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Lessons from the Capture and Collaring of the Critically Endangered Hirola Antelope in Ijara, Kenya; A Progress Report

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Summary

To better inform conservation efforts, we initiated work on the demography, habitat selection, and movements of hirola (*Beatragus hunteri*) in Ijara District in 2011. As part of this effort, we captured nine adult females (>3 years old) from herds at the periphery of this species' historic geographic range in Arawale and the Burathagoin grazing fields of Ijara District. From August to December 2012, we fitted GPS collars on nine females from seven different herds (mean herd size = 7 ± 2 SE, range = 5-11) to relocate associated individuals and to estimate demographic parameters. GPS radiocollars (Vectronic Aerospace) are set to record one location every three hours for the next 3 years. Iridium satellite communication permits us to track herds within 24 hours of movement. Once per month, we are relocating animals visually from the ground to record survival, recruitment, and age structure; we are comparing these data to those from herds occupying 1) a predator-proof sanctuary in Ishaqbini Community Conservancy; and 2) areas with higher-quality range than Arawale and Burathagoin. This effort will enable us to better understand the relative influence of predation and range quality in driving hirola population dynamics, and will provide insight into historic declines and contemporary lack of recovery. Additionally, the data we generate on habitat selection and movements can be used to identify sites suitable for any future reintroduction efforts.

Acknowledgments

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Background and Need for Research in Hirola Conservation
Historically, conservation of hirola (*Beatragus hunteri*) has been limited by the lack of sustained funding characteristic of low-profile species, weak local involvement, and a dearth of basic biological information (Andanje 2002, Butynski 2000, Kingdon 1982). In attempt to fill these knowledge gaps, we initiated a field study in the Ijara District of eastern Kenya in January 2011 to understand the demography, habitat selection, and seasonal movements of hirola, all of which have been identified by the Hirola Management Committee of the Kenya Wildlife Service (KWS) as critical to guiding future conservation efforts (Andanje 2002, Butynski 2000, Dahiye and Aman 2002).

Recently, we have completed a major undertaking to fit nine adult female hirola from seven distinct herds with GPS radio-collars on community lands in Ijara District. We targeted herds at the periphery of the historic geographic range, where hirola often come into contact with humans and their livestock. We hope that information generated from these herds will prove particularly valuable, given the majority of hirola occur in areas lacking formal protection and thus rely ultimately on the goodwill of local communities.

Because of the strong pastoral presence in the study area, community involvement was key to carrying out this exercise. So, as an initial step, we held two meetings in Gababa village and in Masalani town in Ijara to encourage local participation and to address firsthand any concerns raised by community members.

Community members were quick to voice two major concerns. First, they were apprehensive that livestock would be disturbed by our capture efforts. Second, community members were sensitive to their lack of involvement in past hirola captures and translocations. We note that while communities were eventually supportive of our work on hirola conservation, suspicion toward formal conservation persists because of weak local involvement and communication in past efforts. Community-based conservation is a relatively new concept in Ijara, and many individuals associate such activities with loss of grazing rights and fines levied by agencies for trespassing into formally protected areas.

After holding a third meeting with communities and government officials from Ijara, we eventually received enthusiastic endorsement from all involved, and several local elders participated in the capture effort from start to finish. It is our hope that these elders will serve as ambassadors for hirola conservation throughout Ijara, thereby strengthening long-term conservation efforts. It is only through such grassroots involvement that the general public will understand their indispensable role in the conservation of hirola, and their responsibility both to hirola and future generations to practice sustainable natural resource management.

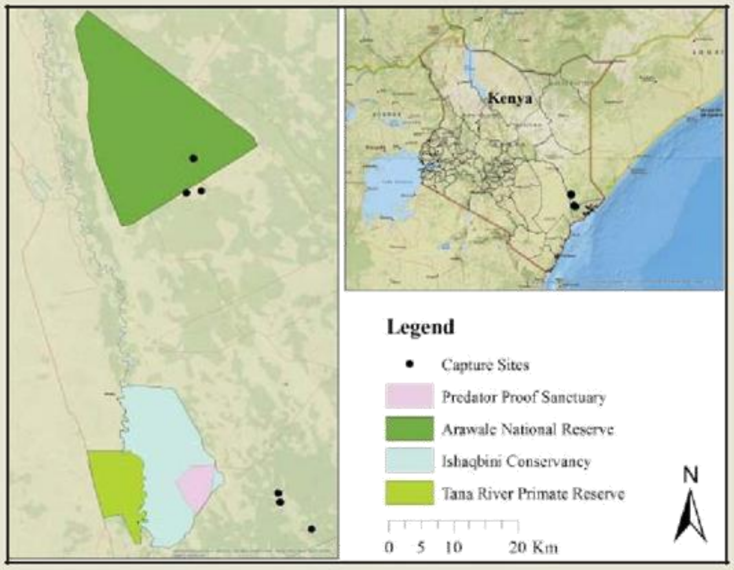

Plate 1: Map of the project area, showing capture sites.

Field Operations and Logistics
Our capture efforts of three individuals in August 2012 complemented an effort to translocate hirola into a predator-proof sanctuary within Ishaqbini Conservancy, for which a report has already been circulated by the Northern Rangelands Trust.

