

SEASONAL HOME RANGE OF SWAYNE'S HARTEBEEST (*ALCELAPHUS BUSELAPHUS SWAYNEI*) IN SENKELE SWAYNE'S HARTEBEEST SANCTUARY

Berhanu Gebre¹ and Solomon Yirga^{2*}

¹Simien Mountains National Park, PO Box 13, Debarq, North Gondar, Ethiopia

²Department of Biology, Faculty of Science, Addis Ababa University
PO Box 1176, Addis Ababa, Ethiopia. E-mail: solyy@bio.aau.edu.et

ABSTRACT: The home range of the endangered Ethiopian endemic hartebeest, Swayne's hartebeest, *Alcelaphus buselaphus swaynei*, was studied in Senkele Swayne's Hartebeest Sanctuary (SSHS). The size of the sanctuary has been diminishing since 1974, resulting in the shrinking of the area available for the hartebeests. Even in the current available habitat, the animals still preserved their behaviour of ranging in wider area during the wet season and smaller area during the dry season. However, when the human settlers migrate from the sanctuary and the bordering area during the dry season, the hartebeests occupy a range which is larger than their wet season range in the sanctuary. As their dry season home range increased in absence of the settlers, their movement was observed to have increased becoming equivalent to that of the wet season.

Key words/phrases: *Alcelaphus buselaphus swaynei*, home range, human interference, movement, Senkele Swayne's Hartebeest Sanctuary

INTRODUCTION

Swayne's hartebeest, *Alcelaphus buselaphus swaynei*, ("Korkey" in Amharic), is a subspecies of the widespread African antelope, *Alcelaphus buselaphus*. Both sexes of them have horns which spread into wide brackets, but they are heavier and have more pronounced knobs in the males. The general body colour is chestnut brown, whereas the rump, hind legs and the lower half of the fore legs are brown. The tail tuft is black, and has a black stripe extending from the shoulder to just above the knee.

The distribution of this hartebeest is restricted to Ethiopia. They are present in the Senkele Swayne's Hartebeest Sanctuary (SSHS), Nechisar National Park, Awash National Park, and Maze Wildlife Area (Hillman, 1993). Bolton (1973), reported the presence of Swayne's hartebeest in Yabello (southern Ethiopia), but according to Hillman (1993) it is now extinct in that area. Herds of thousands of individuals were observed by Brigadier-General Swayne, who first reported them in 1891–1892 south of the Golis range of Somaliland (Last, 1982).

Swayne's hartebeests in SSHS are in danger of extinction during the time of this study (February

1999 to December 1999) than any other time in the past. The ever-diminishing range of the subspecies is threatened by loss of habitat to subsistence agriculture and livestock overgrazing. Poaching is still one of the main threats to their survival.

Accurate estimation of the size of home range is an important prerequisite to a better understanding of the behavioural ecology of any species and for its management (Sanderson, 1966; Cederlund and Okarma, 1988). A number of factors such as season, availability of food, breeding activity and population density affect home range estimates. Koepl *et al.* (1975), Samuel and Garton (1985) and Samuel *et al.* (1985) defined home range as that area traversed by the individual in its normal activities of food gathering, mating and caring for young.

Even though it is generally known that the home ranges of alcelaphines are larger during the wet seasons than in the dry season (Estes, 1974; 1991), in the case of the SSHS hartebeests, we attempted to see whether this was affected by the new human settlements in the sanctuary. The aim of the present study was, therefore, to determine the size of home range of Swayne's hartebeest and to investigate how it varies seasonally.

* Author to whom correspondence should be addressed.

STUDY AREA

SSHS is located at about 300 km. south of Addis Ababa, and about 12 km. from the road between Shashemene and Alaba Kulito on the road to Arba Minch. The area is situated on the western side of the Ethiopian Rift Valley, approximately 7° 11.8' N, and 38°16' E (Fig. 1). The sanctuary was established in 1976 with the primary objective of saving the endangered Swayne's hartebeest (Hillman, 1993). Most of the area is a gently undulating plain at an altitude between 2225 m.a.s.l. at the top of Borena Mountain and 2030 m.a.s.l. at the head quarter in the sanctuary.

The monthly maximum temperature ranges between 26°C in the dry season and 21°C in the late wet season. The monthly minimum temperature during the dry season is ranging from 8°C to 15°C between March and May (Messana and Bereket Netsereab, 1994).

