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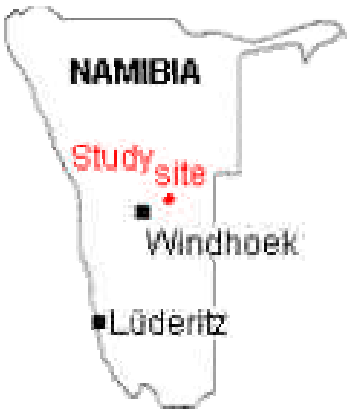
Expedition report

Population ecology and long-term monitoring of the Namibian cheetah



Expedition dates: **13 October - 6 December 2003**

Report published: **April 2004**

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Okatumba Wildlife Research

Matthias Hammer (editor)
Biosphere Expeditions

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Abstract

This expedition to Namibia, run by Biosphere Expeditions and Okatumba Wildlife Research, from 13 October to 6 December 2003, was conducted to provide important baseline data on the world's largest free-ranging cheetah population. The expedition team consisted of four groups of twelve expedition team members each plus staff, each group working for two weeks, and was divided daily into four research teams to conduct various research activities concurrently. Each team of three team members was led by one local scientist or student. Additionally, two groups were joined by local trackers. This expedition design led to a very large amount of data being collected.

The difficulty of observation in the wild, especially in bushy areas, and the timidity of Namibian cheetahs necessitate the use of indirect sampling methods, rather than depending on direct observations. Therefore radio telemetry was used to locate study animals in order to determine space use (home range sizes, territories, habitat preferences, etc.) and activity rhythms.

Eight box traps were set in the study area and capture activities took place on 45 days. One cheetah, which was already collared, was caught and released. In addition to this 8 porcupines, 3 aardwolfs, 2 baboons, 2 aardvarks, 1 warthog and 1 bat-eared fox were captured.

Aside from capture-recapture and radio telemetry, counting of cheetah tracks can be used to compute indices that reflect cheetah density. During the expedition spoor tracking took place daily. 15 cheetah tracks were detected around traps, 27 cheetah tracks and 7 leopard tracks were found along farm boundaries.

An area survey conducted to locate marking trees. 100 km² farmland were surveyed and 14 marking trees were found.

Game counts using a line transect method were also conducted to obtain information on the cheetah's prey base.

Finally, a bird list of 102 species was compiled.

Diese Expedition wurde von Biosphere Expeditions und Okatumba Wildlife Research durchgeführt und fand in der Zeit vom 13. Oktober bis zum 6. Dezember 2003 in zentralen Landesteilen Namibias statt. Sie diente dazu, wichtige Basisdaten über den größten wild lebenden Gepardenbestand der Welt zu liefern. Das Expeditionsteam bestand aus vier Gruppen von je zwölf Teilnehmern plus Mitarbeitern, die jeweils für zwei Wochen vor Ort waren, und wurde in vier verschiedene Arbeitsteams unterteilt. Dadurch konnten verschiedene Forschungsaktivitäten parallel nebeneinander durchgeführt und eine große Menge an Daten gesammelt werden. Jedes Arbeitsteam von je drei Teilnehmern wurde von einem Wissenschaftler oder Studenten geleitet. Außerdem wurden zwei Arbeitsteams von einheimischen Fährtenlesern begleitet.

Zum einen ist es schwierig, Beobachtungen in freier Natur, insbesondere in verbuschten Gebieten, durchzuführen, zum anderen sind Geparden auf Farmland in Namibia sehr scheu. Dies macht die Anwendung indirekter Beobachtungsmethoden erforderlich. Mit Hilfe der Radiotelemetrie können Tiere zu bestimmten Zeiten lokalisiert, ihre Raumnutzung (Größe der Streifgebiete, Territorien, Habitatpräferenzen, etc.) bestimmt und ihre Aktivitätsrhythmen ermittelt werden.