We based our operation at the Masalani KWS station from the 13th-16th December 2012. We captured hirola during early morning hours (0600-0800) and late in the evening (1700-1900) when temperatures were low and conducive for such an exercise. Given our ongoing, ground-based studies of hirola in Ijara, we quickly noticed that detecting hirola from the air was more difficult than doing so from the ground. As we flew from Masalani towards Arawale, the first animals one could see were reticulated giraffes (*Giraffa camelopardalis reticulata*) co-occurring with pairs of lesser kudu (*Ammelaphus imberbis*). These species are the most abundant ungulates in the area, and our data suggest their numbers are increasing. Our preliminary work with satellite imagery demonstrates that tree encroachment throughout Ijara has converted historically-open rangeland into dense woodland, presumably favoring browsers (like giraffe and lesser kudu) but potentially at the expense of forage for hirola and other grazers.

As we hovered away from Masalani towards the capture sites, we regularly encountered bomas (livestock corrals) and Burchell's zebras (*Equus burchelli*). Zebra associate closely with hirola, and these areas eventually resulted in encounters with hirola. It worth mentioning that, although hirola and livestock utilize the same areas, they seemed to do so at different times: hirola were always at least 2 km away from bomas.

After nearly two hours of searching, we were rewarded by finding approximately 13 animals in two groups in Arawale. These groups and others were found in open areas along the edges of woodlands. Reticulated giraffe, lesser kudu, Burchell's zebra, topi (*Damaliscus lunatus*), and buffalo (*Syncerus caffer*) were common in these areas as well. While we could see thousands of buffalo and topi in these grasslands, we only found seven total groups of hirola in these areas (from which three individuals were fitted with GPS collars in August 2012).

Once groups were sighted, the first task was to determine the herd's age structure—calves, juveniles, subadults, adult females, and adult males (Plate 2)—without disturbing the group. Following this, we carefully identified our target female and prepared the dart gun and the collar. We targeted adult females for two reasons. First, we have noted that young hirola are faithful to mothers for at least nine months prior to dispersal, thereby enabling us to monitor juveniles for nearly a year by relocating mothers. Second, in other species of ungulates, the survival of adult females (as opposed to juveniles or adult males) most strongly influences rates of population change. We are conducting demographic analyses to assist in identifying age classes that are most important for population growth, and to uncover mechanisms responsible for population change of hirola. It is our hope that these analyses will guide future management directions.

Once we had identified a target female, we separated her from the herd. The pilot then descended within 30 meters and a gunner darted the target individual. We then hovered for 7-10 minutes until the animal went down under the watchful eye of the team. Total pursuit time was 5 minutes or less for most individuals.

We immobilized hirola with a combination of 2.5 mg Etorphine hydrochloride (a narcotic) and 25 mg Azaperone (a tranquilizer). We used 6mg Diprenorphine hydrochloride as a reversal. During processing, capture technicians drew blood samples (15 ml) from the jugular vein and we fixed uniquely-numbered ear tags to individuals to aid in future identification. At this point, the vet administered the reversal agent while we deployed the collar. Average handling time was less than 5 minutes per animal. The blood samples we collected complement an existing data bank and will be screened to evaluate serum chemistry and pregnancy hormones.

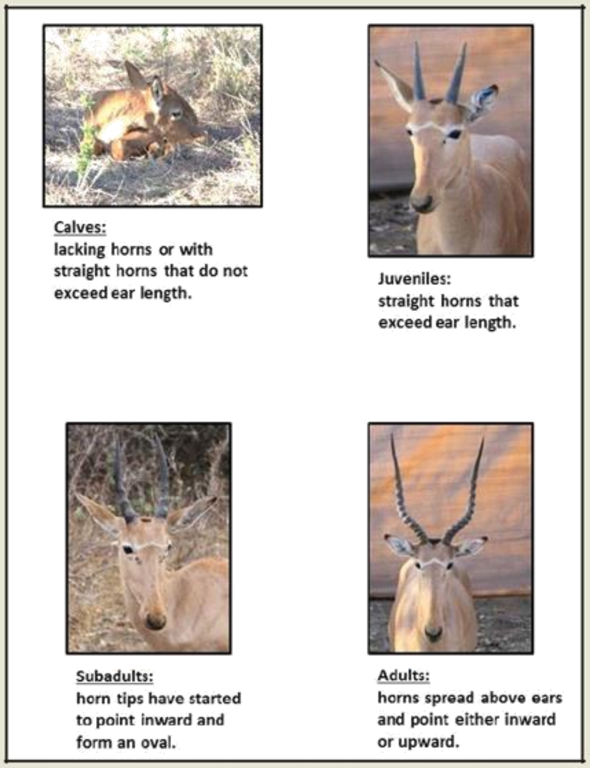

Plate 2: Age classes used to identify heard structure.

Individuals Captured and Herd Composition

We fit three females in Arawale (Plate 3) and six females in Burathagoin with Vectronic Aerospace GPS Plus Iridium collars. In sum, the nine adult females that we GPS collared in 2012 belong to seven groups totaling 51 individuals. Conservatively, we estimate that this represents nearly 13% of the global population (King et al. 2011).