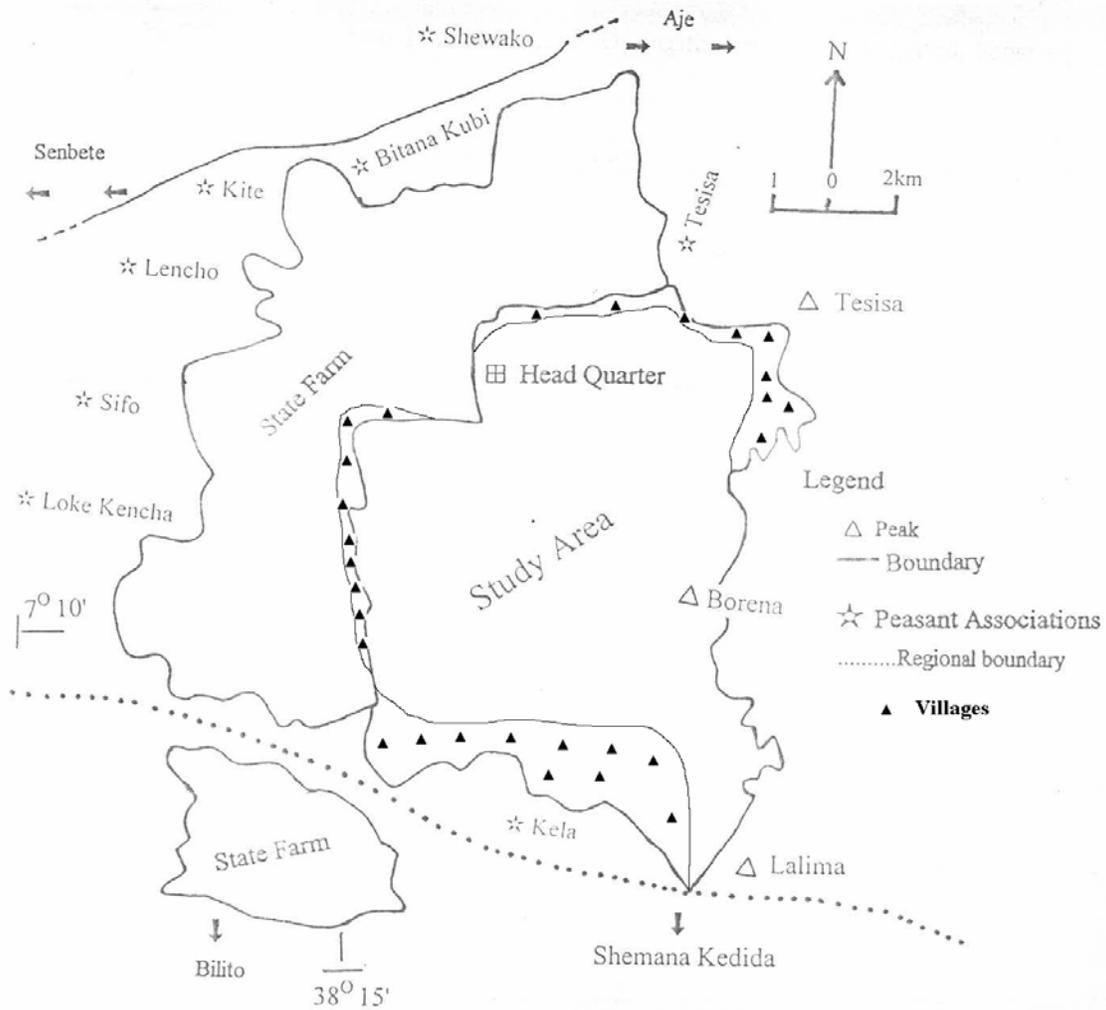
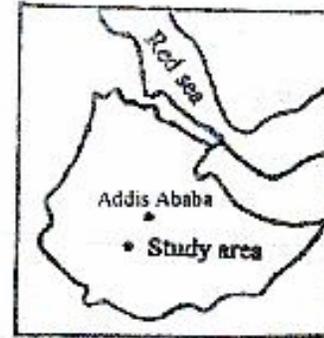


Fig. 1. Study area.

Adjacent to the sanctuary, on the west and north, is the state farm, which also has taken part of the land that used to belong to the sanctuary. The state farm remains fallow since the farm quit operation in 1995. People have settled inside the sanctuary, as well as between the state farm and the sanctuary, along the boundary (Fig. 1).

