



Predator Research Programme



May 2001

Research Progress Report

***Population ecology and long term monitoring of
free-ranging populations in Namibia's
marginal and arid environments.***



Field work by: P. Stander, L. Hanssen, S. MacLennan, J. Junker, W. Moller, M. Isak, W. Dougab, S. Ariseb.

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***Report
compiled by: Dr. P. Stander
PRP Co-ordinator, MET
P/Bag 13306 Windhoek
Namibia***



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INTRODUCTION

Although large carnivores in sub-Saharan Africa have showed a marked reduction in numbers and distribution during the past five decades, their numbers appear to be stable in Namibia. The past decline can be attributed to an increased conflict with human development and in many parts of Africa large carnivores only persist in protected areas.

Namibia is one of few African countries that support six species of large carnivore. The distribution of lions, spotted hyenas and wild dogs is restricted to either protected or areas of low human density with sufficient numbers of suitable prey. Leopards, cheetahs and brown hyenas are more adaptable and show a much broader distribution, including areas of intensive livestock farming. Although the populations of all six species appear to be stable there is constant conflict between these predators and people, mainly in the form of livestock depredation.

For some species, such as lions and wild dogs, due to their restricted distribution, there is concern over the long-term sustainability of the populations. This is mainly due to a shortage of scientific data on the ecological mechanisms that drive population regulation. Despite the immense size of the areas that large carnivores in Namibia inhabit, they live at very low density. These populations may therefore be susceptible to the threats that face small populations, such as demographic and environmental stochasticity and reduced genetic variability that could lead to social instability or extinction.

Lions are important to the ecology of both Etosha National Park and the Khorixas District. Previous studies have indicated that these lions exhibit unique behaviour, adapted to the harsh environment, but data are generally not 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.

Baseline data on density, demography and ecology are needed for all large carnivore species in Namibia. This is essential to assess the conservation status of the species and to address conservation problems. Our research activities are presently focussing on lions and leopards in three distinctly different habitats in northern Namibia. These research activities forms part of our *Predator Research Programme* that spans over a period of ten years with intensive research projects pending on cheetahs and wild dogs, and monitoring projects on all six species. The *Predator Research Programme* contributes to the Namibia Carnivore Monitoring Programme and has the following main objectives.

OBJECTIVES

1. To determine the population demography and limiting factors of Namibian large carnivores.
 - 1.1. Demography, land use characteristics, genetic and disease status.
 - 1.2. Social structure and population ecology, with particular reference to density dependant population regulation.
2. Design and implement reliable and cost effective techniques for estimating and monitoring population density and demography.
3. Establish training programmes for wildlife managers and conservancies on the monitoring of carnivore density population demography and other wildlife monitoring techniques
4. Investigate and assess the extent of conflict between carnivores and people and develop sustainable utilisation activities to the benefit of local communities.

Present research results are presented under:

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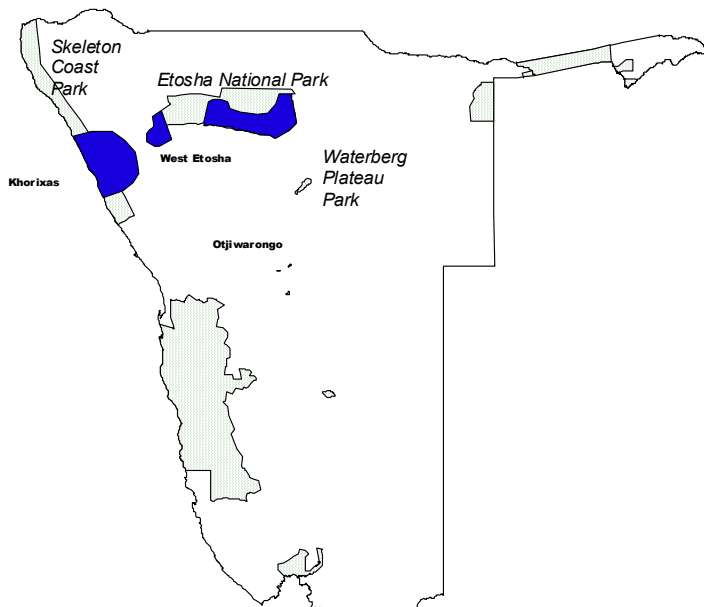
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STUDY AREAS

Our present research is focussed on lions and leopards in three study sites. The Khorixas study site (10826 km²) is located in the northern Namib desert, previously known as Damaraland, and consists of an extremely arid habitat (annual rainfall 0-100mm) that stretches into the Skeleton Coast Park. This study is focussing on desert-adapted lions that frequent the Skeleton Coast Park, Torra Conservancy and the Palmwag tourism concession.

Three study sites in northern Namibia



The Western Etosha study site (610 km²) is the focus of research on both lions and leopards. The study area is a section west of the Dolomite range and up to the western boundary fence and includes the #Khoadi !Hoas Conservancy, and the Hobatere tourism concession to the west of Etosha. The third study site consist of central and eastern Etosha National Park. In both the Khorixas and West Etosha study sites we erected base-camps from where the research activities are co-ordinated. Each base-camp has a short strip where we land with the radio-tracking aircraft. We also keep a field vehicle and essential supplies and equipment at the field camps.





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METHODS

The study sites are covered systematically, by tracking their spoor and setting out bait, to capture and mark all individual leopards and lions. Study animals are immobilised following standard procedures described by our earlier studies and conform to international veterinary standards. All leopards and 80% of lions are radio collared and lions are marked with permanent hot brands. The age of lions and leopards are determined from tooth wear.

Radio-collared animals are located with the use of a fixed-wing aircraft. Aerial locations are then followed-up by ground observations to record group composition in relation to individuals and age/sex structure, and the ratio of marked to unmarked individuals. Home range analyses was based on locating the daytime resting spots of lions and leopards by radio telemetry with at least 24 hours between fixes. Home range size is calculated using the Minimum Convex Polygon and Kernel Contour methods. Sufficiency of sample size was tested by determining whether or not an asymptote of home range estimate was reached. Detailed data on population density, demography and spoor frequencies are being collected within the boundaries of each study site.

RESULTS

Khorixas Study Site - LIONS

To date we have marked eighteen lions and have collected a large amount of data on their movements, behaviour ecology and population structure. Most of the marked lions (n = 15) belong to the Aub Canyon pride, and three lions to the Agab Pride. Lions in the Aub canyon pride are favouring separate sub-groups and have spent the past 14 months in these sub-groups. The adult male, XPL-1, however, frequently visits the XPL-9 group. Although their ranges are largely overlapping such a long separation is most unusual. This might be a behavioural adaptation to the demanding habitat, but more data need to be collected. The data presented here are preliminary and are therefore presented without further discussion.

