Project Update: February 2018

Introduction

Hartebeests (*Alcelaphus buselaphus*) are African antelopes historically ranged virtually in all African grasslands (Lewis and Wilson, 1979). The range and numbers of hartebeests however declined dramatically during the last decades due to habitat loss, livestock grazing, extensive hunting and disease (Datiko and Bekele, 2011; Flagstad et al., 2000; Lewis and Wilson, 1979). From eight recognised subspecies, two (*A. b. buselaphus* and *A. b. nakurae*) are already extinct and others are severely threatened (*A. b. tora, A. b. swaynei, A. b. jacksoni* and *A. b. keniae*). Hartebeests use their long thin muzzle to extract leaf blade from dry swards that enable them to survive in a wide variety of climatic regimes where forage is limited (Murray, 1993).

Swayne's hartebeest (*A. b. swaynei*) population was once widely distributed in Ethiopia, Somalia and Djibouti. The population was however largely reduced by rinderpest virus transmitted from introduced European cattle (Hunt, 1951). Swayne's hartebeests became extinct in Djibouti and Somalia and it is currently recognised as endangered (IUCN SSC ASG 2017). In Ethiopia, subsequent habitat fragmentation due to agriculture, human settlement and livestock grazing further reduce the remaining populations (Refera, 2005). Swayne's hartebeests occur currently in three isolated localities with an estimated total population size of 840 (364 in Maze National Park, 464 in Senkele Swayne's Hartebeest Sanctuary and 12 in Nechisar National Park; Mamo et al., 2012).

In 1974 there was an attempt to increase the population Swayne's hartebeest by translocating 203 individuals from Senkele to the Awash National Park (90 individuals) and Nechisar National Park (113 individuals: Lewis and Wilson, 1977). Only 2 years following the translocation only 12 hartebeest survived in the Awash National Park (Lewis and Wilson, 1977) and were subsequently exterminated. Those translocated to Nechisar National Park, however, appeared to be well established at the early stage and the population showed a slight increase to 130 during 1976. Eventually however, this population decline to the current 12 in 2011 (Mamo et al., 2012). Unfortunately, little effort has been made to understand the decline. Translocation programmes need long-term monitoring to assure the survival and adaptation of the new environment by the translocated population (White et al., 2003).

The potential for exploitive competition increases with the similarity in foraging behaviour and spatial overlap (Murray and Illius, 2000; Wilmshurst et al., 2000). Swayne's hartebeest is non-selective grazers meant a high potential of competition with domestic cattle *Bos taurus* if they share limited grazing land (Beck and Peek, 2005; Odadi et al., 2011). Livestock grazing is an increasing conservation challenge throughout protected wildlife areas in Africa. Although cattle became part of the African herbivore community already 4-5,000 years ago, both people and their livestock remained at fairly low densities up to the recent past (Homewood and Rodgers, 1991). The current high density of cattle which are known to be grazers are expected to compete with wild large grazers. Many studies already confirmed a negative correlation between livestock density and wildlife (de Leeuw et al., 2001; Moleele and Mainah, 2003; Campos Areceiz et al., 2004; Lamprey and Reid, 2004; Liu and Jiang, 2004; Madhusudan, 2004; Bonnington et al., 2007; Namgail et al., 2007; Kittur et al., 2010).

Study Area

Maze National Park (MNP) is located southern parts of Ethiopia with a total area of 175 km^2 (6°25'N, 37°14'E; Fig. 1). The park was established in 2005 primarily to protect Swayne's hartebeest. It is semi-arid habitat with elevation ranges between 900-1200 m asl. The area is drought prone area with low, bimodal but erratic rainfall (minimum annual rainfall <800mm) and with high mean monthly temperature (above 30°C). The park has an enormous water source, the Maze River and several small tributaries such as Daho, Lemasea and Domba (Fig. 1). The park is home for other large mammals including greater kudu (*Tragelaphus strepsiceros*), lesser kudu (*Tragelaphus imberbis*), oribi (*Ourebia ourebi*), waterbuck (*Kobus ellipsiprymnus*), reedbuck (*Redunca redunca*), lion (*Panthera leo*). Maze National Park consists mainly of grassland plains surrounded by chains of mountains except the southern part. The plain area covered with annual grass species (the dominant grass species are *Exotheca abyssinca*, *Heteropogon contortus*, *Loudentia* spp., *Setaria incrassate*, and *Hyparrhenia filipendula* and with scattered *Combretum terminalia* woodland.

