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RESEARCH ARTICLE

POPULATION STATUS, DISTRIBUTION AND SOCIAL GROUPING PATTERNS OF MENELIK'S BUSHBUCK (*TRAGELAPHUS SCRIPTUS MENELIKI*) IN HANTO CONTROLLED HUNTING AREA, ETHIOPIA

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ABSTRACT

Assessment on population status, distribution and grouping patens of endemic Menelik's bushbuck (*Tragelaphus scriptus meneliki*) was carried out in Hanto controlled hunting area for wet and dry seasons of the year 2016 and 2017. The objective of assessment was to compile data on population status, distribution and grouping patens of Menelik's bushbuck in Hanto. Five major habitat types (Erica vegetation, Woodland, Bamboo forest, Riverine forest and Grassland habitat) were identified and 21% of each habitat was surveyed to achieve the objectives. Sample counts of the endemic animal was carried out using random line transect sampling method in an area of 39.9 km2. The estimated populations of Menelik's bushbuck were 385.5±29.2 individuals. From the total population, Male Menelik's bushbuck comprised 34.4%, females were 48.8% and young's of both sexes were 16.9%. The male to female sex ratio was found to be 1:1.42. Age structure was dominated by adults, which constituted 61.9% of the total population. Even though, the bushbucks were distributed in all the five habitat types, it was observed more in the riverine forest habitat (48.5%). The most commonly observed group size throughout the study period (57%) were single (solitary) bushbuck. Moreover, during animal survey highly dependence of the local community on the resource of the controlled hunting area was observed to be the major sources of conservation challenges of wildlife in the study area. Hence, Even though the population status of Menelik's bushbuck is increasing in the study area, appropriate conservation measure with appropriate management plan will be needed to minimize the sources of conservation challenges in the controlled hunting area.

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INTRODUCTION

Ethiopia is a land of great geographical diversity, characterized primarily by variations in altitude. Elevations range from the highest mountain Ras Dashen, rising to 4,620 meters, in the Semen Mountains to Dallol depression in Afar, which is 116 meters below sea-level. Much of the country comprises highland plateaus and mountain ranges, that are dissected by numerous streams, rivers and the great African rift valley. For these facts, the country is a home for highly diversified fauna species composition (Shimelis and Afework, 2008;Melaku, 2011). Ethiopia currently possesses more than 284 species of animals of which 31 are endemic (Cole *et al.,* 1994; Yalden *et al.,* 1996; Afework and Corti, 1997; Leykun, 2000). Out of this, 12 of them are endemic large animals, including *Tragelaphusscriptusmeneliki* (Dereje *et al.,* 2011; Melaku, 2011; Yosef *et al.,* 2015). The high level endemic of animals in Ethiopia is attributed to the large extent of highlands, isolated from the rest part of Africa and the variability of climatic factors among different habitats (Yalden and Largen, 1992). The bushbuck (*Tragelaphusscriptus*) is a medium sized African Artiodactyls of the family Bovidae, distributed in the southern half of the continent from Senegal to Ethiopia and from the Congo basin to the Cape Province in South Africa (Alden *et al.,* 1995, Stuart and Stuart, 2000). Belonging to the same family with mountain nyala, the bushbuck shares with them the family characteristic of shy and elusive behavior. Bushbucks are solitary animals which exhibit momentary male-to-female pairing during the breeding season (Coates and Downs, 2007; Wronski *et al.,* 2009; Abebayehu and Tilaye, 2012). Another form of association includes that of a female and it's young. Bushbucks are known to be non-territorial. Most of bushbucks are forest- living animals inhabiting dense bush, usually near water, though this is not an essential, as