Marked and known lions in Khorixas

Aub Canyon pride in three sub-groups and one A Male XPL-1								
"XPL-9 group"			"XPL-5 group"			"XPL-3 group"		
ID no.	Age	Sex	ID no.	Age	Sex	ID no.	Age	Sex
XPL-2	Adult	E	XPL-5	Adult	E	XPL-3	SA	Γ
XPL-9	Adult	E	XPL-14	Adult	E	XPL-6	SA	Γ
XPL-11	Adult	E	XPL-4	SA	Γ	XPL-10	SA	E
3 x L cub Γ			XPL-7	SA	Γ	XPL-15	SA	E
3 x L cub E			XPL-8	SA	Γ		Adult	E
3 x S cub ?			XPL-12	SA	Γ			
			XPL-13	SA	Γ			
Total = 12			Total = 7			Total = 5		
Agab Pride								
ID no.	Age	Sex						
XPL-17	Adult	E						
XPL-18	Adult	E						
XPL-16	S cub	Γ						
	S cub	Γ						
	S cub	E						
2 x S cub ?								
Total = 7								



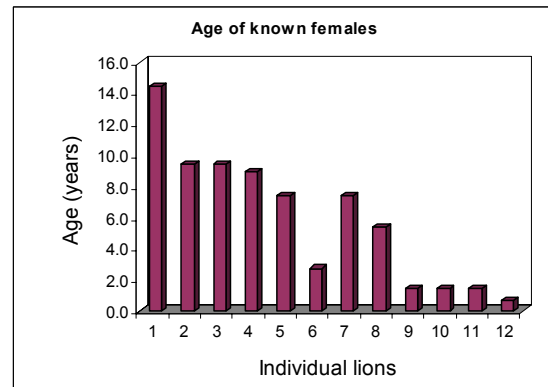
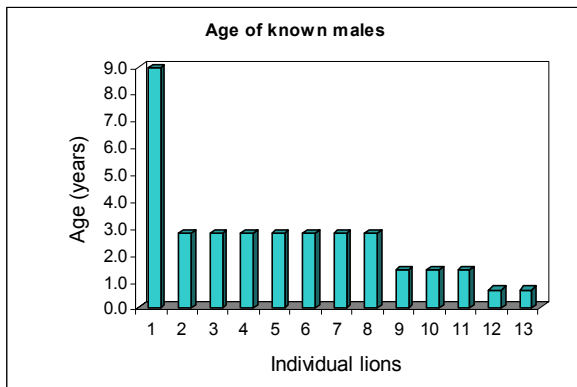
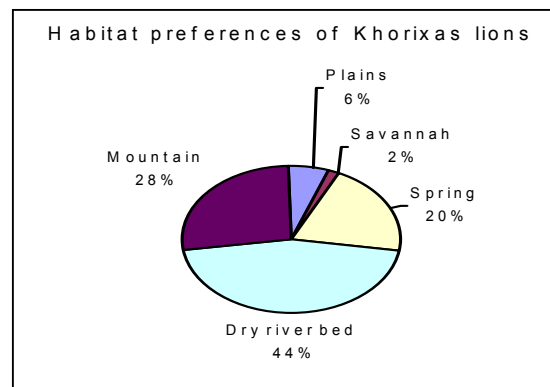
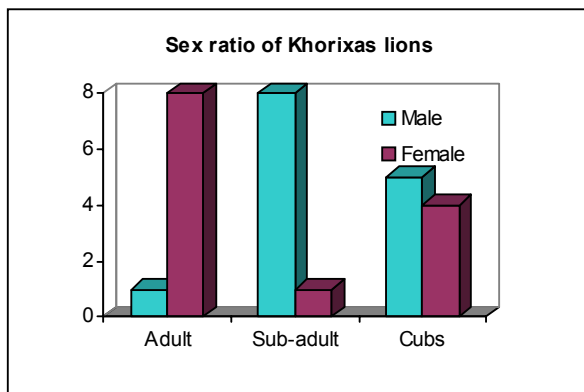
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Population demography of lions in the Khorixas District

Study area size (km ²)	10825.7	
Density sample size (km ²)	2063	
Number of marked lions	18	
Number of radio-collared lions	17	
<u>Lion population estimate</u>	Known individuals	Possible numbers
Adult male	1	2
Adult female	8	8
Sub-adults	9	13
Large cubs	6	6
Small cubs	10	10
TOTAL	34	39
Population density (lions 100 km ⁻²)	1.64	1.89
Sex ratio (Γ:E)	1.07 : 1	1.29 : 1



Of the seven radio-collared adult lionesses, six (85%) have dependant cubs. There are 16 dependant cubs at an average of 2.8 cubs per adult lioness in the population.



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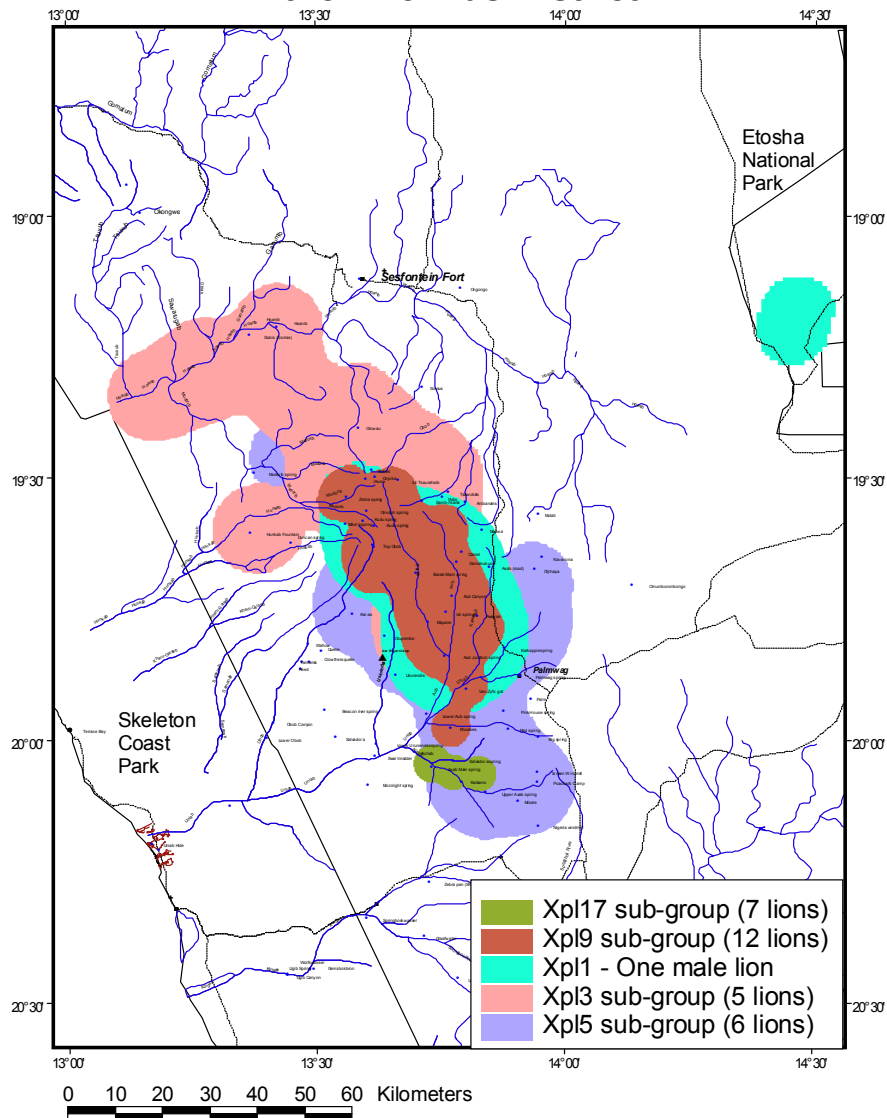
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Home range calculations of lions - Khorixas District

Sub group or individual	N	Home range calculation (km ²)		Accuracy of fixes*
		MCP	Kernel (95%)	
XPL-1	72	3535.4	1795.6	Negative
XPL-5	52	1991.8	3022.4	Negative
XPL-3	49	2378.6	3419.5	Negative
XPL-9	49	721.5	1131.1	Negative
Xpl-17	5	5.0	119.6	Negative

- The number of fixes where the home range estimate reached an asymptote of at least 95% of the home range estimate.

