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HOME RANGE SIZES OF CAPE MOUNTAIN ZEBRAS *EQUUS ZEBRA ZEBRA* IN THE MOUNTAIN ZEBRA NATIONAL PARK

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Abstract — The mean home range size of Cape mountain zebra breeding herds was 9,4 km² (range 3,1 — 16,0 km²). In two herds which split up, the home ranges of the resultant herds included the original home ranges, but were larger.

Introduction

The home range sizes of the Cape mountain zebra *Equus zebra zebra* breeding herds in the Mountain Zebra National Park (MZNP), Republic of South Africa, were determined during an ecological study of the population. Although mountain zebras are not territorial (Klingel 1968; Penzhorn 1979), it soon became evident that breeding herds did not roam over the entire MZNP, but confined their activities to certain areas. Some herds were located in the same locality with such frequency that their presence at a given locality could be predicted with a fair degree of accuracy.

Seton (1909, *In:* Sanderson 1966) pointed out that "no animal roams at random over the country; each has a home-region, even if it has not an actual home". Burt (1943) defined a *home range* as the area traversed by the individual in its normal activities of food gathering, mating and caring for the young. Jewell (1966) restated the definition as "home range is the area over which an animal normally travels in pursuit of its routine activities". Jewell further regarded a home range as an area with a certain productivity that met the energy requirements of the individual or group that occupied it. It therefore bore a relation to the density at which a given population existed. Smuts (1975), studying plains zebras *E. burchelli* in the Kruger National Park, could not demonstrate a relationship between population density and home range size. McNab (1963) stated that the size of the home range in mammals is determined by the rate of metabolism: "A large mammal has a larger home range than a small mammal, because it uses more energy and, therefore, needs a greater area in which to find this energy".

The topography and vegetation of the MZNP were described by Penzhorn (1979) and Van der Walt (1980). The study was conducted between June 1971 and October 1973.

Methods

The roads in the Rooiplaat and Kranskop areas of the MZNP were traversed regularly and all sightings of mountain zebras were recorded. Bachelor groups were seen less frequently than breeding herds (Penzhorn 1982a) and an arbitrary decision was made to ignore herds seen less than 50 times. The sightings of each group were plotted on a map and the peripheral points connected to produce a polygon, the "minimum home range" (Mohr 1947; Hayne 1949). Sightings during summer and winter were initially plotted separately, but they overlapped extensively and were therefore lumped.

Results and Discussion

The home range sizes of 16 breeding herds were calculated. The mean home range size was 9,4 km^2 (range: 3,1 — 16,0 km^2; SD = 2,26; CV =24,0%). There were some indications of different core areas (Kaufmann 1962) during the different seasons, e.g. sightings during the summer often tended to be on the Rooiplaat Plateau and during winter sightings in the sheltered kloofs along the western boundary were more frequent. The differences in utilisation of Rooiplaat in relation to rainfall have been described elsewhere (Penzhorn 1982a).

Hartmann zebras *E.z. hartmannae* in South West Africa/Namibia have winter grazing areas of 6-10 km^2 in the Daan Viljoen Game Reserve and 10-20 km^2 in the Otjovasandu area of the Etosha National Park (Joubert 1972). The summer grazing areas are considerably smaller at both localities. At Otjovasandu the winter and summer grazing areas are separated by *ca* 120 km.

Plains zebras have home ranges of 80-250 km^2 in the Ngorongoro Crater, Tanzania (Klingel 1969), and a mean home range of 167 km^2 (range: 49-566 km^2) in the Kruger National Park (Smuts 1975). The latter figures include migration routes, since a varying period of time, depending on local conditions, may be spent in the transitional passage area. New Forest ponies *E. caballus* in southern England have home ranges of 0,8-10,2 km^2, (Tyler 1972). Tyler and Smuts both reported that home range sizes were independent of group size. In the Pryor Mountain Wild Horse Range, Wyoming, USA, feral horse home ranges varied from 3,0 to 32,0 km^2, with a mean of 14,9 km^2 (Feist & McCullogh 1976). The home range of a herd of feral horses at the Grand Canyon, Arizona, USA, decreased from 48 km^2 during the late winter-early spring to 8 km^2 at midsummer (Berger 1977). Feral donkeys *E. asinus* in the Chemehuevi Mountains, southeastern California, USA, had a mean home range of 32,0 km^2, with a range from 4,0 to 97,0 km^2 (Woodward 1979).