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some of them have been known to go without drinking for long periods when necessary (Kingdon, 1997; Wronski *et al.,* 2008). Bushbucks are primarily browsers and also known to graze occasionally (Dankwa-Wiredu and Euler, 2002; Dereje *et al.* 2011). According to Nowak (1999), the reproduction of bushbuck is not seasonal; gestation lasts around six months and breeding is year round. According to Yalden *et al.* (1984) three subspecies of bushbuck are believed to occur in Ethiopia. The common bushbuck (*Tragelaphusscriptusdecula),* inhabits most of the northern parts of the country including the Simien Mountains and highlands extending to the Awash River valley. The southern half of the country is mainly inhabited by the endemic subspecies, Menelik's bushbuck (*Tragelaphus scriptusmeneliki*). In Ethiopia, this species is found on the highlands of Bale, Arsi, Chercher, Western Shoa, Illubabor, Borena Saint National Park and Menagesha-Suba state forest at altitudes ranging between 2400 m and 3440 m (Dereje *et al.,* 2011; Abebayehu and Tilaye, 2012). The third subspecies, *Tragelaphusscriptusfasciatus*, is rare and is restricted to riverine forests of the southeastern parts of Ethiopia along the Wabe Shebelle River (Yalden *et al.,* 1984; Abebayehu and Tilaye, 2012). Menelik's bushbuck is a beautiful animal, with a coat longer than that of other bushbucks. The horns, which are carried only by the male (Plate: 1a), have a spiral twist and a well-defined longitudinal ridge or keel on the front or back surfaces, and transverse rings (Wronski *et al.,* 2008; Wronski *et al.,* 2009; Dereje *et al.,* 2011). It is easy to recognize the sex of bushbucks by difference in the patterns of individual coats (Plate: 1a and 1b). Most bushbuck tends to spend the heat of the day lying up in dense bush where there is no hope of spotting them. They use different plant species as a shelter and resting sight during daytime.

bushbucks have not been the subjects of research studies in Ethiopia. As a result little is known about abundance and ecology of bushbucks (Dereje *et al.,* 2011; Abebayehu and Tilaye, 2012).The study siteis one of the recently established controlled hunting area (CHA) in Oromia administrative region and currently the local investor whose name is Rocky Valley Hunting Safari Privet Limited Company has the right to conserve and conduct sport hunting in the area. The CHA is found in between Dinsho, Agarfa and Adaba districts in the North-West direction of Bale Mountains National Park (BMNP). As per knowledge of investigator, there was no scientific base line data regarding population status, distribution and grouping patterns of endemic Menelik's bushbuck, in the study site. Thus, the present study is aimed at contributing to fill existing gap though investigating basic ecological information on the study animal.

MATERIALS AND METHODS

The Study Area

The current study site is known as Hanto controlled hunting area (Hanto CHA). It is located in the southeastern part of Ethiopia, in the Oromia administrative region of Bale Zone, Dinsho district. Hanto CHA is 378 km from Addis Ababa towards southeastern direction. The area is established in 1998, and leased to a local hunting concession. Therefore, currently the local investor known as Rocky valley hunting safari P.L.C, hold the rights for hunting throughout the area (OFWE, 2013). The study site is located within geographic coordinates of $7^{o}04'– 7^{o}20'$ N latitude and $39^{o}34'– 39^{o}50'$ E

Plate 1a, Male

Plate 1b, Female

Plate 1a & 1b. Morphology of Menelik's Bushbuck (Photo: Dejene and Demeke2017)

However, they choose human habitat as a resting sight during the night in order to avoid the risk from predation (Dankwa-Wiredu and Euler, 2002). They have a loud barking alarm call, sometimes repeated, which can be heard from some distance away, and also a series of grunts (Dereje *et al.,* 2011; Abebayehu and Tilaye, 2012). The current study animal, Menelik's bushbuck isthe family Bovid antelope species found only in Ethiopia (Yalden *et al.,* 1984; Melaku, 2011).Theanimalis among the most important species fortrophy hunting in Ethiopia as well as in the current study site. Because of its cryptic lifestyle (Wronski *et al.,* 2008),

longitude along the Southeastern highlands of Ethiopia at about 7 km North-West direction from the border of Bale Mountain National Park (Figure 1). It encompasses an area of 190 km^2 and characterized by a chain of mountains and sub-alpine forest ecosystem. The topography of the study area is dominated by high and rugged mountainous ridges with high slopes and gently rolling steep hills with all of the areas elevation ranging from 2,980 - 3,585 m above sea level. It is also characterized by Sub-Afrolapine and upper montane ecosystem vegetation type which are dominated by *Hageniaabyssincia*, *Hypericumrevolutum*, *Juniperusprocera,*

Sinarundinariaalpina and *Erica* vegetation. The mean annual temperature of the area is 10.9°c while the mean lowest and highest temperatures are 4.7°c and 17.1°c respectively. March is the hottest month (18.75°c) and December is the coldest (2.01°c) months (Figure 2). The area has a bimodal local climate with two wet seasons that have heavy and small rains (Figure 3). The data obtained from National Meteorological Agency of Bale branch directorate shows the area were having the mean annual rainfall of up to 1120 mm for the past ten years (2004-2014). The heavy rains occur from July to October, with the highest peak in August and the small rains from March to June, with a peak in April (Ḍejene Worku. and Demeke Datiko, 2017).