MATERIALS AND METHODS

Data on movement and home range size of the Swayne's hartebeest were obtained from ground observation of all the groups of Swayne's hartebeest in the sanctuary. All the groups were located two times in 24 hours, weekly for eight months. This was in accordance with the method of Leuthold and Sale (1973) and Wilson *et al.* (1966). A number of naturally marked individuals (broken legs, broken horns, differently coloured individuals, cut tails), group size, and composition of animals permitted identification of a group of Swayne's hartebeest as was done by Leuthold (1973) for buffalo. Home ranges were mapped by checking the movement and location of the animals (Pennyciuck, 1975). The location of the animals on the ground was approximated on the map and then transferred to a working map of the same scale (1:50,000) with 1 km² grids following Lindzey and Meslow (1977), Larson *et al.* (1978) and Murray (1982). Points on the ground, which were readily identifiable on a 1:50,000 map showing features such as roads and hills were also used to confirm the locations.

The size of home range was calculated by using the Minimum Convex Polygon (MCP) as described by Van Winkle (1975), Dedulding (1981), and Massei *et al.* (1997). The boundary of the home range was obtained by connecting the most peripheral locations where the members of a group have been observed (Catt and Staines, 1987; Jaremovic and Croff, 1987; Massei *et al.*, 1997).

RESULT AND DISCUSSION

The home range size estimated by MCP method varied between seasons. It was 16 km² for the wet season (May, June, July and August, 1999), and 9

km² for the dry season (February, March, November and December, 1999). The home range is greater during the wet season, because of the availability of palatable grasses all over the sanctuary during this season. In the dry season, when grasses are dry, the hartebeests tend to occupy only the range in close vicinity to Borena Mountain in the woody cover, which is about 9 km² (Fig. 2). However, in absence of people from the border of the sanctuary, the hartebeests moved into the fallow area of the state farm, and the home range size became 24 km² (Fig. 2).

The number of people from other places dwelling on the border lines of the sanctuary has been increased since 1991. They have their other farms in their respective peasants' associations, away from the sanctuary. Seasonally, especially in December, these settlers with their livestock leave the sanctuary for the purpose of harvesting crops in their farms outside the sanctuary (Nishizaki, 2001). In such time of evacuation of people and their livestock in the dry season, the hartebeests move out of their presently "usual range", to the fallow area that were the state farm, beyond the newly built huts of the people (Fig. 1). The home range size of about 24 km² is greater than their wet season range in the sanctuary. When the people and livestock come back to the sanctuary, the hartebeests move back to their dry season range of the sanctuary, which is by far smaller. This shows that in the absence of interference of people and livestock, the hartebeests occupy a wider home range. The wet season home range area also would have been larger than the 16 km² in the sanctuary if the influence from people and livestock are avoided. The expansion and contraction of the home ranges of the hartebeests is influenced not only by the wet and dry seasons, but also by the seasonal movements of the human population into and out of the area.

The wet and dry season home range differences seem to be determined by food availability. Food is available every where during the wet season, but is limited to the 9 km² woody area during the dry season. However, when there is no competition from the cattle, and food is available, the hartebeests could feed in other areas as well.