Home ranges of 5 groups of lions in the Khorixas District

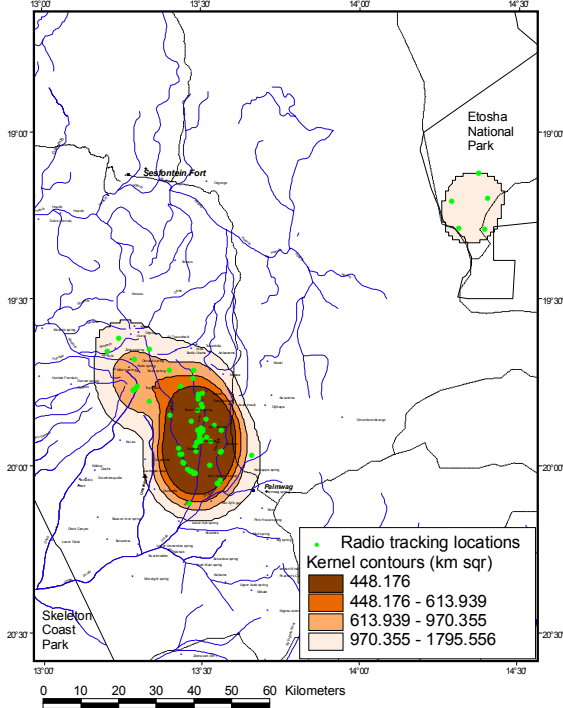




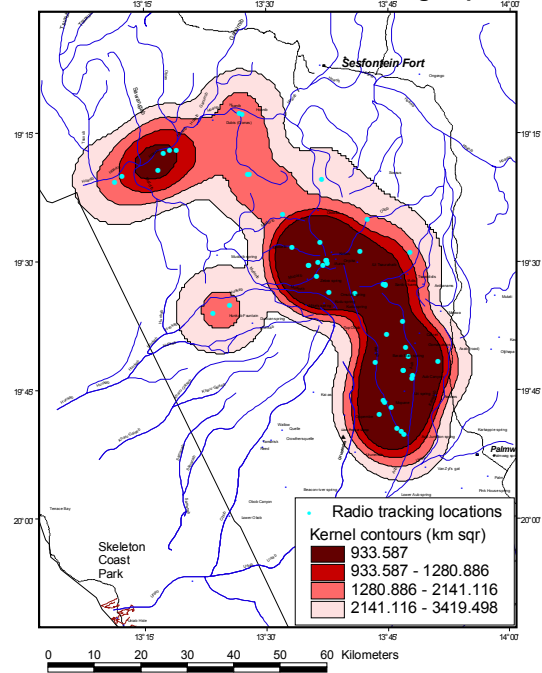
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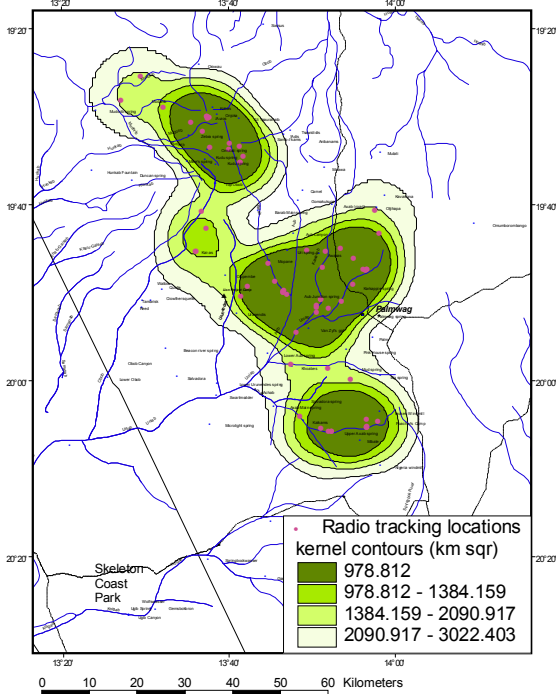
Concentration areas of XPL-1 (adult male)



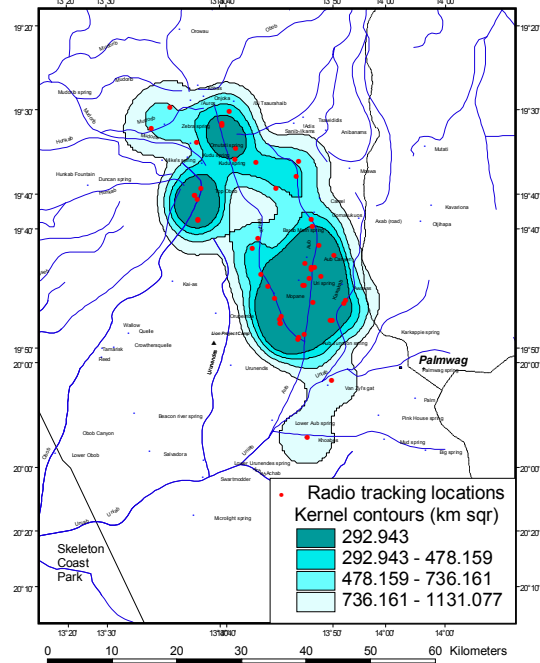
Concentration areas of XPL-3 sub-group



Concentration areas of XPL-5 sub-group



Concentration areas of XPL-9 sub-group





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Western Etosha Study Site - LIONS

To date we have marked 22 lions. Most are members of the Rateldraf pride that live in the northern section of the study area, but several lions from the Renostervlei, Jakkalswater and Duineveld prides have also been marked. Data indicate that the population is healthy with good age/sex ratios. Breeding is prolific and 8 of the twelve known lionesses (67%) have dependant cubs ($n = 24$) at a ratio of 2 cubs per adult lioness in the population. Population density estimates, although still preliminary, indicate higher densities than expected. Our preliminary data on population structure, densities and home ranges are presented below.

