial use of the floodplain and some browsing onnew leaves and flowers, helped maintain dietary nitrogen and phosphorus levels, as indicated by faecal nutrient levels, above maintenance thresholds through the dry season. Hence, the sable herds in the study region did not seem to be limited nutritionally under the rainfall and flooding conditions prevailing during the study.

Key words
Botswana, *Hippotragus niger*, nutritional status, Okavango Delta, resource use

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Habitat suitability modelling and implications for management of roan antelopes in Kenya

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Abstract
The roan antelope is locally endangered in Kenya with <50 individuals remaining in Ruma National Park (RNP). An understanding of the habitat requirements is essential to formulate habitat management strategies for species recovery. This study identifies habitat and management features affecting roan distribution in different seasons using information-theoretic and multimodel inference (MMI) techniques. MMI averaged models were coupled with GIS data to develop habitat suitability maps. Results showed that roan habitat suitability is determined by different factors in different seasons but overall habitat was more important than management. Best predictors of roan incidence were wooded grassland, open grassland and water points. Water was more significant in the dry seasonwhilst vegetation burned status, slope, soil type, distances to snares, park fence and security gates were important predictors at other seasons. Receiver operating characteristic (ROC) plots confirmed that the models fitted well to the data (AUC>0.9). Sustainable conservation of roans in RNP can be achieved via long-term habitat management including prescribed burning and construction of more water points and short-term urgent solutions to key management issues, especially control of poaching.

Population status and distribution patterns of puku (*Kobus vardonii* Livingstone, 1857) in Kasanka National Park, Zambia

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Introduction
The puku (*Kobus vardonii* Livingstone, 1857) is a medium-sized member of the Reduncini (Bovidae) with a golden-yellow coat with horns in males only and distributed along rivers and lakes in south central Africa (Jenkins, 2013). This is a common species in pro-

tected areas in Zambia, but recent population estimates are lacking; East (1998) presented the latest figures. Kasanka National Park (KasNP; 390 km²) is run by the Kasanka Trust Ltd. and is situated in the north of the Central Province of Zambia. Woodlands, especially miombo woodlands, cover 70% of KasNP but are interrupted by grasslands, that is, papyrus swamps, dambos and floodplains (Kennedy *et al*., 2008). In KasNP, data for the last study about puku in Zambia were collected in 1994 (Goldspink *et al.*, 1998). I (re) investigated this population with regard to numbers, population structure and distribution to assess possible changes and to provide new information about puku in Zambia.

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Synthesising bushmeat research effort in West and Central Africa: A new regional database

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Abstract
Unsustainable hunting threatens both biodiversity and local livelihoods. Despite high levels of research effort focused on understanding the dynamics of bushmeat trade and consumption, current research islargely site specific. Without synthesis and quantitative analysis of available case studies, the national and regional characteristics of bushmeat trade and consumption remain largely speculative, impeding efforts to inform national and regional policy on bushmeat trade. Here we describe the structure and content of the West and Central African bushmeat database which holds quantitative data on bushmeat sales, consumption and offtake for 177 species from 275 sites across 11 countries in two regions, spanning three decades of research. Despite this wealth of available data, we found important biases in research effort. The majority of studies in West and Central Africa have collected market data, which although providing a useful record of bushmeat sales, are limited in their ability to track changes in hunting offtake. In addition, few data exist for West Africa, and few studies have tracked changes over time, using repeat sampling. With new initiatives in the regions to track bushmeat hunting, this database represents an opportunity to synthesise current and future data on bushmeat hunting, consumption and trade in West and Central Africa, identify gaps in current understanding, and systematically target future monitoring efforts.

Keywords
Conservation, hunting, exploitation, wild meat

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Antelope in the News

Early records of Jentink's and zebra duikers from Guinea
by D. Mallon

These two rare duikers are endemic to the Upper Guinea Forest and for a long time were known only in Liberia and Côte d'Ivoire. Their occurrence in Guinea was reported by Brugière (2012)[1] at four sites in the extreme south-east of the country. In fact, two of these records date back to the 1990s and are contained in a 1994 forestry project report by Dr W. Bützler that has been largely overlooked.

An English translation of the accounts of the two duikers is presented below in order to make the information more widely available (thanks to ASG member David Brugière for making a copy of the report available). The two sites concerned are Ziama Classified Forest (now Biosphere Reserve) and Diécké Classified Forest.

Bützler, W. 1994. Inventaire des Mammifères des Deux Massifs Forestiers Ziama and Diécké. Rapport Technique. Annexe III. PROGERFOR, Sérédou, Guinea.

Cephalophus jentinki / Jentink's Duiker
Present but very rare in the two forest massifs. In Ziama, two confirmed observations: one by the hunter Barré SOROPOGUI from Gboda, who saw this animal about 5 years ago, while descending the slopes of the mountains east of the village of Dopomai, and another by Diagnan KOIVOGUI, who was based at Gboda in 1992 as a forest warden, in March this year, at almost the same place, on the Gboda-Dopomai track near to the latter village. The species is also known to the hunters of Tilibayé, where it is said to be rare in the Kahourayé mountains north-east of the village. In Diécké Forest, the species is known to hunters of Nonhana and Yossonou. The species is monotypic and endemic to a very confirmed restricted area of distribution in Liberia and Côte d'Ivoire. The records here by PROGERFOR for Ziama and Diécké are the first for Guinea. The species is probably the rarest of all the large forest mammals in Guinea and is completely protected by law.