Senkele Swayne's Hartebeest Sanctuary (SSHS) is located in southern Ethiopia along the Great Ethiopian Rift Valley. It is a relatively small area of only 16.4 km^2 (7° 7'15" - N and - 38°20'15; Fig. 1). Also this sanctuary was establishment to protect Swayne's hartebeests (Datiko and Bekele, 2011; Mamo et al., 2012). Its elevation ranges from 2000 to 2100 m asl, and its vegetation type is open grassland with scattered savannah woodland. The water source for the sanctuary's wildlife is scarce. There was no available water source both inside the sanctuary and up to 5 km radius of the surrounding environment. Few mammals including common jackal (*Canis mesomelas*), spotted hyena (*Crocuta crocuta*), warthog (*Phacochoerus africanus*), and oribi (*Ourebia ourebi*) are also found in the sanctuary.

Methods

Population estimation was conducted during both wet and dry seasons of 2017 in both protected areas through transects in block divided with enduring features (gorges, ridge, roads and camp sites; Kie, 1988). A total of 10 blocks were established in Maze National Park and seven blocks in Senkele Swayne's Hartebeest Sanctuary (fig. 1). The counts at each block was carried simultaneously by using transects 6:00 – 10:00 am and late afternoon from 4:00 – 6:00 pm, when animals are most active (Fryxell, Sinclair, and Caughley, 2014; Kie, 1988). The counting was repeated for three days and the mean population size was taken as a population estimate for Park.

Both sex and age structures of the observed groups were recorded. Direct features of reproductive characteristics, scrotum in male reproductive organ, and Horn size were used to differentiate male and females (Caro, 2016; Plumptre, 2000). Females have more slender and less marked than the adult male horns (Lewis and Wilson, 1979). Seven groups of sex and age structures of hartebeest population were recorded namely: calf, juvenile, sub-adult male, sub-adult female, adult male, adult female and unknown sex (if any) (Fryxell et al., 2014). We classified the age groups in months: calf (0 to 9), juvenile (9 to 18), sub-adult (18 to 30), and adult (above 30) (Mamo et al., 2012).
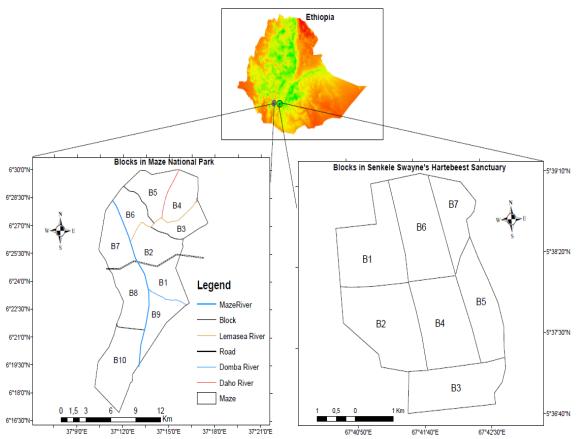
Figure 1. Blocks which has been used in the total population estimate in Maze national park and Senkele swayne hartebeest sanctuary.

Results

Averages of 925 and 1096 individuals were counted during wet and dry seasons respectively in Maze National Park (Table 1). In Senkele Swayne's Hartebeest Sanctuary we counted an average of 514 and 522 individuals during wet and dry seasons, respectively (Table 2).