Marked and known lions in West Etosha																																																																	
Rateldraf pride			Renostervlei pride			Duineveld pride			Jakkalswater pride																																																								
ID no.	Age	Sex	ID no.	Age	Sex	ID no.	Age	Sex	ID no.	Age	Sex																																																						
WPL-9	Adult	♂	WPL-14	Adult	♂	WPL-21	Adult	E	WPL-19	Adult	♂																																																						
	Adult	♂	WPL-16	Adult	E	WPL-22	Adult	E	WPL-18	Adult	E																																																						
WPL-4	Adult	E	WPL-17	SA	E		Adult	E		Adult	E																																																						
WPL-5	Adult	E	WPL-15	SA	♂		Adult	E	WPL-20	S cub	E																																																						
WPL-6	Adult	E				4 x S cubs			5 x S cubs																																																								
WPL-7	Adult	E																																																															
WPL-8	Adult	E																																																															
WPL-10	SA	♂																																																															
WPL-11	SA	♂																																																															
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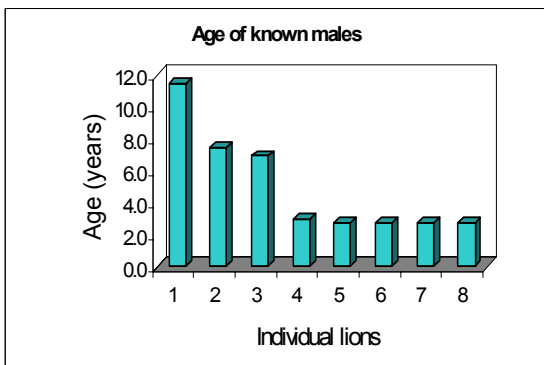
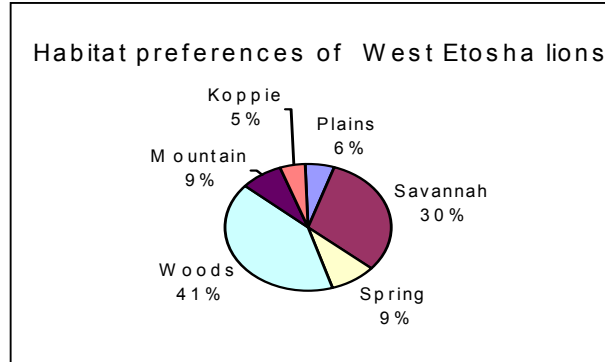
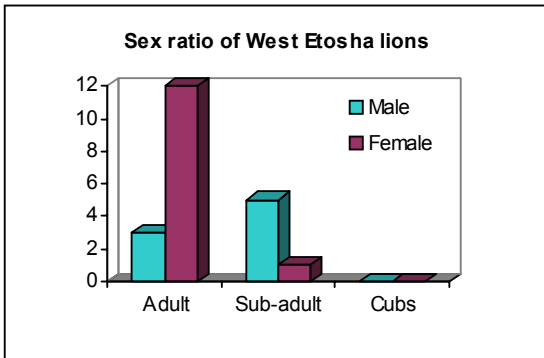
Population demography of lions in West Etosha

Study area size (km ²)	577.8	
Density sample size (km ²)	577.8	
Number of marked lions	12	
Number of radio-collared lions	8	
<u>Lion population estimate</u>	Known individuals	Possible numbers
Adult male	4	4
Adult female	12	12
Sub-adults	6	6
Large cubs	0	0
Small cubs	24	24
TOTAL	46	46
Population density (lions 100 km ⁻²)	3.46	4.33
Sex ratio (♂:♀)	0.62 : 1	0.62 : 1



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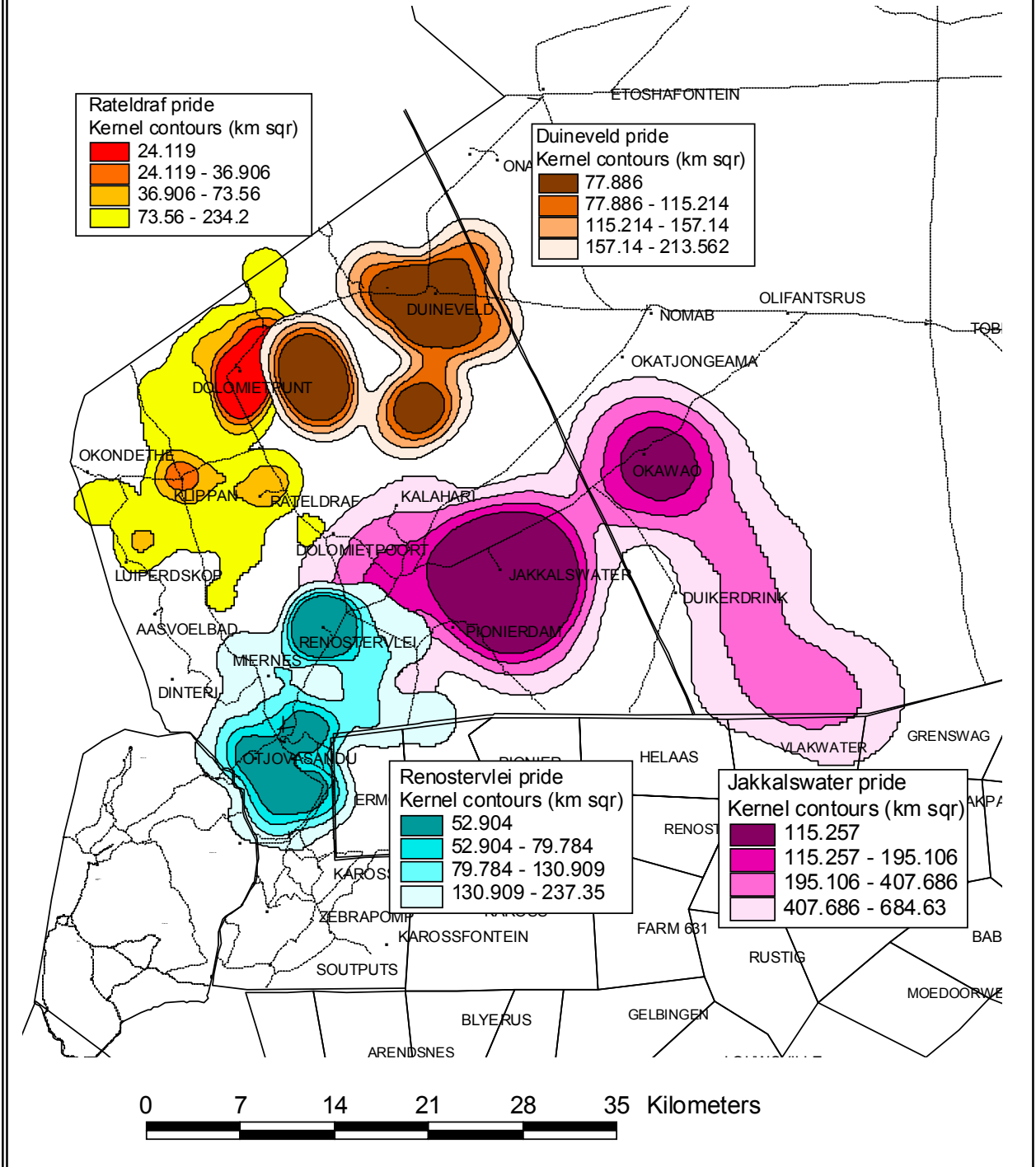


Home range calculations of lions – West Etosha

Sub group	N	Home range calculation (km ²)		Accuracy of fixes*
		MCP	Kernel (95%)	
Rateldraf pride	57	263.6	234.2	Negative
Renostervlei pride	20	161.6	237.4	Negative
Jakkalswater pride	16	377.1	684.6	Negative
Duineveld pride	12	97.5	213.6	Negative

* The number of fixes where the home range estimate reached an asymptote of at least 95% of the home range estimate.

Home ranges of four lions prides in western Etosha





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Western Etosha Study Site - LEOPARDS

To date eight leopards that occupy a 102 km² intensive study site in the Hobatere Concession have been captured and radio-collared. The sex ratio of marked leopards is strongly in favour of females. There are several more leopards that inhabit the area, and tracks of male leopards have often been observed. Similar to the previous sections, the data are preliminary, however, several interesting conclusions can be drawn. The density of leopards is surprisingly high at 3.85 leopards per 100 km², especially considering that several more leopards frequent the study site and need to be marked during the next phase. Home range sizes are variable, although this is probably due to low sample sizes, with a large overlap of 27.8% between females. The data collected so far are presented below.