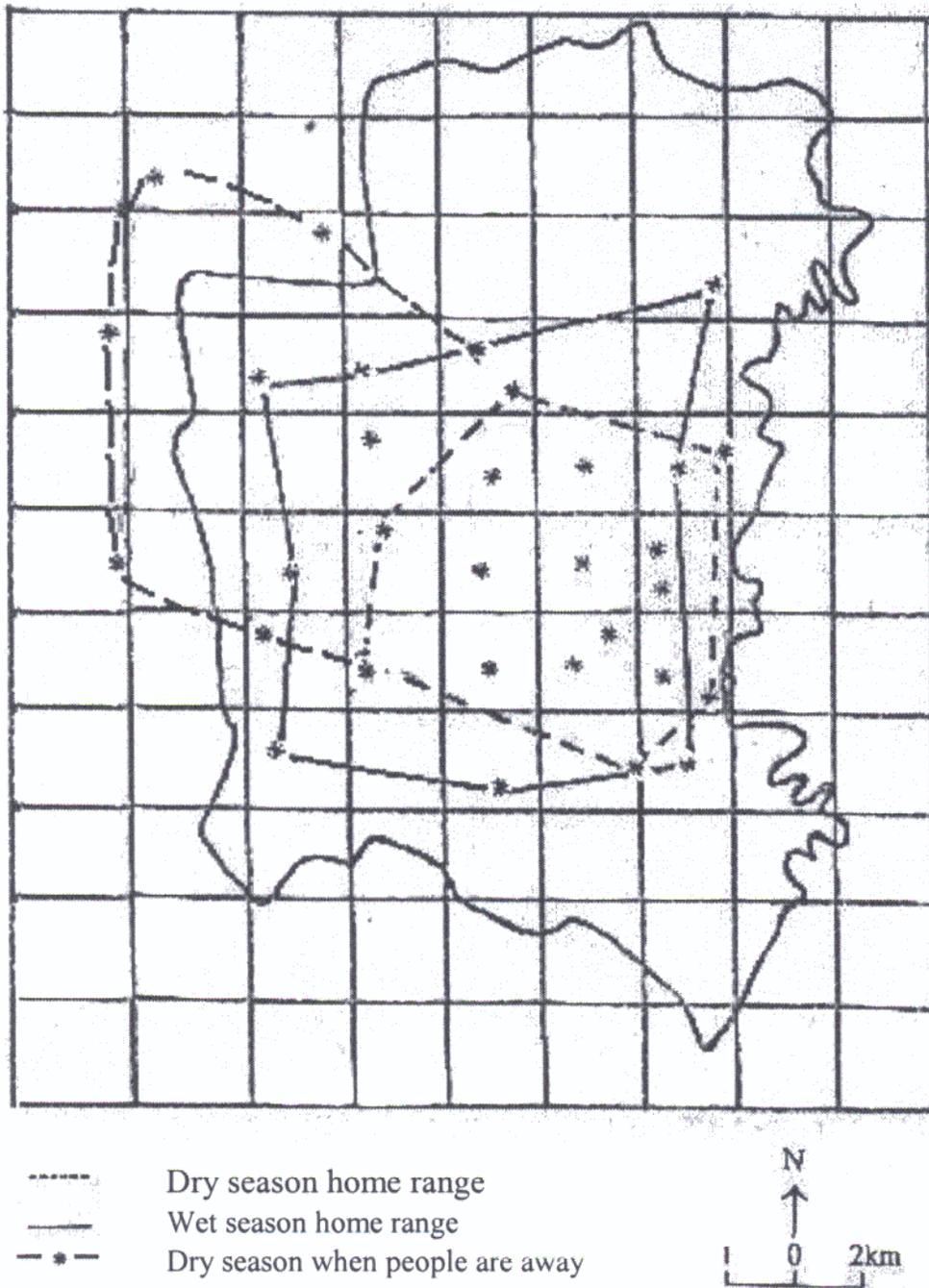


Fig. 2. Dry and wet seasons home range size.

The need for adequate grazing conditions is often cited as a major cause of movement in wildebeest (Talbot and Talbot, 1963), zebra (Bell, 1971), and caribou (Miller, 1974). The major cause of movement of the Swayne's hartebeest is found in this study to be the need for adequate grazing. The range area is very similar to the one reported for Hirola (*Damaliscus hunteri*) by Yakub (1999) in that the Hirola range area was smaller during the

dry season. Spatial use of home range is known to vary through out the year in response to the availability of food (Jonkel and Cowan, 1971).

The Swayne's hartebeests in SSHS were very often observed to move in a circle, usually returning in the evening to the point from where they started in the morning. They often remained in the same general area for prolonged periods. For the most part, the hartebeests move slowly in the

Sanctuary, feeding as they walk. Only occasionally do they walk in a deliberate fashion. The typical pattern observed during feeding is spending long period of time in the mornings and late afternoons, grazing while moving slowly but steadily over the grasslands. During the dry season, the hartebeests spend less time grazing, and they move shorter distances compared to the wet season. However, the spatial use of home range observed is highly influenced by human interference that the home range of the hartebeests had increased in absence of the human settlers, and the natural trend of movement in the dry season which is shorter distance has been drastically changed. This is consistent with the availability of food. Even though it was during the dry season, the fallow area of the state farm beyond the huts of the settlers provided better grazing area. This had enabled them to move as good as in the wet season.

ACKNOWLEDGEMENTS

We would like to thank Professor Zerihun Woldu and Medhane Asmelash for their help in making the maps and the anonymous reviewers for their comments.