MATERIALS

Materials used for data collection were: Handheld Garmin GPS 60, digital camera, 7x35 binocular, and animals field guide, tape meter, data sheet, field tents, rain coat and sleeping bag.

Sampling Design

A preliminary survey was carried out in the first week of March 2016in the CHA, in order to collect basic information about the location, climatic condition, topography, habitat types and approximate size of the study area. Vegetation types, landscape of the study area, and wildlife distribution and representative habitat sites and their size were identified. Based on the preliminary observation, classification of vegetation type was carried out in the proposed study area. The survey revealed that the vegetation cover and topography of the area was not homogenous. For the purpose of this investigation, the entire study area was clustered into five major habitat types: Ericaceous vegetation, *Hygeneaabysinica* dominated woodland, riverine forest, bamboo forest and grassland habitat. Four sample areas for Erica vegetation and one sample area for each of the bamboo forest, *Hageniaabyssinica* dominated woodland, grassland and riverine forest habitats were identified. Population status, patterns of distribution in the area and their groupings were examined using a representative random sampling design of line transects method (Buckland *et al.,* 1993). Line transects survey was selected because it is the most commonly used distance-based method for surveying large animals like African ungulates in preference to point transects (Sutherland, 1996; Caro, 1999; Dereje *et al.,* 2011). A total of 23 transects were marked on the identified eight sample area. The number of transects that laid on the major habitats types were based on the total size of the habitat. The representative transects that cross each habitat were randomly selected in order to represent all of the major habitat type. During the study, 21% (39.9 km^2) of the total study area were surveyed as indicated below following the methods used by Girma and Afework (2008); and Dereje *et al.* (2011).

- *Erica* vegetation zone was the first largest habitat that covers about 129.2 km^2 of the study area. In this habitat a total of 12 transect with 7.5 km length and 300 m strip width each (150 m on each side of the transect line) were marked.
- *Hageniaabyssinica* dominated Wood land zone was the second largest habitat that covers about 30.4 km^2 of the study area. In this habitat 2 transects with 8 km length and 400 m strip width each was marked. It was cover a total area of 6.4 km^2 of the sample area.
- Riverine forest was the third largest habitat that covers about 15.2 km^2 of the study area. In this habitat 3 transects with 5.5 km length and 200 m strip width each was marked.
- Bamboo forest zone was the fourth largest habitat that covers about 9.5 km^2 of the study area. In this habitat 4 transects with 5 km length and 100 m strip width (50 m on each side) each was marked.
- Grassland was the smallest habitat that covers about 5.7 km^2 of the study area. In this habitat 2 transects with 1.5 km length and 400 m width (200 m on each side) was marked.

Each of this transect-line was located randomly in the study area in each of the habitat type using Garmin GPS 60. A space of about 200-500 m was left between consecutive transects based on vegetation type to avoid double counting. All transects were laid roughly parallel to each other and the same transects were used for both wet and dry seasons survey. Each transects in a given habitat were surveyed at the same time twice per day. The transect lines were demarcated using natural boundaries like rivers, streams, rocks big trees etc.

Data Collection Methods

The data were collected once for the dry season and twice for the wet season. Data collection was carried out on April, 2016 and August, 2016 months to accommodate the wet seasons, and January 2017to accommodate the dry season. Data collections were focused on the population status, population density, group size and type age and sex categories, habitat preference and distribution of the animals. As done by Ratti *et al.* (1983) and Buckland *et al.* (1993) a line-transect census method were employed to collect the data. Eight trained people were involved in the research to assist data collecting process. Based on the number of transects, four patrolling teams with two person at each transect were assigned. Prior to data collection training was given for the patrolling team on how to operate the GPS receiver and data recording on data sheet. The transect lines in each sample zone was fixed to assist the foot counts by making use of standard transect counting methods (Western, 1978; Norton-Griffiths, 1979).