The size and shape *per se* of home ranges are probably not important. A home range for a mountain zebra herd should include sufficient grazing, at least one permanent drinking place, mineral licks (Penzhorn 1982b) and sufficient shelter. Generally, if all the requirements of a species could be provided in a small area, its home range would probably be smaller — down to some unknown minimum size — than the average now found for the species (Sanderson 1966). The shapes of Cape mountain zebra home ranges determined during the present study were obviously

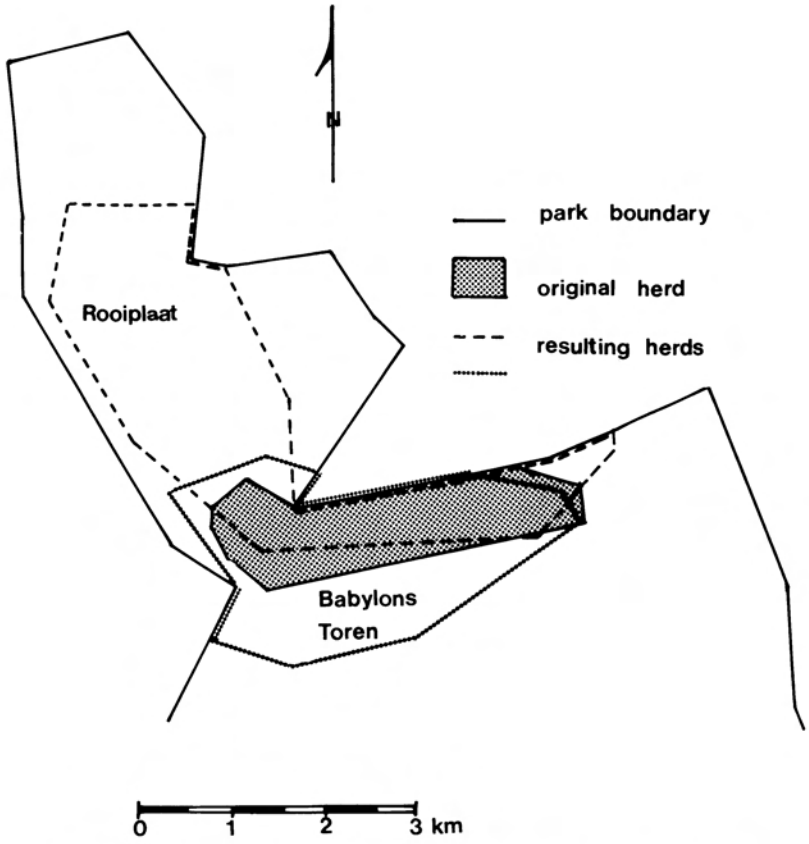

Fig. 1. Map showing a portion of the Mountain Zebra National Park with the home range of a Cape mountain zebra breeding herd which split up and the home ranges of the two resulting breeding herds.

influenced to a great extent by the MZNP boundaries (Figs 1 and 2). An investigation of the shape or general proportions of the home ranges, such as median-composite ranges (Mohr & Stumpf 1966), would therefore be spurious.

Home ranges of free-ranging Cape mountain zebra herds could well have been in excess of those described in the MZNP during the present study. Joubert's (1972) observations on the vast distances covered by Hartmann zebra herds between the summer and winter home ranges (or grazing areas) would tend to support this. The social structure of mountain zebra populations make them independent of site attachment and hence possibly well adapted to changing conditions by being free-ranging and not tied to any specific area (Penzhorn 1979).

In the Kruger National Park, the home ranges of plains zebras in optimum habitat were smaller than elsewhere (Smuts 1975). In New Forest ponies, Tyler (1972) reported that there were four requirements within any home range: a grazing area, shelter, water and shade. When these four requirements were present close

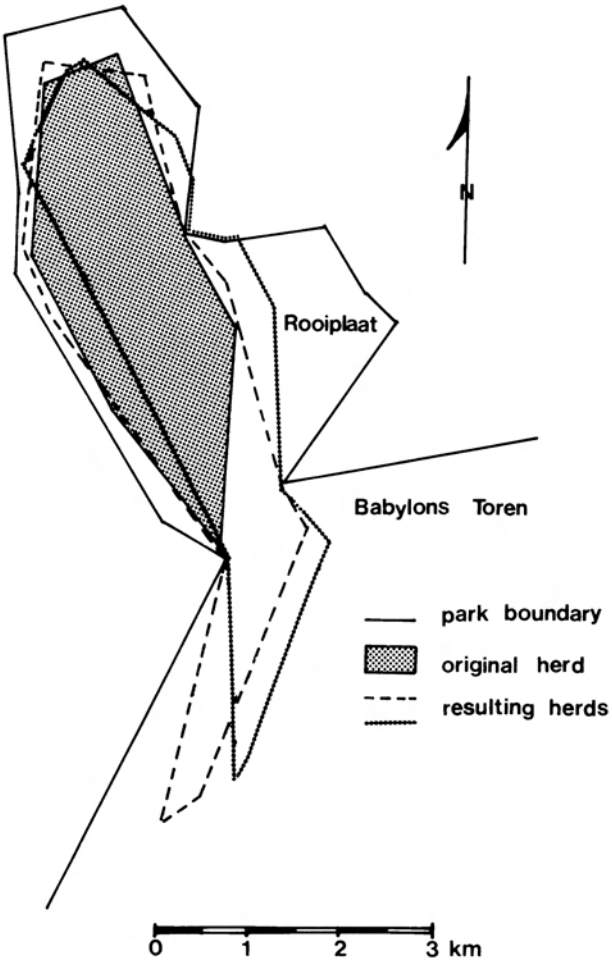

Fig. 2. Map showing a portion of the Mountain Zebra National Park with the home range of a Cape mountain zebra breeding herd which split up and the home ranges of the two resulting breeding herds.

together, the home range was small (0,8-1,6 km^2). The largest recorded home ranges (6,6-10,2 km^2) were in an area where the grazing was found on a hill top, where the ponies also shaded, while shelter and water were found in the valleys and woods, some distance away.