Das Studiengebiet war mit acht Lebendfallen ausgerüstet, die an 45 Tagen scharf gestellt wurden. Es wurde ein Gepard gefangen, der bereits besendert war. Zusätzlich zu diesem Studientier gingen 8 Stachelschweine, 3 Erdwölfe, 2 Paviane, 2 Erdferkel, 1 Warzenschwein und 1 Löffelhund in die Fallen.

Außer Fang- und Wiederfang sowie Radiotelemetrie kann das Zählen von Spuren genutzt werden, um Indikatoren für die Gepardendichte zu ermitteln. Deshalb wurden täglich Spuren gesucht. Während der Expedition wurden 15 Gepardenspuren um die Fallen herum, sowie 27 Gepardenspuren und 7 Leopardenspuren entlang der Farmgrenzen gefunden.

Eine zeitaufwändige aber sehr effektive Forschungsaktivität bestand in der systematischen Suche nach Markierungsbäumen der Geparden. Rund 100 km² Farmland wurden abgelaufen und dabei 14 Bäume entdeckt, die in diesem Studiengebiet noch nicht bekannt waren.

Wildzählungen nach dem Line-Transekt-Verfahren wurden durchgeführt, um Informationen über das Beutespektrum der Geparden zu erhalten und eine Vogelinventur ergab 102 Vogelarten im Studiengebiet.

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1. Expedition Review

M. Hammer (editor)
Biosphere Expeditions

1.1. Background

Biosphere Expeditions runs wildlife conservation research expeditions to all corners of the Earth. Our projects are not tours, photographic safaris or excursions, but genuine research expeditions placing ordinary people with no research experience alongside scientists who are at the forefront of conservation work. Our expeditions are open to all and there are no special skills (biological or otherwise) required to join. Our expedition team members are people from all walks of life, of all ages, looking for an adventure with a conscience and a sense of purpose. More information about Biosphere Expeditions and its research expeditions can be found at www.biosphere-expeditions.org.

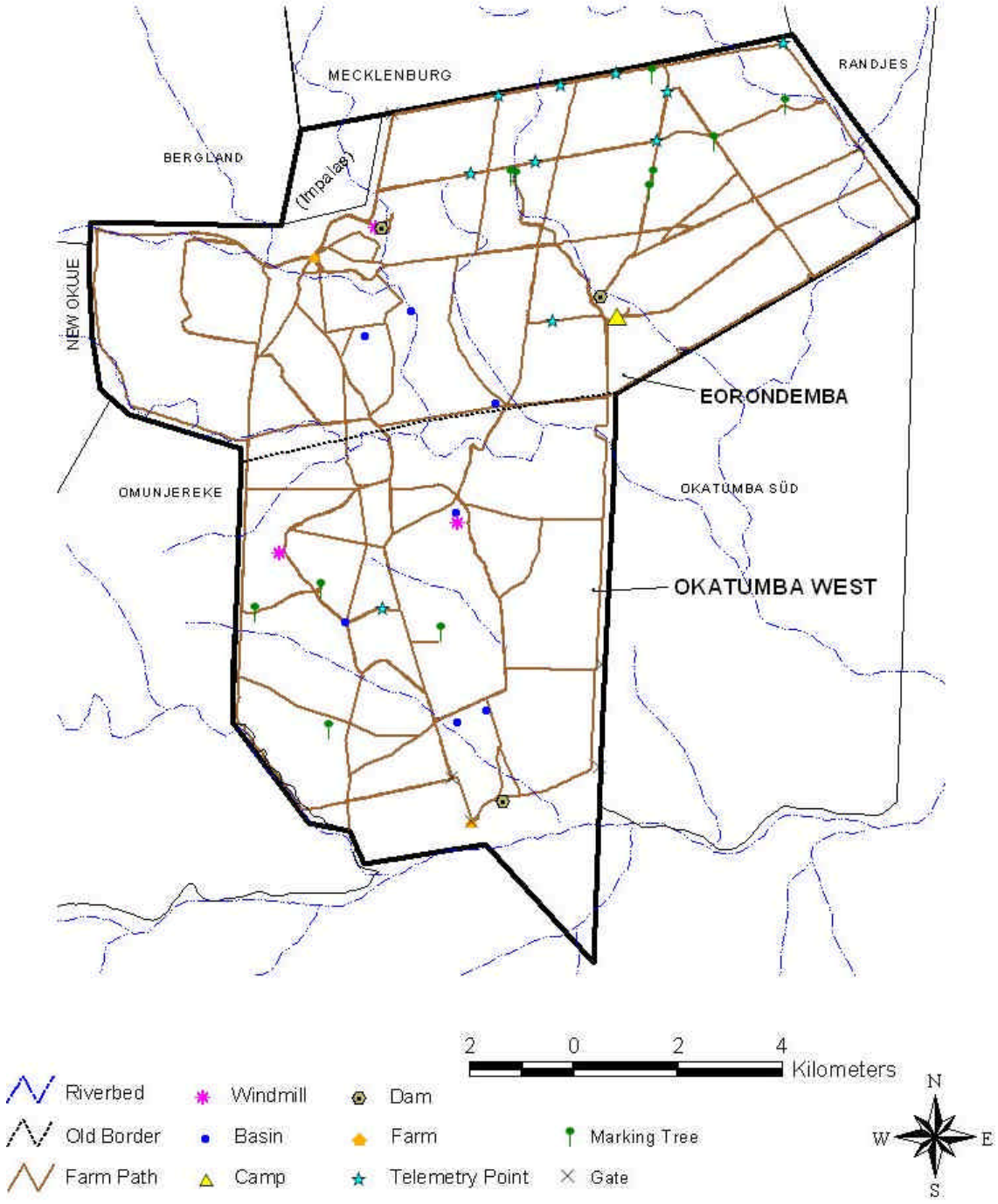
This expedition report deals with an expedition to Namibia that ran from 13 October to 6 December 2003. The expedition was part of a long-term research project on the Namibian cheetah with an emphasis on locating cheetah marking trees, capture activities, radio-tracking, counting cheetah track frequencies and on recording cheetah prey animals.