The field survey times were morning and afternoon (between 6:00 - 11:00 a.m. and 3:00-6:00 p.m.), when the animals are more active for feeding and maximum observation of the animal is possible. During the assessments, 20 days and night were spent per counting seasons for animas survey. Species sex, age category of species, group size and composition, GPS location and habitat type were recorded during the observations. Data collection was made through direct observations with naked eye and/or by using 7 x 35 binoculars. As indicated by Wilson *et al.,* (1996) the direct observational technique is most appropriate for medium to large sized animals. Further, silent detection method like traveling against direction of wind was also used to minimize disturbances (Wilson *et al.,* 1996). Indirect evidences such as fresh fecal droppings, feeding marks were used to confirm doubtful observations of the animals. Furthermore, stopping after every 50 m for about a minute were followed to listen for animals or branch movements and vocalizations, to maximize the counting of individuals as indicated by Kiwia (2006).

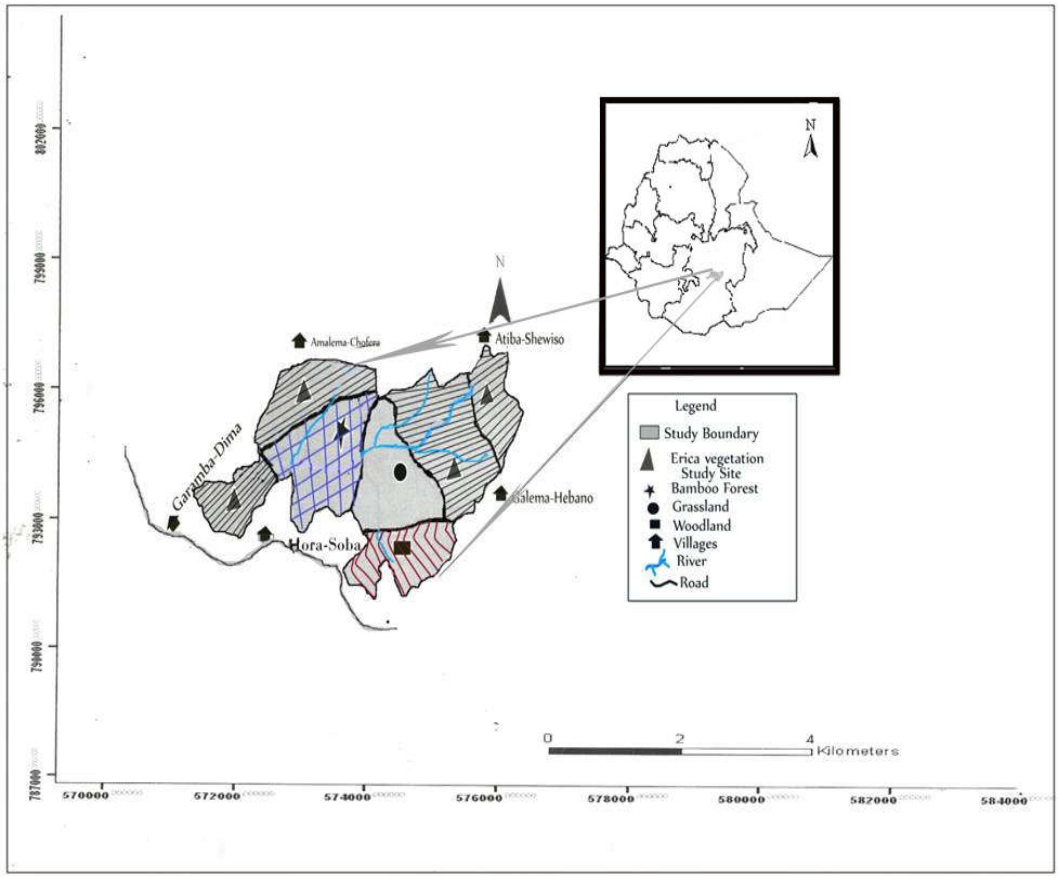


Figure 1. Map of study area with location of study sites.

