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**Conservation of lions and other large carnivores in
Etosha National Park and Khorixas District, Namibia**

***Population ecology and long term monitoring of
free-ranging populations in a marginal and arid environment.***

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INTRODUCTION

Lions and other large carnivores in sub-Saharan Africa have showed a marked reduction in numbers and distribution during the past five decades. This decline can be attributed to an increased conflict with human development (Nowell & Jackson 1996). Namibia supports a small lion population and there is concern over the long-term viability of Namibian lions. Most lions live in Etosha National Park (ENP) and the bordering Khorixas District (KD). Lions also occur in three other locations (Kaudom Game Reserve / Nyae Nyae Conservancy; western and eastern Caprivi) but numbers in those locations appear to be low. A conservation area, such as ENP does not offer full protection to lions because of intensive live stock farming along the borders. Lions often cause live stock losses along the borders and are persecuted (Van der Meulen 1977; Mills et. al 1978; Anderson 1981; Stander 1990). The long-term sustainability of this population is uncertain. This is mainly due to a shortage of scientific data on the ecological mechanisms that drive population regulation.

Despite the immense size of the area lions live at very low density and may therefore be susceptible to the threats that face small populations such as demographic and environmental stochasticity and reduced genetic variation which could lead to social instability or extinction (Caughley & Gunn 1996).

Lions are important to the ecology of Etosha National Park and the Khorixas District. Previous studies have indicated that Etosha lions exhibit unique behaviour, adapted to the harsh environment (Bridgeford 1985; Stander 1992), but little data are available on their population dynamics and conservation status. Lions are of great aesthetic appeal and financial value. Tourism is a growing industry in southern Africa and predators are arguably a great attraction to national parks in Namibia. It is therefore important to provide baseline data on ecological and population characteristics to guide long term conservation of the species.

OBJECTIVES

1. To determine the population demography and limiting factors of the lion population.
 - 1.1. Determine the demography, land use characteristics and genetic status of the lion population.
 - 1.2. Design and implement a reliable, repeatable, and cost effective technique for estimating and monitoring population size and basic demography.
 - 1.3. Study the social structure and population ecology, with particular reference to stability and population regulation.
 - 1.4. Monitor the health status and diseases in the population.
2. To establish a training programme where employees of Etosha National Park, and relevant communal conservancies participate and receive training on the monitoring predator population demography and other wildlife monitoring techniques. Investigate the potential of using the traditional skill to the benefit of integrated community development and wildlife conservation.
3. To investigate and assess the extent of conflict between lions and bordering pastoralists and propose a management strategy.

STUDY AREA

The study is being conducted in two study sites. The Western Etosha study site (578 km²) is a section west of the Dolomite range and up to the boundary fence, both to the west, south and north. The Khorixas District study site (10826 km²) borders the ENP and includes the Grootberg and Torra Conservancies, and the Palmwag and Hobatere concessions. Detailed data on population density, demography and spoor frequencies are being collected within the boundaries of these study sites.

METHODS

Population estimates and demography

Population size is determined through the recognition of groups and individual lions. The study sites are being covered systematically in an attempt capture and mark all individuals. Marking takes the form of radio and visual collars, and hot branding. Lions are being located by tracking their spoor and using sound play-backs to attract them to bait and are then immobilised, following procedures described earlier (Stander & Morkel 1991).



Radio-collared animals are being located with the use of a fixed-wing aircraft. Aerial locations are then followed by ground observations to record group composition in relation to individuals and age/sex structure, and the ratio of marked to unmarked individuals.



The frequency of the spoor of lions and other large carnivores along roads and around waterholes are being collected. On the basis of a theoretical relationship between spoor frequency and true density (Stander 1998), spoor counts will be compared with true density data. Long-term monitoring techniques will be developed using spoor frequency as an index of true density.

RESULTS

Population density and demography

Western Etosha study site

There were two field trips into the designated study site to collect further data on the population were. All roads and waterholes were visited and spoor frequency data were collected. The spoor and roars of lions were followed and some lions were located. One additional lioness was radio-collared (Table 1). The distribution of sightings for the study area is indicated for each large carnivore species. The distribution of sightings for the study area is indicated for each large carnivore species. Sample sizes are very low but data are presented in the spirit of a quarterly progress report. Twelve individual lions were identified to give a density of 2.08 lions 100 km⁻² (Table 1), which is lower than data for the same area in 1988 (2.5 – 2.9 lions 100 km⁻²; Stander 1991). Sex ratios appear normal, as did the age composition. Radio-tracking data are indicating some overlap in home ranges (see figure) but more work is needed, both to radio collar more animals and to tracked marked animals more often.

Khorixas District study site

One intensive field trip was launched during August 1999. During this period 2063 km², 20 % of the study area (Table 1) was sampled in search of lions and other large carnivores. The size of the area is enormous and access into the area is difficult, as a result, sampling of the study area is slow. The spoor of different groups of lions was followed but due to the constraints of the terrain, mainly the slow speed of travelling, none were captured. Between 15 and 22 different lions were identified from their spoor, following techniques described elsewhere (Stander et. al 1997). The density of 0.73 – 1.07 lions 100 km⁻² (Table 1) is higher than indicated in the previously quarterly report. The sex and age composition appears to be normal when compared with data from western Etosha.

When data from the two study sites were combined 129 lions were observed during 25 sightings. The age and sex composition of these observations reflects that of a healthy population.

Spoor counts

Western Etosha study site

The entire road network of the study site was assessed for its suitability to conduct spoor frequency counts. In total 38 sampling segments were delineated measuring a total 233.3 km. During two field trip 675.8 km were sampled for spoor frequency (Table 1). Despite the low sample sizes the data (Table 1) are surprisingly comparable with data collected in the Kaudom Game Reserve, an area of similar densities (Stander 1998).

Khorixas District study site

During the three field trips to date, 1057 km were sampled for spoor frequencies. Similar to the Western Etosha study site four species of large carnivore were observed but at much lower frequencies (Table 1). Similar to data presented for the Kaudom Game Reserve (Stander 1998) the frequency of spoor was lower in the Khorixas District study site where the density of lions appear to be lower, compared to the Western Etosha study site

When data from the two study sites were combined spoor data of age and sex composition, similar to visual observation data, reflect that of a healthy population.

Lion project in Etosha National Park and Khorixas District

Table 1. Population demography and spoor frequency data for lions and other large carnivores in Western Etosha and bordering Khorixas District on 31 October 1999.

	Western Etosha	Khorixas District
Study area size (100 km ²)	577.8	10825.7
Density sample size (100 km ²)	577.8	2063
Number of marked lions	8	0
Number of radio-collared lions	3	0
<u>Lion population estimate</u>		
Adult male	2	Age/sex unknown
Adult female	3	
Sub-adults	3	
Large cubs	0	
Small cubs	2	
TOTAL	12	15-22
Population density (lions 100 km ⁻²)	2.08	0.73 – 1.07
Sex ratio (male:female)	1:1.5	?
Age ratio (Adult:sub-adult:cub)	1:1:0.4	?
<u>Spoor counts</u>		
Total km surveyed	675.8	1057
Spoor observed		
Lion	7	10
Spotted hyaena	15	9
Leopard	3	5
Cheetah	4	5
<u>Spoor frequency (spoor 100 km⁻¹)</u>		
Lion	1.2	0.95
Spotted hyaena	2.7	0.85
Leopard	0.54	0.47
Cheetah	0.72	0.47

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