Namibia harbours the world's largest population of cheetahs and is one of a few African countries that support six species of large carnivores. Lions, spotted hyaenas and wild dogs are mainly restricted to protected areas, but cheetahs, leopards and brown hyaenas still occur on areas with intensive livestock and/or game farming. Today, about 40% of Namibia is used for commercial livestock breeding and it is estimated that this land provides the habitat for 90% of the current Namibian cheetah population. Ensuing conflict with humans has resulted in large numbers of cheetahs being captured and/or shot. Cheetahs do kill livestock, but the extent of losses and financial damage to the farmers has to date not been properly quantified.

Although the Namibian cheetah is a fascinating flagship species, its ecology is poorly understood and this makes conservation of the species difficult. Hunting quotas are set without scientific basis, removal through human conflict is poorly monitored and no reliable population density estimates exist. (The frequently used and well-published figure of 2,000-3,000 individuals has been quoted for the past 15 years, but is very likely inaccurate as it is based on unscientific guesswork). Due to this lack of scientific data, the effectiveness of present conservation efforts are in doubt. New baseline data on population density, demography and ecology are thus urgently required. Data gathered during this expedition will be an essential ingredient to a new and effective conservation strategy for the Namibian cheetah.

1.2. Research Area

With a small human population spread over a large area, Namibia is in better environmental shape than most African countries. Because Namibia lies mostly within an arid zone, much of the flora is typical African dryland vegetation. The research area covers about 40,000 hectares (400 km^2) on conservancy farmland savannah, as it is this farmland, not the National Parks, which harbours 90% of the Namibian cheetah population. Conservancies are created by neighbouring farmers who agree to manage their land and livestock in a sustainable way and in return are granted ownership of the game on their land by the state. Within the research area was a core zone of 10,000 ha where counting of tracks, marking trees, prey density and cheetah capture took place, and a perimeter zone for radio-tracking.



Map showing the research area and expedition base ("camp").