Plate 3: Releasing a collared adult female hirola in Arawale.

Table1: Herd composition of herds containing collared female hirola in Ijara.							
COLLAR ID	STUDY AREA	Adult Males	Adult Females	Sub-adults	Juveniles	Calves	Total # in herd
11482*	Barathagoin	1	5	1	2	0	9
11483**	Arawale	1	4	2	2	2	11
11484	Barathagoin	1	6	0	0	0	7
11485**	Arawale	1	4	2	2	2	11
11486	Arawale	1	4	0	0	0	5
11487	Barathagoin	1	3	0	0	1	5
11488	Barathagoin	1	4	0	0	2	7
11490*	Barathagoin	1	5	1	2	0	9
11491	Barathagoin	1	6	0	0	0	7

***Note**: Individuals were classified into the following age/sex categories (Plate 2: modified from Andanje 2002). * these individuals belong to the same herd. ** theses individuals belong to the same herd.*

Preliminary results from our capture and post-collaring efforts suggest that hirola are selecting open grassland with scattered trees. Hirola strongly avoid dense tree cover (Plate 4), which complements evidence that the geographic range of this species has collapsed alongside tree encroachment over the past 30 years.

Colours and Collars

Collar batteries are expected to last for 4 years and will relay information in near-real time (within 24 hours) on habitat selection and movements. Interested parties are welcomed to monitor movements of hirola hersd at http://www.jakegoheen.com/index.php/research-group/abdullahi-hussein-ali.html.

GPS radiocollars record GPS location every three hours throughout

Plate 4: GPS movement trajectories of 4 hirola herds 1-31 January 2013 in the Buratha-goin grazing fields. Note the pronounced avoid-ance of tree cover (dark green)

the year. Each collar is equipped with a Very High Frequency (VHF) signal that emits 50 pulses per minute for monitoring, or 30 pulses per minute to indicate mortality if the individual has not moved for eight hours or more. VHF signals will be used to relocate animals visually to note the occurrence of calves and age structure of herds. Initial concern was raised that that GPS collaring (or otherwise marking) hirola might make individuals more conspicuous to predators. From the only study of its sort (Butynski 2000), no differences were found in mortality rates between radio-collared and non-collared individuals in Tsavo East National Park. Despite this, we deliberately purchased beige colored collars to match the coats of hirola. To date all the collared females are alive and roaming freely in our study areas.

Conclusions and Recommendations for Future Captures

Depending on the number of hirola required for study and the availability of resources, the option to dart or use drive nets should be considered carefully. From our capturing and post-collaring efforts, hirola do not seem as sensitive to chemical immobilization as earlier assumed, but may be prone to negative effects of capture when handling is prolonged. In addition, collaring appears to not have had undue influence on the movements of these animals, as the first data points collected post-collaring do not lie outside established home ranges. This is reassuring, and tells us that the process may not have been quite as stressful as we anticipated.

Our study represents the first effort to collar hirola in their native range. The overarching goals of our study are to 1) understand the relative importance of range quality versus predation in driving numbers of hirola; and 2) identify preferred habitats where population growth is high. We hope that information from our study will form the basis of conservation and monitoring of this critically endangered species in its native range in eastern Kenya, and will prove particularly useful in informing future reintroduction efforts of sanctuary-bred animals.

The immense effort of collaring individuals from these groups will only pay off with close monitoring, objective scrutiny, and open dialog among communities, government officials, and conservationists. At the end of every month, we visually locate herds to which these nine individuals belong to generate information on age structure, recruitment, and survival (Table 1). Because these herds are exposed to a suite of predators including wild dogs (*Lycaon pictus*), cheetah (*Acinonyx jubatus*), and lions (*Panthera leo*), the demographic data we collect from collared individuals will be compared to that of the hirola recently translocated to a predator-proof sanctuary in Ishaqbini Community Conservancy. This effort will enable us to evaluate the relative influence of range quality and predation in influencing hirola population dynamics, and will provide insight into historic declines and contemporary lack of recovery. In addition, movement data from these nine individuals can be used in the future to identify habitats in which population growth maximized for future reintroduction efforts.

Finally, we hope to elevate discussion for revival of Arawale National Reserve to restore hirola populations that are not just numerically viable but also ecologically functional. In promoting conservation of hirola populations, we must consider formal protection of Arawale National Reserve, which has been neglected by authorities following the disintegration of financial support in the mid-1980s. By virtue of its size (533 km^2), remote locale, vegetative composition, and abundances of tsetse flies (that reduce the profitability of livestock), Arawale represents the last hope for long-term hirola conservation in its native range.

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APPENDICES

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- Dr. Charles Musyoki: Head of Species Conservation, Kenya Wildlife Service
- Maj. (Rtd) Joseph Mugane: Pilot
- Mr. Jarso Halkano: Ranger
- Mr. John Kariuki: Lab Tech
- Dr. Isaac Lekolool SVO: Capture and Translocation
- Mr. Paul Macharia: Driver\