Marked leopards at Hobatere & West Etosha			
ID no.	Age	Sex	Notes.
WPP-1	Adult	E	
WPP-2	Adult	E	
WPP-3	Adult	E	
WPP-4	Adult	Γ	
WPP-5	SA	E	Cub of WPP-1
WPP-6	Adult	E	
WPP-7	SA	Γ	Cub of WPP-1
WPP-8	Adult	E	



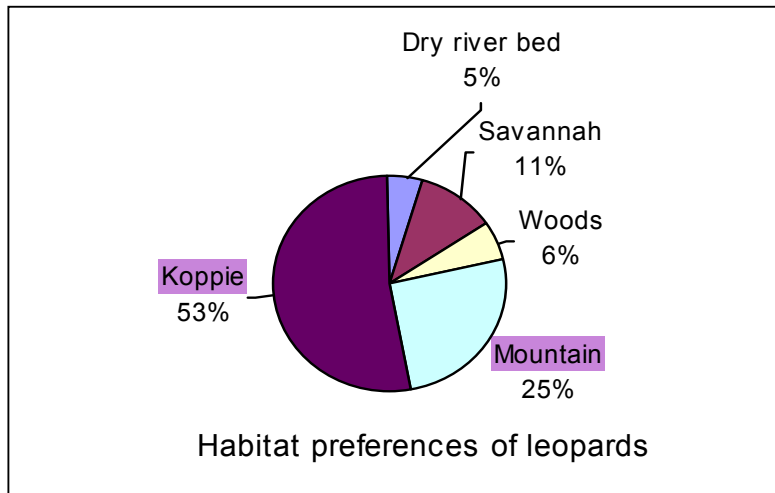
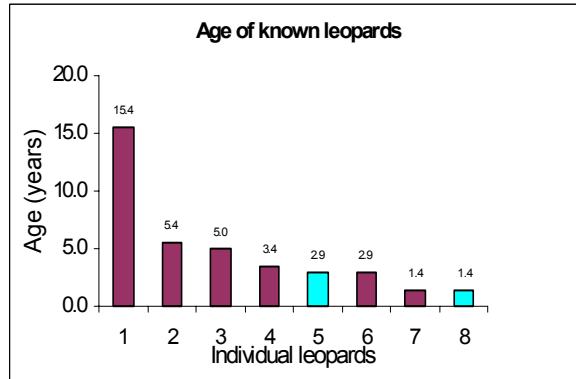
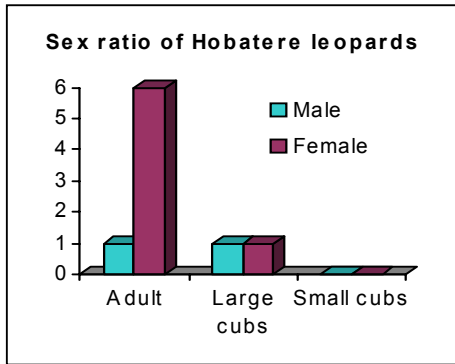
Population demography of leopards at Hobatere & West Etosha

	Hobatere & West Etosha
Study area size (km ²)	310
Density sample size (km ²)	101.37
Number of marked leopards	8
Number of radio-collared leopards	8
<u>Leopard population estimate</u>	Known individuals
Adult male	1
Adult female	5
Sub-adults	0
Large cubs	2
Small cubs	0
TOTAL	8
Calculated population density (leopards 100 km ⁻²)	3.85
Sex ratio (Γ:E)	0.33 : 1



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Home range calculations of leopards – Hobatere & West Etosha

Sub group	Fixes (n)	Home range calculation (km ²)		Accuracy of fixes*
		MCP	Kernel (95%)	
WPP-1 AF	32	48.9	84.5	Negative
WPP-2 AF	28	87.7	131.8	Negative
WPP-3 AF	16	130.6	285.4	Negative
WPP-4 AM	18	49.0	94.9	Negative
WPP-5 AF	15	96.8	187.1	Negative
WPP-6 SAF	9	102.3	339.8	Negative
WPP-7 SAM	12	128.8	316.5	Negative
WPP-8 AM	11	59.6	166.9	Negative

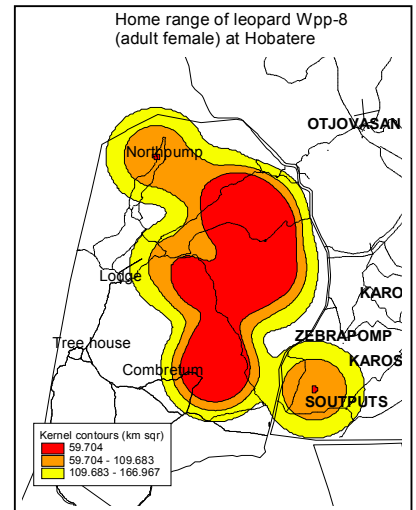
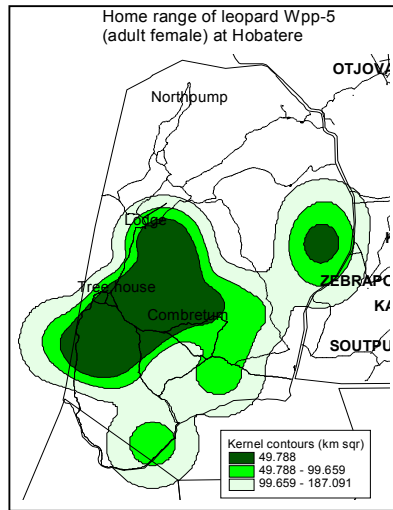
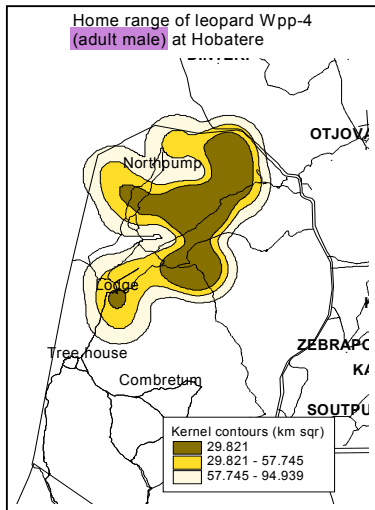
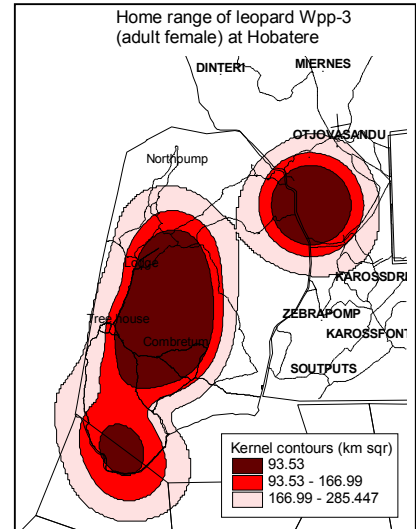
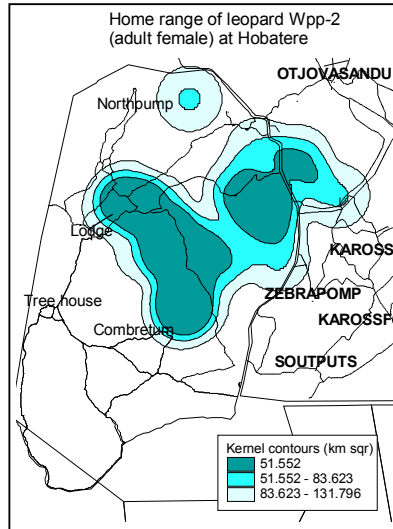
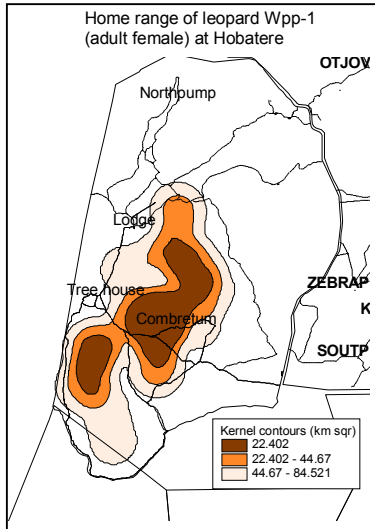
* The number of fixes where the home range estimate reached an asymptote of at least 95% of the home range estimate.