Table 1. Number of detected hartebeests in Maze National Park

Blocks	area km^2	dry season counts				wet season counts			
		1st day	2nd day	3rd day	mean	1st day	2nd day	3rd day	mean
B1	15.4	398	386	395	393	419	427	441	429
B2	16.8	317	314	305	312	7	11	12	10
B3	12	88	101	102	97	9	6	6	7
B4	15.1	34	46	38	39	11	5	5	7
B5	16.8	85	77	84	82	6	9	5	7
B6	12	9	11	19	13	13	11	9	11
B7	18.8	49	61	58	56	317	322	324	321
B8	21.6	33	31	32	32	4	3	8	5
B9	14.2	75	66	72	71	121	126	137	128
B10	31.2	0	0	0	0	0	0	0	0
Total	173.9	1088	1093	1105	1095	907	920	947	925

Table 2. Number of detected hartebeests in Senkele Swayne's Hartebeest Sanctuary

Blocks	Area km^2	dry season counts				wet season counts			
		1st day	2nd day	3rd day	mean	1st day	2nd day	3rd day	mean
B1	2.82	121	125	134	127	69	73	81	74
B2	2.8	0	0	0	0	81	75	81	79
B3	2.25	0	4	2	2	19	17	27	21
B4	2.6	51	55	59	55	101	95	110	102
B5	1.54	23	21	28	24	39	48	48	45
B6	2.99	297	309	318	308	149	154	150	151
B7	1.4	9	7	2	6	39	43	44	42
Total	16.4	501	521	543	522	497	505	541	514

Table 3. Sex and age structures of Swayne's hartebeest in Maze National Park

season	calf	juvenile	sub-adult male	sub-adult female	adult-male	adult-female	unknown	total
dry	146	82	102	94	301	353	17	1095
wet	48	74	66	111	269	326	31	925

Table 4. Sex and age structures of Swayne's hartebeest population in Senkele Swayne's Hartebeest Sanctuary.

season	calf	juvenile	sub-adult male	sub-adult female	adult-male	adult-female	unknown	total
dry	35	49	49	75	146	162	6	522
wet	17	53	42	96	128	172	5	512

Female to male ratio was 1.11 and 1.30 during dry season and wet season respectively in Maze National Park. The ratio is 1.22 and 1.58 during dry season and wet season in Senkele Swayne's. Calf and juvenile has much smaller proportion from the total population during dry season (0.16 in Senkele Swayne's Hartebeest Sanctuary and 0.21 in Maze National Park).

The population in Nechisar National Park has been reported to be exterminated by park officials (). We did not see any hartebeests in 45 km transect by vehicle and 23 km walk. Of the 120 cattle herders, none of the correspondents confirm the presence of hartebeest.
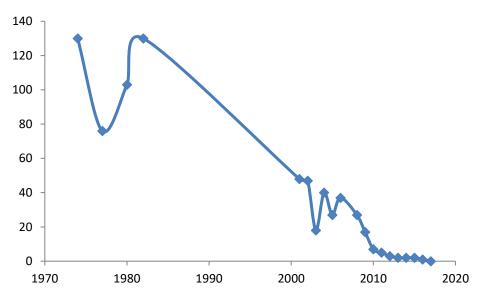
Fig 2. Population decline of Swayne's hartebeest in Nechisar National Park since the translocation in 1973.

Discussion

The population estimate of Swayne's Hartebeest in Maze National Park is over three times the population estimate provided by Mamo et al. (2012) for counts conducted in 2009. The human resettlement from the park during 2010 and enhanced protection of the park may contribute for the observed sharp increase of population size.

The population estimate in Senkele Swayne's Hartebeest Sanctuary showed a slight increase from the report of 464 individuals during 2009 (Mamo et al., 2012) to the current 522. The combined effects of the predators (African wolf and Hyena) and a small size of protected area and critical scarcity of water may contribute for slaw increase of population size.

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