1.3. Dates

The expedition ran over a period of eight weeks divided into four two-week slots, each composed of a team of international research assistants, guides, support personnel and an expedition leader. Slot dates were:

13 October - 25 October 2003
27 October - 8 November 2003
10 November - 22 November 2003
24 November - 6 December 2003

Dates were chosen at the beginning of the rainy season when vegetation is still sparse (and animal visibility therefore high).

1.4. Local Conditions & Support

Biosphere Expeditions is assisting Okatumba Wildlife Research in its endeavours to provide important baseline data for a better understanding of the Namibian cheetah ecology. Three study sites in three different types of habitat were established, and the expedition camp with all essential supplies and equipment was situated in the Western study site.

The climate is semi-arid with summer rainfalls, which peak from February to April. The dominating vegetation type is highland savannah in which various *Grewia* species occur. Large parts of the area also consist of camelthorn savannah on deep sandy soils. The characteristic plant species is camelthorn (*Acacia erioloba*), as well as some other types of acacia. Thickbush areas, which are mainly found on little hills, are dominated by *Acacia mellifera*.

Expedition base

The expedition team was based at a tented camp near Okatumba Wildlife Research, about 80 km East of Windhoek in a remote region of savannah farmland. Transport to and from base camp, and around the study site was by Land Rover Defenders.

The expedition base consisted of several safari tents for the expedition team, each with a shower, toilet and washing facilities. Team members were in pairs inside these tents. All meals were prepared for the team and were served either outside or in an additional tent, which was also used as an office. Vegetarians could be accommodated. There was limited electricity at base camp.

Field communications

There was no telephone/fax/internet line at base. Two-way Motorola hand-held radios and vehicle-mounted portable radios were used for communication between teams around the study site. There was also irregular mobile phone coverage at base and around the study site.

Transport & vehicles

Team members made their own way to the Windhoek assembly point. For the expedition , the team had the use of two Land Rover Defender 110 Station Wagon, two Land Rover Defender 130 Double Cab, and various other vehicles. The vehicles were provided by Land Rover as part of its Fragile Earth policy, which is the company's commitment to the environment through the sponsorship of leading environmental organisations, the development of sustainable practices and technologies and the company's 'Off-Road Code'.

Medical support & insurance

The expedition leaders were trained first aider, and the expedition carried a comprehensive medical kit. Namibia's healthcare system is of an excellent standard and the nearest doctor and hospital were in Windhoek. Emergency medical support was provided by SOS International. All team members were required to carry an adequate travel insurance covering emergency medical evacuation and repatriation. The only medical incidents were a few cases of minor stomach upset [korrekt?].

1.5. Local Scientists

Birgit & Harald Förster, originally from Germany, now live and work in Namibia. Birgit Förster trained as a veterinary assistant and studied Biology. Harald Förster is a trained horticulturist and after his apprenticeship studied Forestry, specialising in tropical forestry and wildlife biology. The Försters founded Okatumba Wildlife Research (OWR) together with local farmers and a veterinarian in an effort, amongst other aims, to conduct fundamental and applied research on the farmland habitat, especially regarding complex ecological patterns and human influence on wildlife populations. Their main research interest is in developing strategies for the sustainable use of natural resources and all their projects are conducted in close co-operation with the Namibian Ministry of Environment and Tourism (MET). Various MET scientists provide the Försters with logistical support as well as scientific advice. OWR is also working with various universities and research institutes in Europe.

1.6. Expedition Leaders

This expedition was led jointly by Ben McNutt and Lisa Fenton.

Originally from County Donegal on the North West coast of Ireland, Ben McNutt has had a keen interest in Natural History from an early age. Educated at the Coleraine Academical Institute, he went on to gain a BA (Hons) from the University of Lancashire. Since leaving University, Ben has spent many years studying and training under the expert guidance of Ray Mears (internationally renowned survival expert, author and BBC television presenter of Tracks, World of Survival and Extreme Survival). Through his study of Bushcraft and Survival skills, Ben spends many months every year leading and instructing groups in the outdoors. Now one of the few instructors whose ability is recognised by Ray Mears, both he and Lisa teach wilderness survival and wildlife observation skills, when not leading expeditions. Joining Biosphere Expeditions in 2002, Ben has led expeditions to Poland and Namibia.