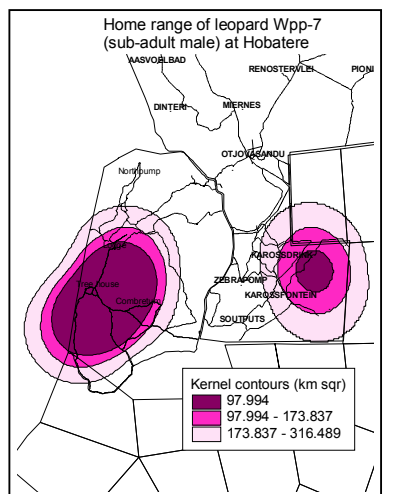
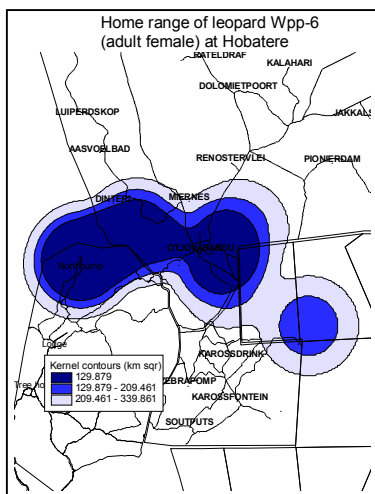
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Home ranges of leopards at Hobatere and West Etosha



cube of WPP-1



cube of WPP-1



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Training of community game guards in the Kunene Region

This training programme forms part of the western Etosha study sites based at Otjovasandu and aims to build capacity within communal conservancies in the Kunene Region to solve large carnivore problems and to monitor their large carnivore populations. Skilled Haijhom and Ju/Hoansi (San) trackers are involved to provide expert training to selected conservancy members. The training programme combines traditional tracking skills with technology and modern wildlife monitoring and management techniques. Conservancy members are trained in the use of Global Positioning Systems in combination with tracking skills to record large carnivore numbers and distribution.

A Carnivore Management Plan (CMP) will be developed for five different conservancies. The selection process is directed at those conservancies where problems with large carnivores are frequently experienced and/or where the interaction with large carnivores is similar to neighbouring conservancies. These CMPs will then be used as a blueprint and replicated in other conservancies. The five conservancies will be #khoodi !Hoas, Torra, Ehriovipuka, Sesfontein & Marienfluss. Each conservancy will select a member to be trained by the project as their future "Carnivore Management Officer" (CMO). The CMOs will also receive training on basic large carnivore behaviour and ecology, livestock protection techniques, problem animal identification and management options, capture techniques and effective trophy hunting skills to target problem carnivores. In addition they will also receive basic training in scientific methods, such as data recording and record keeping.

Three training courses have been held to date. Mr. S. MacLennan, manager of the Otjovasandu research base, lead the training courses and provided the following accounts.

Reportback: training of Ehriovipuka conservancy game guards (10/04/2001 - 15/04/2001, Western Etosha)

This was the first of the week-long training courses to be run by the Predator Research Programme at the base camp in Otjovasandu. Advanced carnivore spoor interpretation and some basic monitoring techniques were taught. Some theoretical background of large carnivores (behaviour, food preferences etc.) was also discussed. An introduction to using the GPS formed part of the course.

The trainees were interested and enthusiastic. Even when being shown material that they were already familiar with (eg spoor), they were willing to engage in discussion and participate in tracking exercises. All three of the trainees have a good understanding of large carnivore spoor.

Feedback from the participants was generally good. All three expressed concern about the dangers of working with large carnivores. They were unhappy about the lion observation session (sitting in the back of an open vehicle) and would have felt much safer had there been a gun in the vehicle.

The atmosphere of the course was good. These are all committed people and seem to have a fair grasp of conservation. General discussion revolved around the work covered in the course as well as carnivore issues in Ehriovipuka conservancy (trophy hunting, livestock protection etc.)

Seamus MacLennan, course facilitator.
30/04/2001

Names of participants:

- Fillimon Kapi
- Siumion Veyorerako
- Jatiye Uaroua

Reportback on the training of Omatandeka conservancy game guards (16 - 20 April 2001, Western Etosha)

The Omatandeka trainees are fairly adept at reading carnivore spoor, but still showed some interest in the process of spoor examination and monitoring procedures (atlas forms, spoor counts etc.) Willem and Sagarias had to work hard to point out subtleties in the spoor that we came across. The trainees' prior knowledge of spoor encouraged debate and precise interpretation.

Some basic GPS handling was covered - marking and naming a point, performing a goto and the basic concept behind GPS. There was interest shown in the radio-tracking process, up until the point where it involved climbing a number of small hills. Some behaviour and feeding habits of the large carnivores were also dealt with.

Feedback from the participants was fairly non-committal. No-one expressed any disappointment with the course content, but there were some grievances about the safety of our work and the strenuousness of the schedule. This is disappointing because it seems to show a lack of understanding of carnivore monitoring principles and/or little commitment to the research process. On the whole this was a good group to work with. They learnt something and they took with them an idea of what this project is about. They could have gained more from the course if they had shown more enthusiasm/participation.

Seamus MacLennan, course facilitator.
30/04/2001

Names of participants:

- Alphons Uarje
- Fillimon Hungua
- Gerson Mukuaruize

Reportback: training of Sesfontein conservancy game guards (24/04/2001 - 27/04/2001, Western Etosha)

Although the trainees arrived without warning, this turned out to be a really constructive course. One of the participants (Mike Muheuse) has spent some time with the project in December 2000. Perhaps this gave them an idea of what to expect and how to get the most out of their time here.

Participation and interest shown throughout the course was excellent. As a consequence these trainees probably took more with them than any of the other participants we've had so far. Their spoor knowledge when they started was perhaps not as advanced as some of the other groups, but by the end of the week, after much exposure and active learning the foundation was there. As well as GPS work and filling out atlas/spoor count forms, all three gained some experience of radio-tracking.

The response of the Sesfontein trainees to the course was good - they would like to know when the rest of the conservancy staff can come...It was really gratifying to see concepts click into place and to have people grapple with spoor interpretation before giving their answer. This was the first group that had someone taking notes during the course - a positive sign. The only hesitation was an issue of perceived safety when radio-tracking lions from the vehicle (they initially refused to sit down in the back, preferring to sit up top and see mortal danger from afar...)

