

# **KRUGER NATIONAL PARK**

## **DEPARTMENT OF RESEARCH MEMORANDUM**

### **MONITORING OF UNGULATE POPULATION STRUCTURE IN THE KRUGER NATIONAL PARK**

Report on a survey during August, September  
and October 1990

Compiled by  
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Skukuza, April 1991

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Dept of Research

## MEMORANDUM

### MONITORING OF UNGULATE POPULATION STRUCTURE IN THE KRUGER NATIONAL PARK - REPORT ON A SURVEY DURING AUGUST, SEPTEMBER AND OCTOBER 1990

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#### INTRODUCTION

Data on age distributions (the proportions of different age-groups) and sex ratios pertaining within animal populations provide a useful basis for assessing recruitment and survival rates. While population trends reflect the interplay of numerous, often variable, environmental factors, they are effectively determined by the relative rates of natality and immigration versus mortality and emigration. Long term monitoring of ungulate populations is essential for understanding their dynamics vis-à-vis environmental variables and thereby providing a basis for enlightened management.

Monitoring of the major ungulate populations in the Kruger National Park (KNP) has largely depended on standardised aerial censusing techniques. These aerial surveys are conducted annually during the dry season and also provide some data on calf percentages and social structure for certain large herbivore populations, but not the more comprehensive data on sex and age composition that can be obtained from periodic sample counts on the ground. Moreover, apparent trends in population numbers based on aerial counts may be subject to counting variability between successive years. Field classifications of sex and age classes also have limitations, particularly in that they do not provide information on adult mortality, which is necessary for interpreting age ratios. Adult mortality rates may markedly influence estimates of juvenile mortality based on the proportions of juveniles and adults at different times, and increases or decreases in population size may occur without change in age ratios (see Caughley 1974). Ideally therefore, a combination of aerial and ground surveys should facilitate more reliable assessment of population trends by providing complementary data on population size and structure.

#### OBJECTIVES

To facilitate understanding of the processes which naturally regulate ungulate populations in the KNP, regular field classifications of sex and age classes are undertaken to establish base-line data on long-term population dynamics which may highlight interspecific demographic patterns and responses. Particular objectives are :

1. To assess the usefulness of sex and age ratios as indicators of population trends of ungulates in the KNP;
2. To investigate variance of these ratios in relation to sample size;
3. To investigate correlations between these ratios and rainfall patterns.

## METHODS

Standardised ground surveys of population structure of ungulates (excluding buffalo, hippopotamus and impala) were conducted for the eighth successive year in 18 representative sampling regions (Fig. 1) delineated and simplified from the 35 landscape units described and mapped by Gertenbach (1983). Over 13 000km were traversed by vehicle between 13 August and 31 October 1990, making every effort to count and classify all ungulates encountered to ensure representative samples of their population structure. Criteria and methodology have been described by Mason (1990). Population samples of zebra, wildebeest and giraffe were analysed according to only four sampling regions (coinciding with administrative regions) demarcated by the Sabie, Olifants and Shingwedzi Rivers. Because impala frequently occur in large herds comprising several sex and age classes, sampling of their population structure was delegated to two assistants. However, the results were unsatisfactory and did not constitute a representative population sample.

Current estimates of ungulate population levels are derived from the 1990 ecological aerial survey using a fixed-wing aircraft to cover all of the KNP except the Punda Maria / Pafuri region in the far north, which was omitted because of delays caused by aircraft problems and overcast weather (Viljoen 1991). Following the discovery of incorrect data entries for the 1986 aerial counts (Viljoen, *op. cit.*) the corrected totals have been incorporated in all relevant tables of this report.

## RESULTS AND DISCUSSION

Fieldwork in the Northern Region coincided with the peak of an anthrax epidemic that had commenced there during August 1990 and caused mortality among 15 ungulate species ranging from steenbok to white rhinoceros. Although the epidemic continued into the first half of November and spread into some localities north of the Shingwedzi River, it did not overtake the ground survey of ungulate population structure in the Far Northern Region, where subsequent anthrax deaths were moreover very few. The results of population sampling in the Central Region were likewise unaffected although isolated anthrax deaths subsequently occurred along or near the southern fringes of the Olifants River. Of a total of 723 ungulate carcasses where anthrax was confirmed or suspected and which were burnt as part of a campaign of countermeasures, kudu comprised 43,6% and buffalo 40,2%.

Very dry conditions prevailed in the northern half of the KNP until mid-November, and along the lower Luvuvhu River ungulates were frequently in poor condition and would probably have suffered substantial starvation-induced mortality if meaningful rains had been delayed a few more weeks. In the wilderness trails area south of the confluence of the Olifants and Letaba Rivers, the very sparse ground cover that occurred during fieldwork in 1989 had improved noticeably.

Analyses of sex and age composition and categories of social units are tabulated separately (Tables 1 - 18). Where data for certain ungulates may not be representative due to small sample size, the proportions of sex and age classes and social units are merely listed for all sampling regions combined. Major sampling compartments demarcated by rivers have been designated according to the administrative regions with which they coincide, viz.

Southern Region	-	between the Crocodile and Sabie Rivers;
Central Region	-	between the Sabie and Olifants Rivers;
Northern Region	-	between the Olifants and Shingwedzi Rivers;
Far Northern Region	-	between the Shingwedzi and Limpopo Rivers.

## ZEBRA (Tables 1 and 2)

Aerial counts of zebra in the KNP in relation to annual percentages of adult females with juveniles in population samples over the past eight years are summarised below:

Three steenbok deaths due to anthrax and one suspected were recorded in the Northern Region during the 1990 epidemic.