Cephalophus zebra / Zebra Duiker

One complete skin in good condition collected by BÜTZLER at Soundédou on 30/01/95. The animal was caught in a steel snare to the north of Soundédou, near the [Ziama] classified forest, 1 km east of the track from Massadou by a very old hunter in December 1994. He confirmed that it was the first time he had seen such an animal. FIRST RECORD FOR GUINEA of this species, hitherto known only from Liberia and Côte d'Ivoire.

[1]Brugière, D. 2012. Identifying priority areas for the conservation of antelopes in the Republic of Guinea, West Africa, using the complementarity approach. *Oryx* 46: 253-259.

Mongolian gazelle (*Procapra gutturosa*) horns seized in China

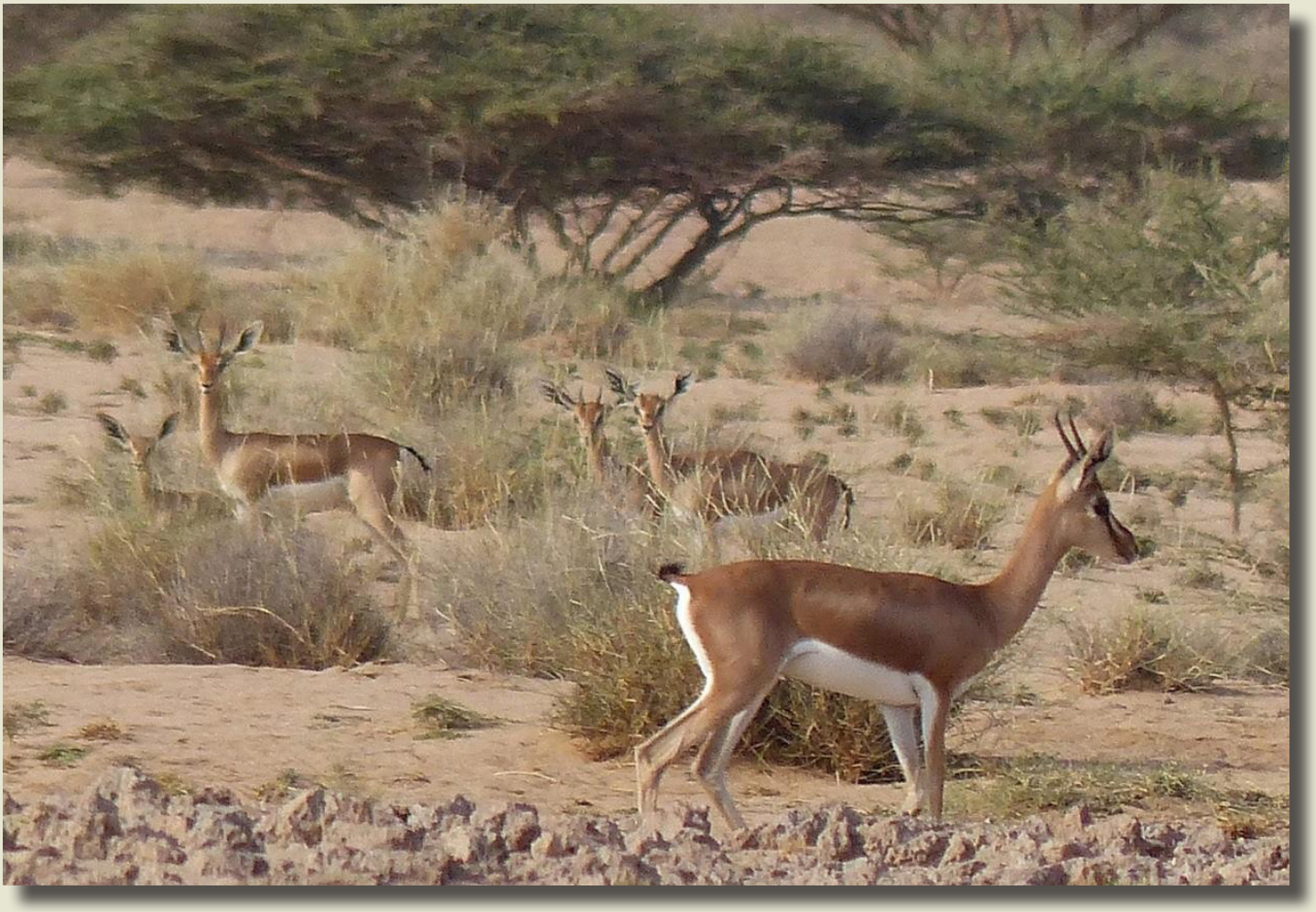
On 17 October 2014 the People's Daily twitter feed reported that customs officers in Hohhot (in Inner Mongolia) had seized 14,597 Mongolian gazelle horns, described as the most valuable animal product smuggling into China in years.
https://twitter.com/pdchina/status/523117067520974848

Confiscated Mongolian gazelle horns

Saiga Die-off

In late May 2015, a mass die-off saiga antelope occurred in the largest population in Kazakhstan. The Ministry of Agriculture has repoted that at least 120,000 animals have died so far, representing about 35% of the global population. An international team of veterinary experts is working with the Kazakh authorities and local NGOs to investigate the cause of the outbreak. For a detailed report: http://www.unep.org/newscentre/default.aspx?DocumentID=26816&ArticleID=35061 An update on the situation will be published in the next issue of Gnusletter.

Credit Kazakhstan's Ministry of Agriculture, via Reuters



Dorcas Gazelles on Buri Peninsula *photo by David Mallon*

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