Camp living was easy. Mike and co. were up at dawn every morning, ready to attack the next spoor count. This was a good course.

Seamus MacLennan, course facilitator.
30/04/2001

Names of participants:

- Mike Muheuse
- Epsen Mbunguha
- Petrus Naseb



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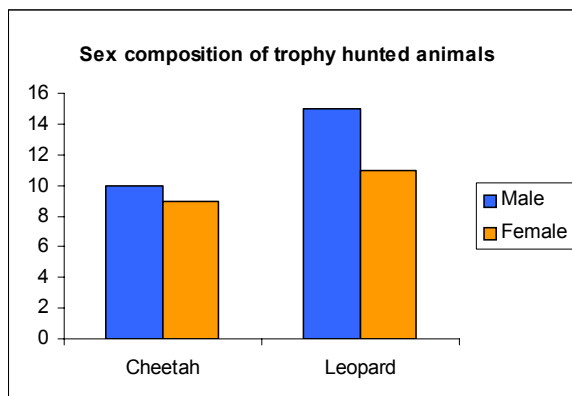
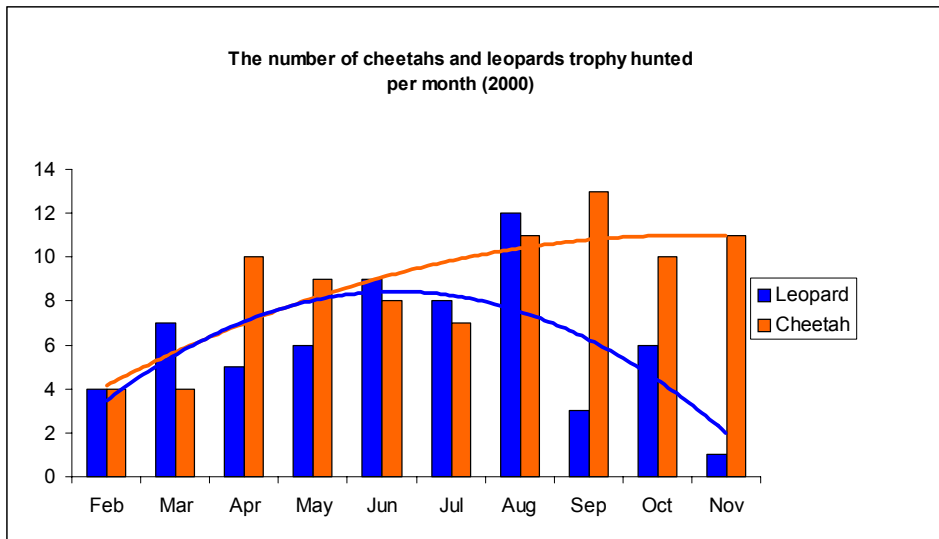
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Trophy hunting of cheetahs and leopards in Namibia (data summarised by W. Moller)

During the year 2000 a total of 87 cheetahs and 63 leopards were trophy hunted in Namibia, as part of Namibia's CITES allocation. Most Namibian hunting guides only utilised one cheetah or one leopard but several individuals were more successful and utilised several individuals. Most leopards were shot during the winter months, in the middle of the year, whereas the number of cheetahs hunted increased steadily towards the end of the year. For both species slightly more males were shot than females. This sex discrepancy being more pronounced in leopards, probably due to the sexual dimorphism in the species.

Number of cheetahs and leopards utilised by Namibian hunting guides

Name	Cheetah	Leopard	Total	Name	Cheetah	Leopard	Total
J.H. Briedenhann	5	3	8	G. Viglietti	2		2
B.D. Connock	2	2	4	H. Eberhardt	2		2
H.S. von Seydlitz		4	4	H. Herzog		2	2
J.H. Oelofse	2	2	4	H. Hofmeister	2		2
C. Mentrup	3		3	H. Schoneberg		2	2
E. Kratzer	3		3	J. Kotze	2		2
H.W. Hortsthemke	3		3	J. Vaatz	2		2
I.J. Jansen	3		3	J. van Rensburg		2	2
R.W. Haase		3	3	J.C. Kotze	2		2
A. Huber		2	2	M.H.J. van Vuuren	2		2
D.P.J. van Vuuren		2	2	Mr. Herzog		2	2
F.W. Redecker		2	2	P.H. Meyer	2		2
G. Heimstad	2		2	T. Garbade		2	2



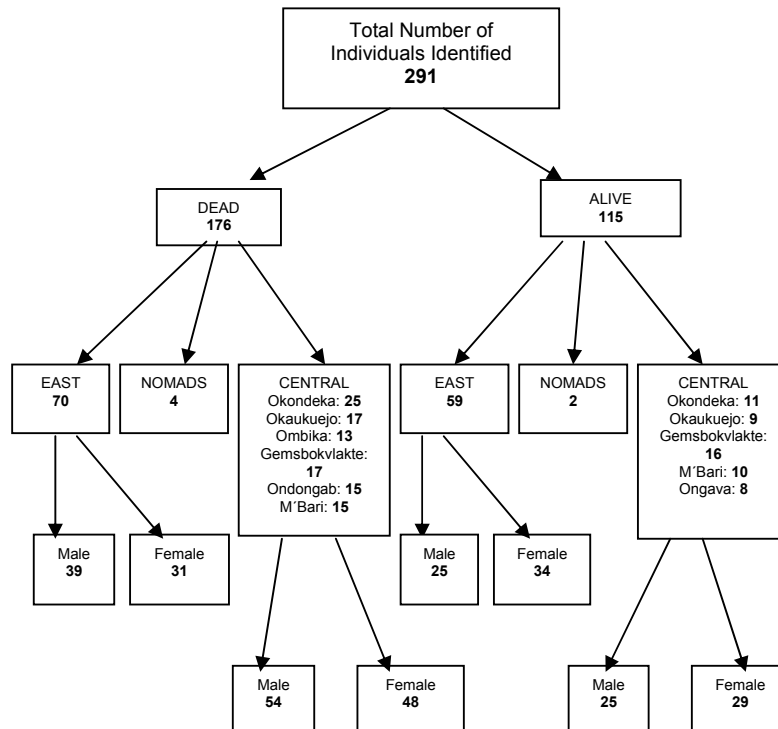


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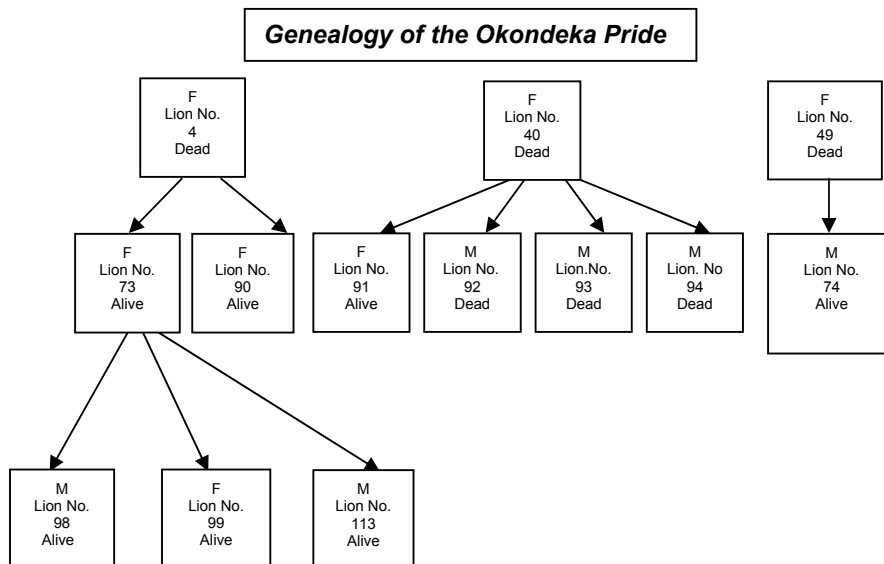
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Central & Eastern Etosha Lion Project

