Seasonal Landscape Preference of the White Rhinoceros in the Southern Timbavati

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The wet and dry season landscape preference of the White Rhinoceros in the 14 780ha Ngala concession in the southern Timbavati Private Nature Reserve is described and densities measured. This data is analysed using a preference index and is compared with landscape preference and density in the northern, central and southern Kruger National Park as determined by Pienaar et al in 1992 and 1993.

Introduction

In an attempt to understand White Rhino territory size and habitat utilisation in the southern part of the Timbavati Private Nature Reserve (TPNR), some interesting observations on seasonal landscape preference emerged.

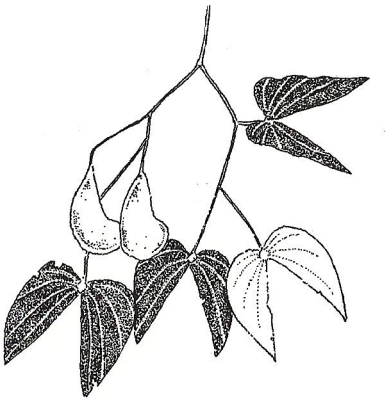
Ngala is comprised of three principal landscape types: a) *Colophospermum mopane* woodland, b) *Combretum apiculatum* woodland, and c) *Acacia nigrescens* savanna (Roche, C. 2000a). These landscape types essentially conform to Gertenbach's Landscape 6 ('Combretum spp/ Colophospermum mopane woodland'), Landscape 5 ('Mixed Combretum spp./Terminalia sericea woodland') and Landscape 19 ('Thornveld on gabbro') respectively (Gertenbach, 1983). For the sake of comparative uniformity, these landscape types will be referred to under Gertenbach's categorisation in this study.

Landscape 6 comprises only 1 345ha at Ngala and as such is not included in the data for this study. The study area then is comprised in almost equal parts of Landscape 5 (46%) and Landscape 19 (54%). Pienaar et al (1992, 1993a), using annual aerial census data, a *chi square* * test and a preference index, were able to determine landscape preference for White Rhino in the southern, central and northern Kruger National Park (KNP). In the central KNP, adjacent to the study area, Landscape 5 is the fifth most preferred landscape, while Landscape 19 is the twelfth most preferred landscape (Pienaar et al 1993a). In the southern KNP Landscape 5 is the fourth most preferred landscape (Pienaar et al 1992), while Landscape 19 is absent; all data for the aforementioned study was collected in the dry season and as such reflects 'dry season habitat utilisation', 'however as white rhinoceros . . . do not exhibit seasonal migrations, the distribution data may be considered representative for the whole year' (Pienaar et al, 1992). In the southern Timbavati, White Rhino densities in Landscapes 5 and 19 showed remarkable seasonal variation and the differing densities and preference indices are below compared to the findings in the KNP.

** a chi square is a method of comparing observed and theoretical values in statistics.*

Results

Landscape preference implies the favouring of one landscape over another and assumes unfettered movement and 'choice'. Some topographical features of a landscape that have been identified as being of importance to White Rhino, are the presence of river or stream banks (where rhino feed on shade-loving grass species in the cooler mornings), the ridges along watersheds (where rhino rest in the shade) and the clayey soils that accumulate in the bottomlands (where rhino utilise the mud wallows) (Pienaar et al 1993a). The presence of these, as well as the availability of water, might be assumed to have some influence on landscape preference. In this study, as well as in Pienaar et al, 'the landscape white rhinoceros prefer most . . . is that with which they are associated most frequently. That is, that landscape which had the highest White Rhino density and showed the greatest White Rhinoceros frequency of occurrence in relation to size' (Pienaar et al 1992).



The following variables and formula (after Pienaar et al 1992) were used:

- n_x = the number of White Rhinoceros in landscape 'x'
- N_1 = the total number of White Rhinoceros in the study area
- a_x = the surface area - square km - of landscape 'x'
- A_1 = the total surface area - square km - of the study area
- n_x/N_1 = the proportion of White Rhinoceros recorded in landscape 'x' relative to the total population of the study area.
- a_x/A_1 = the proportion of the study area covered by landscape 'x'

$$P.I._{(x)} = \frac{-1}{n_x/N_1}\ (a_x/A_1 - n_x/N_1)$$

Table 1: A comparison of seasonal White Rhino density and landscape preference indices in the central and northern KNP (Pienaar et al 1993a) and the southern TPNR. (density = White Rhino per square km)

Landscape	Density KNP	Preference KNP	Density Ngala		Preference Ngala	
			Wet	Dry	Wet	Dry
5	0,0209	0,4541	0,0647	0,2428	-0,9547	0,2028
19	0,0119	0,0442	0,1792	0,1516	0,2937	-0,2766

As is evident from Table 1, the White Rhino densities at Ngala are significantly higher, both in the dry and wet seasons, than those in the same landscapes in the adjacent KNP. This is possibly a reflection on the accuracy of aerial censuses (used by Pienaar et al 1992/3a) compared to the known animal count used in the data for the southern TPNR which would inevitably result in higher numbers. Given the huge difference in densities, however, this is more likely to be due to water provision in the study area. To determine if this was in fact the case and whether or nor it would have a significant bearing on the results of the study, Table 2 compares KNP data with that obtained in an aerial census of the study area in August 1999.

Table 2: A comparison of dry season White Rhino density and landscape preference indices in the central and northern KNP (Pienaar et al 1993a) and the southern TPNR using aerial census figures. (density = white rhino per square km)

Landscape	Density KNP	Preference KNP	Density Ngala	Preference Ngala
5	0,0209	0,4541	0,2428	0,2948
19	0,0119	0,0442	0,1103	-0,5527

The similarity of the Ngala figures in Tables 1 and 2 indicate that the differing White Rhino densities in the KNP and the study area are not likely to be attributable to different methods of data collection, but rather to local factors such as water provision.

Conclusion

What is clear from Table 1, is that there are marked seasonal differences in density and preference for the two major landscapes of the study area. In the wet season Landscape 19 is far more preferred than Landscape 5, which shows a negative preference index. Landscape 19 shows a minor decrease in White Rhino density in the dry season, which is contrasted by a marked increase in density in Landscape 5. This change results in a negative preference index for Landscape 19 in the dry season, while Landscape 5 is strongly preferred over it.

It is obvious then, that White Rhino in the study area do display some seasonal movement. This results in Landscape 19 being preferred by White Rhino in the wet season, while Landscape 5 is preferred in the dry season. The dry season findings in the study area display some similarity to those of Pienaar et al in the central and northern KNP, but the wet season data suggests a reversal that, while unexplained in this study, indicates that dry season data cannot be held 'representative for the whole year' (Pienaar et al, 1992). The 14 780ha study area does not offer a conclusive comparison to the much larger KNP, but the trends described above are clear. This very apparent localised seasonal movement in the White Rhino population of the study area, with regard to Landscape 5, is likely to have some bearing on the management of White Rhino populations in fenced reserves.

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