Lisa Fenton was born in North London and completed her degree in 1997. Since then her wanderlust and interest in indigenous survival skills has taken her to the deserts of Utah and deep into the Malaysian jungles of Kelantan. She has also made independent journeys to Laos, remote regions of Thailand and jungle areas along the Thai/Burmese borders where she has learned much about jungle life from the Hill Tribe villagers. Lisa began her formal Bushcraft/Survival training in 1998. The following year she joined Ray Mears Company 'Woodlore' as an assistant instructor, where she continued to work and train for the next three years. Lisa joined Biosphere Expeditions in 2002 and has led expeditions to Poland and Namibia.

1.7. Expedition Team

The expedition team was recruited by Biosphere Expeditions and consisted of a mixture of all ages, nationalities and backgrounds. They were:

13 October - 25 October 2003

Alfred Balmer (Switzerland), Tad Dippel (UK), Damian Baumann (Switzerland), Joy & Peter Gordon (UK), Joris Hoogerwerf (the Netherlands), Janet & Terry James (UK), Myra Kline (UK), Helen Püntener (Switzerland), Hanke Ravesteijn (the Netherlands). Also: Michael Woods (UK, journalist for the Financial Times).

27 October - 8 November 2003

Neil Bowman (UK), Dirk Brune (Germany), Lindsay Goundry (UK), Sue Haigh (UK), Andreas Immel (Germany), Bernd Jorzyck (Germany), Alan Lyne (UK), Carole Mahoney (UK), Katherine Manning (USA), Sabine Reiser-Weckerle (Germany), David Willey (UK), Monika Zerbe (Germany).

10 November - 22 November 2003

Jane & Lea Blackham (UK), Brigitte Blunier (Switzerland), Joyce Bond (UK), Neil Bowman (UK), Joanne Carr (UK), Sophie Crawford (UK), Lindsay Goundry (UK), Carole Mahoney (UK), Paul Tchengang (France), Annette Whittaker (UK), David Willey (UK).

24 November - 6 December 2003

Toril Andresen (Norway), Tony Bush (UK), Clare Downing (UK), Klaus-Peter Erichsen (Germany), Colin Fraser-Malcolm (UK), Theo Heyting (UK), Yvonne Kueng (Switzerland), Horst Paehlke (Germany), Kristin & Brigitte Schober (Germany), Ella Townsend (UK), David Willey (UK).

Staff (throughout the above period):

Josef & Piet (bushman trackers who do not use surnames), Niko Balkenhol (scientific assistant), Ruth Eales (assistant leader), Werner Pfeiffer (scientific assistant), Stefanie Pietsch (scientific assistant), Marcel Quinten (scientific assistant), Harald Schüren (cook and supplies).

1.8. Expedition Budget

Each team member paid towards expedition costs a contribution of £1250 per person per two week slot. The contribution covered accommodation and meals, supervision and induction, a permit to access and work in the area, all maps and special non-personal equipment, all transport from and to the team assembly point. It did not cover excess luggage charges, travel insurance, personal expenses like telephone bills, souvenirs etc., as well as visa and other travel expenses to and from the assembly point (e.g. international flights). Details on how this contribution was spent are given below.

Income	£	
Expedition contributions	57,994	
Expenditure		% of which spent directly on project
Base camp and food includes all meals, base camp equipment, gas, wood	12,373	100
Transport includes fuel, car maintenance	2,566	100
Equipment and hardware includes research materials & gear etc purchased in UK & Namibia	2,200	80
Biosphere Expeditions staff includes salaries, travel and expenses to Namibia	5,643	100
Local staff includes salaries, travel and expenses, gifts	4,027	100
Administration includes bribes, registration fees, sundries etc	3,636	100
Scientific services & logistics organisation Payment to Okatumba Wildlife	11,455	100
Team recruitment Namibia as estimated % of PR costs for Biosphere Expeditions	4,800	100
Income – Expenditure (unadjusted)	11,293	
Income – Expenditure (adjusted to % spent on project)	11,733	
Total percentage spent directly on project	80%	