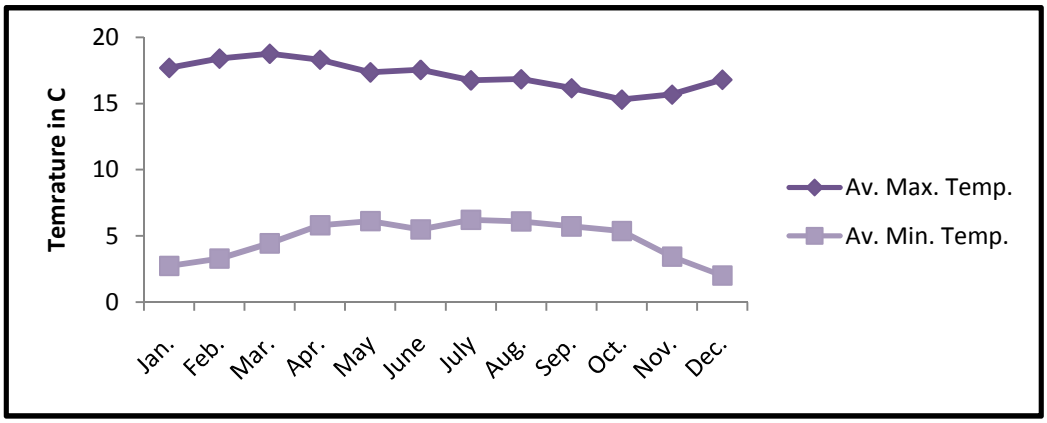
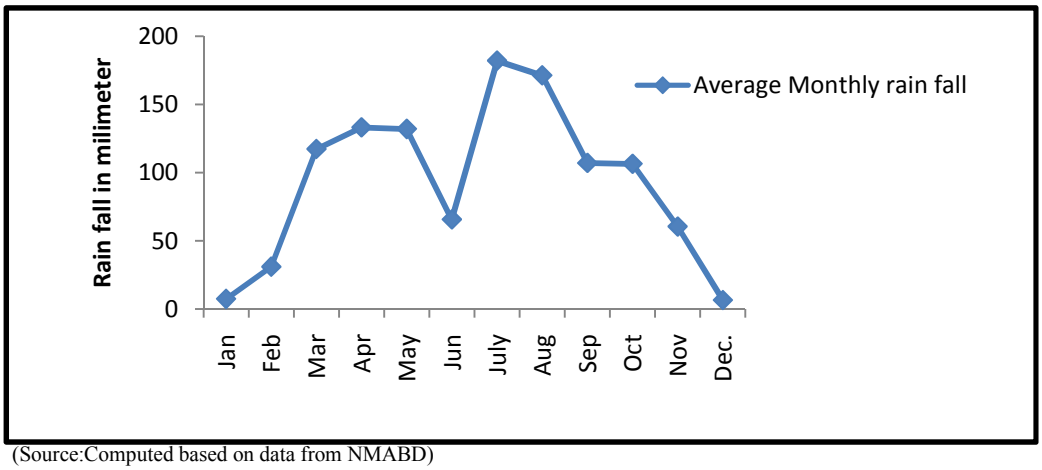


Figure 2. Average monthly minimum & maximmum temprature for the year 2004-2014



(Source:Computed based on data from NMABD)

Figure 3. Average monthly rain fall from 2004-2014

To increase the accuracy of estimation of the populations, each transect was repeated six times both during the wet and dry seasons (Buckland, 2001). Information on the approximate demographic composition and structure, like: age class and sex ratio, was used to predict the general trend of the animals population. Each individual sex and age classes were identified and categorized following Befekadu and Afework (2004) and Dereje *et al.* (2011). Binoculars were used for proper sex and age identification. Age and sex determination were carried out based on body size, presence or absence of horn, horn size and coat color. The individual or individuals in a herd were recorded as adult male (AM), adult female (AF), sub-adult male (SAM), sub-adult female (SAF) and young of both sex (Kingdon, 1997).Sex ratios for the animals were obtained from direct count of the animals using the methods of Hillman (1986).As suggested by Dereje *et al.* (2011) and Yosef *et al.* (2015), solitary individuals were considered as a group of one for statistical analysis. Following the method of Befekadu and Afework (2004) individuals were considered to be in the same group if the distance between them was less than 50 m. The distributions of Menelik's bushbuck were assessed during ground survey. Group size and group composition, age, total number in the herd and other special features of the animal encountered were used to avoid double counting.