REFERENCES

- Bell, R.H. (1971). A grazing ecosystem in Serengeti. *Scient. Am.* **225**:86-93.
- Bolton, M. (1973). Hartebeest in Ethiopia. *Oryx* **12**:99-108.
- Catt, D.C. and Staines, B.W. (1987). Home range use and habitat selection by red deer (*Cervus elaphus*) in a Sika spruce population as determined by radio tracking. *J. Zool. Lond.* **211**:681-693.
- Cederlund, G.N. and Okarma, H. (1988). Home range and habitat use of adult female Moose. *J. Wildl. Manage.* **52(2)**:336-343.
- Deduling, H.L. (1981). Summer home range of Mule deer fawns. *J. Wildl. Manage.* **45(3)**:726-728.
- Estes, R.D. (1974). Social organization of the African Bovidae. In: *The Behaviour of Ungulates and its Relation to Management*. (Geist, V. and Walther, F., eds). IUCN Publication, Morges, Switzerland.
- Estes, R.D. (1991) *The Behavior Guide to African Mammals*. The University of California Press. Berkeley and Los Angeles, California.
- Hillman, J.C. (1993). *Ethiopia: Compendium of Wildlife Conservation Information*. EWCO, NYZS.
- Jaremovic, R.V. and Croff, D.B. (1987). Comparison of techniques to determine Eastern Grey Kangaroo home range. *J. Wildl. Manage.* **51(4)**:921-930.
- Jonkel, C.J. and Cowan, I.M. (1971). The black bear in the spruce-fir forest. *Wildl. Monogr.* **27**:1-57.
- Koepl, J.W., Slade, N.A. and Hoffman, R.S. (1975). A bivariate home range model with possible application to ethological data analysis. *J. Mamm.* **56**:81-91.
- Larson, T.J., Rongstad, O.J. and Terbilcox, F.W. (1978). Movement and habitat use by white tailed deer in south central Wisconsin. *J. Wildl. Manage.* **42(1)**:113-117.
- Last, J. (1982). *Endemic Mammals of Ethiopia*. Ethiopian Tourism Commission, Addis Ababa.
- Leuthold, W. (1973). Home range, movements and food of a buffalo herd in Tsavo National Park, Kenya. *E. Afr. Wildl. J.* **10**:233-234.
- Leuthold, W. and Sale, J.B. (1973). Movement and habitat utilization of elephants in Tsavo National Park. *E. Afr. Wildl. J.* **11**:369-384.
- Lindzey, F.R. and Meslow, E.C. (1977). Home range and Habitat use by black bears in Southwestern Washington. *J. Wildl. Manage.* **41(3)**:413-425.
- Massei, G., Geriove, P.V., Staines, B.W. and Gorman, M.L. (1997). Factors influencing home range and activity of wild boar (*Sus scrota*) in a Mediterranean coastal area. *J. Zool. Lond.* **242**:414-423.
- Messana, G.G. and Bereket Netsereab (1994). *The Senkele Swayne's Hartebeest Sanctuary Management Plan*. EWCO, Addis Ababa.
- Miller, R.D. (1974). Seasonal changes in the feeding behaviour of barren ground Caribou on the Tagia Winter Range. In: *The Behaviour of Ungulates and its Relation to its Management*. No. 41, pp. 744-755, (Geist, V. and Walter, F., eds). IUCN Publication.
- Murray, M.G. (1982). Home range, dispersal and the clan system of impala. *Afr. J. Ecol.* **20**:253-269.
- Nishizaki, N. (2001). Towards the co-existence of people and wildlife: Natural Resource Conservation and Utilization in Senkele Swayne's Hartebeest Sanctuary, Ethiopia. Research Report submitted to Research and Publication Office and Department of Biology, AAU.
- Pennyciuck, L. (1975). Movement of the migratory wildebeest population in the Serengeti area between 1960 and 1974. *E. Afr. Wildl. J.* **13**:65-87.
- Samuel, M.D. and Garton, E.O. (1985). Home Range: a weighted normal estimate and tests of underlying assumptions. *J. Wildl. Manage.* **49(2)**:513-519.

24. Samuel, M.D., Pierce, D.J. and Garton, E.O. (1985). Identifying areas of concentrated use within the home range. *J. Ani. Ecol.* **54**:711-719.
25. Sanderson, G.C. (1966). The study of mammal movements - a review. *J. Wildl. Manage.* **30**(1):215-235.
26. Talbot, L.M. and Talbot, M.H. (1963). The Wildebeest in Western Masailand, East Africa. *Wildl. Monogr.* **12**:1-88.
27. Van Winkle, W. (1975). Comparisons of several probabilistic home range models. *J. Wildl. Manage.* **39**:118-123.
28. Wilson, D.E., Cole, F.R., Nichols, J.D., Rudran, R. and Foster, M. (1966). *Measuring and Monitoring Biological Diversity. Standard Methods for Mammals.* Smithsonian Institution Press, Washington, D.C.
29. Yakub, M.O. (1999). Population size and seasonal distribution of the hirola (*Damaliscus hunterii*). Unpubl. MSc Thesis, Addis Ababa University.