Between 1980 and 2000 (20 years) 289 lions have been marked in central and eastern Etosha National Park. We believe that 115 (40%) of these animals are still alive. In central Etosha there are presently 54 marked lions (25 ♂ : 29 ♀) in five prides. In eastern Etosha there are 59 (25 ♂ : 34 ♀) marked lions, but we have not yet been able to divide these into different prides. According to mortality records 101 marked lions (53 ♂ : 48 ♀) in central Etosha and 69 lions (39 ♂ : 30 ♀) in eastern Etosha died during the past 20 years.



Genealogy data from five prides in the area around Okaukuejo were summarised and are presented in the form of a family lineage for each pride. These family trees are incomplete, as there are gaps in the available information. More accurate results will be presented in the next progress report.

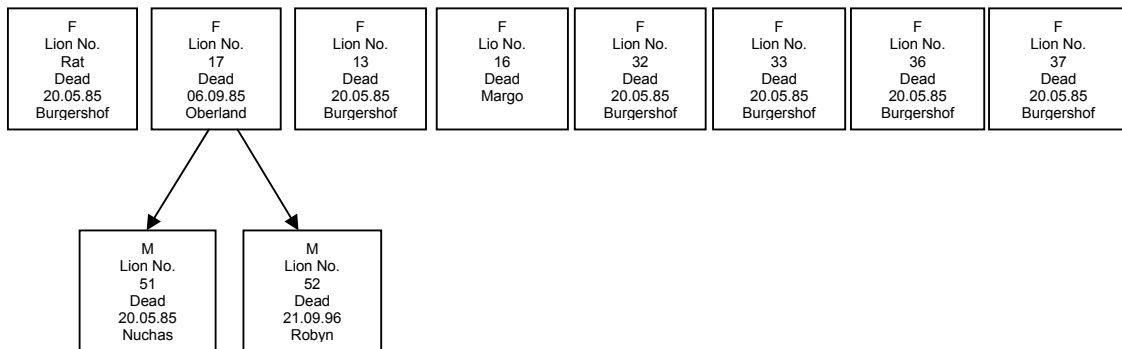




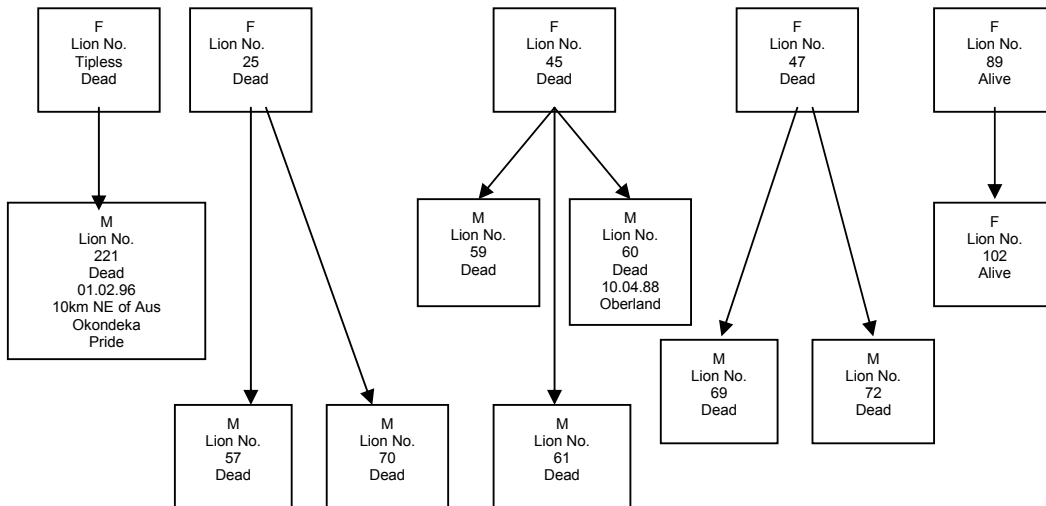
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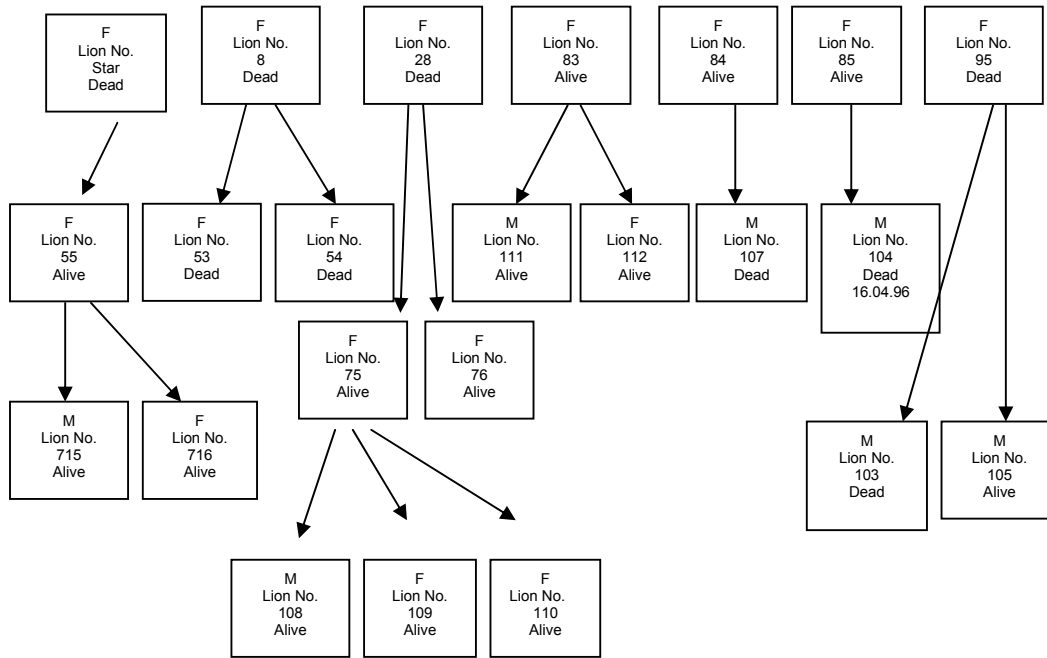
Genealogy of the Ombika Pride



Genealogy of the Okaukuejo Pride



Genealogy of the Gemsbokvlakte Pride



In Memory

We wish pay a tribute to Mafuta Isaak Augumeb (10 Dec 1948 – 1 Apr 2001) who died tragically in the course of duty whilst tracking lions in the harsh terrain east of the Skeleton Coast. Mafuta worked with P. Stander on large carnivores since 1984. He was one of the few remaining Hei!hom San that was born in Etosha National Park at a time when the Hei!hom roamed the park freely. His remarkable tracking skills, humour and passion for lions will be missed.