Data Analysis

For data analysis SPSS computer software version 20 and descriptive statistics (mean, frequency, Standard error and percentage) were used. Population estimates of the animals for wet and dry seasons, sex, age category and distribution of the animal were compared using Chi-square test at 95% confidence interval and 0.05 levels of significance. For density and population estimation Sutherland (1996) methods were also used. D = N/2LW, where D = estimated density of animals in each habitat, N = number of animals seen, L = length of transect lines and W = mean perpendicular distance of animals seen. The population sizes of animals in each habitat were estimated by multiplying the population density (D) with total extent of each habitat type by the present study area (A) following the method of Sutherland (1996). Finally, the sum of estimates in each habitat type will give the total estimates of the animal in the CHA.

RESULTS

Population Status of Menelik's Bushbuck

The survey results of sample counts of Menelik's bushbuck for wet and dry seasons in the CHA are given in Table 1. On average, 76 and 84 individuals of Menelik's bushbuck were recorded during the wet and dry seasons respectively. The mean numbers of individuals observed during both seasons of the study were 80. The mean population estimate for the CHA was 385.5±29.2 individuals of Menelik's bushbuck. There was no significant difference in the number of animals observed during wet and dry seasons (χ^2= 0.4, df = 1, P > 0.05). However, there was better count during the dry season.

Sex Ratio and Age Structure

The proportion of age and sex categories of Menelik's bushbuck in the study area is shown in Table 2. Out of a total number of 80 individuals observed Menelik's bushbuck, 20(25%) were adult male, 29.5(36.9%) were adult females, 7.5(9.4%) were sub-adult male, 9.5(11.9%) were sub-adult female, 13.5(16.9%) were young's of both sexes. There was no significant difference (χ2= 0.04, df = 1, P > 0.05) between the mean number of males and females observed during the two seasons. On average, 61.9% of the total population was adults, 21.3% was sub-adults and only 16.6% was young Table 2. The age ratios of adult bushbuck to sub-adult and adult to young in both wet and dry seasons were statistically significant (χ^2= 15.88, df =1, p < 0.05 and χ^2 = 21.32, df =1, p < 0.05).

Distribution of Menelik's Bushbuck

The number of individuals observed in each habitat type is given in Table 3.Menelik's bushbuck showed high preference for riverine forest both during wet and dry seasons. Out of 76 individuals observed during wet season and 84 individuals observed during dry season, 34(44.7%) individuals in wet season and 44(52.4%) individuals during dry season were observed in riverine forest habitat type. There was no significant difference in use of riverine forest habitat in dry and wet season (χ^2 = 1.3, df = 1, P > 0.05). In addition on average during both seasons Menelik's bushbuck showed habitat preferences of 19.4%, 15.6%, 13.8% and 2.5% for bamboo forest, Erica vegetation, and woodland and grassland habitats respectively. There is significant difference in distribution of Menelik's bushbuck (χ^2 = 47.7, df = 4, p < 0.05) among the habitat types.

Grouping Patterns of the Animal

During the study period the groups (clusters) observed for Menelik's bushbuck were groups composed of all males, all females group, male and female groups, females and young groups, and mixed groups of both sexes and young. There was no significant difference in the mean groups of the Menelik's bushbuck (χ^2 =0.01, df = 1, p > 0.05) counted during the dry and wet seasons (Table 4). Throughout the study period, the most commonly observed groups (57%) were groups containing single (solitary) bushbuck. The highest range of group size was recorded during the wet season (1-5 individuals), mean group size and the total number of groups observed during the wet season was 1.7 and 46, respectively. While, during the dry season the mean group sizes recorded and the total number of groups observed were 1.5 and 55, respectively. Menelik's bushbuck were observed some times in association with mountain nyalaand sometimes fed among domestic livestock.