Two of the Cape mountain zebra breeding herds of which the home ranges had been determined, split up during the study. The home ranges of the resulting breeding herds included those of the original herds, but were larger (Figs 1 and 2). This implies that mares play an important role in the delimination of group activities and hence of the area covered by a breeding herd. Leadership in breeding herds is random, and mares frequently determine group activity (Penzhorn 1979).

During a severe dry period in the 1972/73 summer when there was no surface water on Rooiplaat for a few weeks, a number of breeding herds drank at a dam at the eastern end of Babylons Toren, a few kilometres from the entrance to Rooiplaat. In a few instances observed, breeding herds which had been grazing on Rooiplaat purposefully headed eastward toward the dam, drank, and then returned to the area where they had been grazing.

A knowledge of the area beyond the usual home range would be beneficial to the mountain zebras. The long period during which foals remain with their maternal herds probably enables the foals to learn the locality of water-holes and good feeding areas, which they may later utilize under adverse conditions. The bachelor groups were observed to range widely, certainly over greater areas than the breeding herds (Penzhorn 1982a). The knowledge thus gained by a bachelor could be important at a later stage when, as a herd stallion, he could lead his breeding herd to alternative water-holes when those within their usual home range had dried up. Geist (1971) demonstrated the importance of learning for mountain sheep *Ovis canadensis* to know suitable home ranges.

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REFERENCES

BERGER, J. 1977. Organizational systems and dominance in feral horses in the Grand Canyon. *Behav. Ecol. Sociobiol.* 2: 131-146.

BURT, W.H. 1943. Territoriality and home range concepts as applied to mammals. *J. Mammal.* 24: 346-352.

FEIST, J.D. and D.R. McCULLOGH. 1976. Behaviour patterns and communication in feral horses. *Z. Tierpsychol.* 41: 337-371.

GEIST, V. 1971. *Mountain sheep: a study in behaviour and evolution.* Chicago: Univ. Chicago Press.

HAYNE, D.W. 1949. Calculation of home ranges. *J. Mammal.* 30: 1-18.

JEWELL, P.A. 1966. The concept of home range in mammals. *Symp. zool. Soc. Lond.* 18: 85-109.

JOUBERT, E. 1972. The social organization and associated behaviour in the Hartmann zebra *Equus zebra hartmannae. Madoqua Ser. I.* 6: 17-56.

KAUFMANN, J.H. 1962. Ecology and social behaviour of the coati, *Nasua narica,* on Barro Colorado Island, Panama. *Univ. Calif. Publs Zool.* 60: 95-222.

KLINGEL, H. 1968. Soziale Organisation und Verhaltensweisen von Hartmann- und Bergzebras *(Equus zebra hartmannae* und *E.z. zebra). Z. Tierpsychol.* 25: 76-88.

KLINGEL, H. 1969. The social oganisation and population ecology of the plains zebra *(Equus quagga). Zool. afr.* 4: 249-263.

McNAB, B.K. 1963. Bio-energetics and the determination of home range size. *Am. Nat.* 97 (894): 133-140.

MOHR, C.O. 1947. Table of equivalent populations of North American small mammals. *Am. Midl. Nat.* 37: 223-249.

MOHR, C.O. and W.A. STUMPF. 1966. Comparisons of methods for calculating areas of animal activity. *J. Wildl. Mgmt* 30: 293-304.

PENZHORN, B.L. 1979. Social organisation of the Cape mountain zebra *Equus z. zebra* in the Mountain Zebra National Park. *Koedoe* 22: 115-156.

PENZHORN, B.L. 1982a. Habitat selection by Cape mountain zebras in the Mountain Zebra National Park. *S. Afr. J. Wildl. Res.* 12: 48-54.

PENZHORN, B.L. 1982b. Soil-eating by Cape mountain zebras in the Mountain Zebra National Park. *Koedoe* 25: 83-88.

SANDERSON, G.C. 1966. The study of animal movements — a review. *J. Wildl. Mgmt* 30: 215-235.

SMUTS, G.L. 1972. Home range sizes for Burchell's zebra *Equus burchelli antiquorum* from the Kruger National Park. *Koedoe* 18: 139-146.

TYLER, S.J. 1972. The behaviour and social organisation of the New Forest ponies. *Anim. Behav. Monogr.* 5: 85-196.

VAN DER WALT, P.T. 1980. A phytosociological reconnaissance of the Mountain Zebra National Park. *Koedoe* 23: 1-32.

WOODWARD, S.L. 1979. The social system of feral asses *(Equus asinus). Z. Tierpsychol.* 49: 304-314.