### SHARPE'S GRYSBOK

Total sample = 14 (excluding two individuals that could not be classified)

Sex and age composition: 9AM, 5(A+J)F.

Social units: 9 lone AM, 5 lone (A or J) F.

Regions where sightings were recorded: E,I,L,M,N,O,P,R.

### ROAN ANTELOPE

Compared to the 1989 aerial count of 204 roan antelope in the entire KNP, the 1990 tally was only 167 animals although the Punda Maria/Pafuri census compartment (where eight roan were counted in 1989) was omitted. Mean group size was 3,3 (cf. 5,2 in 1989) and only two herds of more than 10 animals were counted from the air (cf. six in 1989). During the 1990 ground survey, all individuals (n=38) from a total of 11 observations of roan antelope were counted and classified. Mean group size from the ground was 3,5 (range 1-8). The following social units were recorded:

- 2 lone AM - region M
- 1 breeding group (1AM+5AF+2J) - region M
- 1 breeding group (3AF+1YF+2J) - region M
- 1 bachelor group (4AM, all estimated 2-3 years) - region M
- 1 lone AM - region O
- 3 lone AM - region P
- 1 breeding group (4AF+4J) - region P
- 1 breeding group (4AF+1YF+1J) - region P

The 1990 anthrax epidemic caused nine deaths of roan antelope (2 males, 7 females) and was suspected of causing the death of one female, all in the Northern Region. A breeding herd of about 15 roan antelope, including one adult bull and at least three calves, was reported on a burnt area about 2 km south of Sekurakwane outpost on the Sabie River (region A) on 90.06.09 (K. Williams).

### WHITE RHINOCEROS

Total sample = 61.

Sex and age composition: The population sample comprised 48 adults (30AM, 18AF), 1 subadult male (estimated 2-3 years old), 3 subadult females (1 estimated 2-3 years old and 2 estimated 3-4 years old), 3 yearlings (1M,2F), 6 juveniles (4M,1F,1 unsexed).

Social units: 12 lone AM, 4 bachelor groups (of 2AM each), 5 (AM+AF) pairs, 1(AF+SAF) pair, 1 (AF+SAF) pair accompanied by 1AM, 2 (AF+YF) pairs, 3(AF+J) pairs, 3(AF+J) pairs accompanied by 1AM, 1 association of 1AF+1SAF+1YM, 1 association of 2AF+1SAM accompanied by 1AM.

Regions where sightings were recorded: A,B,C,D,E,F (41,0% of rhinos classified were from region B).

The 1990 aerial count total of 1 381 white rhinos in the KNP (excluding the Punda Maria/Pafuri region where three were counted for the first time in 1988) was 7,6% higher than in 1989. Mean group size recorded from the ground was 1,8 (range 1-4) compared with a mean group size of 2,2 from the air, and 36,4% of ground observations involved single individuals, all adult males. Singletons comprised 19,7% of

the total number of rhinos encountered (n=61) during the ground survey, compared with 12,6% of the population recorded from the air.

Signs of an adult male white rhino were observed as far north as the Dothole windpumps, 17 km SSW of Punda Maria camp, on 90.10.23. Two male white rhinos killed by anthrax were recorded in the Northern Region during September 1990.

## BLACK RHINOCEROS

An adult bull and adult cow were seen together 3 km southwest of Marabou windpump in the Sweni wilderness trails area (region D) on 90.09.06. In the Nduzi area near the Mocambique boundary, several old dungheaps were found along the Matshamabye watercourse 1,5 km west of the confluence with the Olifants River on 90.09.28 (Dr. D.R. Mason). Two dungheaps were also reported over 5 km southwest of the Matshamabye site on the north bank of the Olifants River near the confluence with the Letaba River on 90.09.05 (M. Engelbrecht).

## LICHTENSTEIN'S HARTEBEEST (*Sigmoceros lichtensteinii*)

Of the animals reintroduced from Malaŵi, an adult bull and adult cow were seen together in region O and a yearling male in region P. The yearling male was associating closely with the cows of a breeding herd of tsessebe (one adult male, three adult females and two females aged about 11-12 months) near the Nwarihangari South windpumps on 90.10.13. Although the yearling Lichtenstein's hartebeest bull was still slightly smaller than the adult tsessebe bull, survival and growth past two years of age would give the former a distinct size advantage over tsessebe bulls in any competition for tsessebe cows that could arise because of the scarcity of hartebeest cows in the region, and interbreeding could occur. A presumed hybrid between a red hartebeest (*Alcelaphus buselaphus caama*) and a tsessebe (*Damaliscus lunatus lunatus*) was reported by Selous (1893); the colour of the body, legs and head resembled a tsessebe while the skull and large bushy tail were hartebeest-like and the horns intermediate. (During 1988 a genetically-confirmed roan/sable antelope hybrid was recorded in the KNP).

## BUSHPIG

Since the first two reports of a lone bushpig, probably the same individual, along the Sabie River between Skukuza and Mkulu picnic site during December 1988 and January 1989, a pair of adult bushpigs was reported along the south bank of the Sabie River about 6km WNW of Skukuza (F. Strydom). These pioneer immigrants would almost certainly have dispersed along the Sabie River from localities where bushpigs are fairly common near Hazyview town only some 20 km upstream from where the river enters the KNP. Photographs of the Sabie River in the early 1900's show that the river banks and fringing habitats were much more open. Woody vegetation has subsequently encroached and thickened dramatically so that today there are belts of riparian closed canopy woodland abutted by extensive areas where the shrub layer forms virtual thickets. Since the Sabie riparian belt now provides favourable habitat for bushpigs, their range expansion and colonisation of this avenue within the KNP should proceed quite rapidly.

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