DISCUSSION

In order to manage the population of endemic Menelik's bushbuck properly in the CHA and to set quota on the number of animals to be hunted per year; estimating the population status, and describing their distribution in the study area is very important. During the study period more Menelik's bushbuck were counted in the dry seasons than wet season. The most plausible reason for this might be human activities such as collection of firewood, harvesting of grass and livestock encroachment were very high in the CHA high during the wet season. This might affect the foraging opportunities of Menelik's bushbuck, thereby reducing the sighting. Cultivation at lower altitudes during the wet season leads to the displacement of livestock into the high altitudes. However, during the dry season, after crops were harvested, livestock and pack animals move to lower altitude.

Table 1. Population estimates Menelik's bushbuck (Mean ±SE)

Types of Animal	Seasons	Habitat Types					
		Erica	Wood L	Riverine F	Bamboo	Grass L	Total
Menelik's bushbuck	Wet	11	13	34	14	4	76±5.0
	Dry	14	9	44	17	0	84 ±7.4
	Mean	12.5	11.0	39.0	15.5	2.0	80.0±6.2
	Density	0.5	1.7	12.2	7.8	1.7	4.8± 2.2
	P. Estimates	64.6	51.7	185.4	74.1	9.7	385± 29.2

Wood L= Woodland, Grass L= Grassland, Riverine F= Riverine forest, P. Estimates= Population Estimates

Table 2. Age and sex ratio of Menelik's bushbuck during wet and dry seasons

Types of Animal	Season	Age and Sex Category					Ratio			
		AM	AF	SAM	SAF	Young	M:F	A:All	Y:All	Y:F
Menelik's bushbuck	Wet	17	25	10	12	12	1:1.37	1.24:1	1:5.33	1:3.08
	Dry	23	34	5	7	15	1:1.46	2.11:1	1:4.60	1:2.75
	Mean	20	29.5	7.5	9.5	13.5	1:1.42	1.62:1	1:4.93	1:2.89
	±SE	±1.9	±2.8	±1.6	±1.6	±0.95				

Where: AM= Adult Male, AF= Adult Female, SAM= Sub-Adult Male, SAF= Sub-Adult Female, M= Male, F= Female, A= Adult, Y= Young

Table 3. Number of individuals observed in each habitat type and their percentage

Animal Type	Seasons	Habitat Type					
		Erica Forest	Woodland	Riverine Forest	Bamboo Forest	Grass land	Total
Menelik's bushbuck	Wet	11(14.5)	13(17)	34(44.7)	14(18.4)	4(5.3)	76
	Dry	14(16.7)	9(10.7)	44(52.4)	17(20.2)	-	84
	Mean	12.5(15.6)	11(13.8)	39(48.8)	15.5(19.4)	2(2.5)	80

Table 4. Group size during dry and wet seasons

Animal Type	Season	Individuals observed	Number of groups	Group range	Mean group size
Menelik's Bushbuck	Wet	76	46	1-5	1.7
	Dry	84	55	1-3	1.5
	Mean	80	50.5	1-4	1.6

Seasonality in the abundance of livestock grazing was also observed by Zerihun *et al.* (2012) in Mount Kaka and Hunkolo Fragments, Southeast Ethiopia. Several studies in different localities have also revealed the adverse effect of livestock encroachment and human settlement on the abundance and distribution of wild animals (Stephens *et al.,* 2001; Zerihun *et al.,* 20012). It is difficult to assess the long term population trend of Menelik's bushbuck in Hanto CHA, as periodic censuses have not been conducted in the CHA and this study was pioneer. However, information's collected from local people and CHA scouts indicated that before the establishment of the CHA the number of wildlife were very small. Particularly, around 1991 during government change in Ethiopia, sever loss of wildlife encountered in the area. But now the populations of animals are increasing since 1998 after the establishment of the CHA. According to the CHA managers and local peoples the animals where highly hunted before the establishment of the CHA mainly for bush meat. However, illegal hunting of the animals was not reported after the establishment of CHA. This might be, because of high penalty and the protection of the CHA by the Rocky valley scouts and the awareness rising program made for local people. The concept of sex ratio and age structure of individual animal is vital for evaluating the viability of a species for the reason that, these variables reflect the structure and the dynamics of population (Wilson *et al.,* 1996). Sex and age structure of a population at any given point of time is also an indicator of the status of the population. Therefore, relatively the higher population number of females in the CHA (male: female = 1: 1.42) is beneficial in terms of adding more individuals to the population through birth. Therefore the current observation indicates a healthy and a possibility of increasing Menelik's bushbuck population in the CHA area.

Young productivity was 0.46 young per adult females (46 young per 100 adult females). Relatively, the higher productivity of young observed in this study supports the previous study by Yosef (2015) in BMNP. On the other hand, the high proportion of adults in the present study could indicate higher degree of survival of sub-adults. The low proportion of young to other age groups, 1: 4.93 was observed during the investigation. This might be the young ones are more vulnerable to predators and hidden under dense grasses and vegetation. This was in line with the findings of Wronski (2004) and Dereje *et al. (*2011) which confirmed that at the early stage of their lives the young are highly vulnerable to predation. On the other hand, low proportion of sub-adults to others in the present investigation shows a problem of long term survival of the young in the area. Probably this was due to the high number of predators such as common jackal, spotted hyena, leopard and domestic dog in the CHA. The sex ratios of males were small. This might be largely due to probability of increase in killing of males Menelik's bushbucks due to predation. The males leave the natal herd and distributed in less favorable habitats, and suffer an increased predation pressure compared with the females of the same age classes, which stay in the natal herd. Wronski (2004) also confirmed that, the young female ungulates maintain their relationship with their mother group for some time after weaning. Young males, however, may soon become displaced because of antagonistic behavior from other males. The other reason observed for lower number of males in the CHA could be, because of male-biased selective sport hunting practices in the area. As the area is established for trophy hunting, adult male of bushbuck have been hunted for $ 6000 by professional hunters. The investigation indicated that some census zones had higher number of individual animals than others. The

variations in census zones might be due to habitat quality, influence of human activities and livestock distribution and availability of resource in the area. Similar studies of Yosef *et al.* (2010) in BMNP revealed that, resource distribution affects the distribution of animals. During the study period Menelik's bushbuck was observed in all the five habitat type but, with different number of individuals (Table 3). Even though, the animal was evenly distributed in the CHA. Menelik's bushbuck showed high preference for riverine forest and least distributed in grassland habitat. This might be bushbucks are cryptic, shy and solitary in nature. So to hide from predators and human disturbances, bushbucks preferred areas with dense vegetation cover and availability of resources, especially water. Moreover, habitat selection may be influenced by vegetation type, the presence of water, topographical features, predator avoidance and availability of food and other environmental factors among habitats and between seasons within each habitat. This observation is in line with the findings of Kingdon (1997) and Wronski *et al. (*2008) for the same species in different places, that states; most of bushbucks are forest living animals inhabiting dense bush, usually near water. The groups (clusters) observed were social group's composed different age and sex categories. A group of all males, all females, male and female group, females and young group, and mixed groups of both sexes and young were observed. The most commonly observed group size throughout the study period (57%) were single (individual) bushbuck. It confirms the findings at other different places that describe; bushbucks are solitary animals which exhibit momentary male-to-female pairing during the breeding season (Coates and Downs, 2007; Wronski *et al.,* 2009; Abebayehu and Tilaye, 2012). However, the present finding is not in line with the suggestion of Kingdon (1997) who stated that bushbucks are strictly solitary.

Conclusion

The present investigation provides valuable information on population status, distribution and social grouping patterns of endemic Menelik's bushbuck in Hanto CHA. The study revealed that, the CHA was serving as a home for large number of endemic Menelik's bushbuck. More females of bushbuck as compared to males in the CHA imply a healthy population of the specie in the area. However, as the study site is hunting concession, it needs continuous monitoring of population status and related ecological problems in the area. Regarding the distribution of the animal, despite the fact that, Menelik's bushbucks are distributed in all habitat types, a dense forest with nearby water is more preferable habitat for its life. However, due to human population increase, human activities like, encroachment to the wildlife habitat, deforestation, animal husbandry, agricultural expansions, dry season forest fire are fueling the loss, degradation and fragmentation of habitats of wildlife. As a result, the CHA needs strong attention and immediate action from concerning regional and Federal government institutions. Generally, this study was the first formal investigation on population status and ecology of Menelik's bushbuck in the study area. Hence, the findings could serve as a baseline to make comparison against future research findings and will help to improve wildlife management decisions in the CHA.

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