1.9. Acknowledgements

This study was conducted by Biosphere Expeditions which runs wildlife conservation expeditions all over the globe. Without our expedition team members, who are listed above and provided an expedition contribution and gave up their spare time to work as research assistants, none of this research would have been possible. The support team and staff, also mentioned above, were central to making it all work on the ground. Thank you to all of you, and the ones we have not managed to mention by name (you know who you are) for making it all come true. Biosphere Expeditions would also like to thank Land Rover, Motorola, Silva, Field & Trek, Globetrotter Ausrüstung and Gerald Arnhold for their sponsorship.

1.10. Further Information & Enquiries

More background information on Biosphere Expeditions in general and on this expedition in particular including pictures, diary excerpts and a copy of this report can be found on the Biosphere Expeditions website www.biosphere-expeditions.org.

Enquires should be addressed to Biosphere Expeditions at the address given below.

2. Cheetah study

Birgit & Harald Förster
Okatumba Wildlife Research (OWR)

2.1. Introduction

This expedition report deals with an expedition to commercial farmland in central Namibia, which hosts the largest cheetah population in the world. The expedition assisted Okatumba Wildlife Research (OWR) in their endeavours to increase scientific knowledge about the Namibian cheetah and to contribute to a successful co-existence of this species with Namibian people.

Aims and objectives

A large number of studies on free-ranging cheetahs have been published (for an overview see Caro 1994), but most of them were conducted in protected areas, mainly in East African countries. By contrast, only a handful of articles on Namibian cheetahs are published in the literature (Bartmann 1981, Gaerdes 1974, Joubert, 1984, Joubert & Mostert 1975, Kraus & Marker-Kraus 1991, Marker et al. 1996, Mc Vittie 1979, Morsbach 1987). The current project on cheetahs living on farmland in Namibia aims to provide important baseline data on population density, demography, behavioural ecology, genetics and diseases.

The habitat “Protected Area” (found in National Parks and other areas under protection) differs from the habitat “Farmland” (commercially used land, mainly by livestock and game farmers) (see table 2.1a). As a result, the ecology of Namibian cheetahs living in the “Protected Area” environment will differ from those cheetahs living on “Farmland”. For example, cheetahs on Namibian farmland exhibit unusually large group sizes (Gaerdes 1974, Joubert 1984, McVittie 1979), prey size expands, and litter sizes increase compared to East African cheetahs (McVittie 1979, Morsbach 1987). Durant (1998), Joubert and Mostert (1975) and McVittie (1979) have argued that lack of inter-specific competition might be one of the main factors in the success of the cheetah on farmland.

Table 2.1a. Differences between protected areas and commercial farmland.

Protected areas	Farmland
- no inhabitants	- presence of people (farmers)
- no livestock	- presence of livestock
- no hunting pressure	- persecution by man
- high inter-specific competition: lion, spotted hyena, leopard, wild dog	- low inter-specific competition: leopard, caracal, brown hyena
- migratory prey base	- permanent availability of prey
- low cheetah density	- high cheetah density

Namibia and commercial farmland

Today about 40% of the total area in Namibia is used for commercial livestock farming, 40% are communal areas and 20% are National Parks and restricted areas (Berry 1990). It is estimated that commercial farmland provides the habitat for 90% of Namibia's cheetah population (Morsbach 1987) and about 80% of the commercially useable larger game species (Brown 1992). Thus Namibian farmland has a crucial role to play in the sustainable management and conservation of the country's wildlife.

The average farm size (commercial unit) in Namibia depends on the average annual rainfall and is about 5,000 ha in the North up to 30,000 ha in the South (Brown 1992). For reasons of efficient livestock management, farmers divide one farm into smaller units, so-called camps. In central parts of Namibia, where the study sites were situated, one camp is about 200 to 400 ha (own results, unpublished), and four to six camps share one watering place, usually water pumped from the ground through wind power. One herd of livestock is rotated from camp to camp, on a rota system governed by season and grass quality.

Commercial farmland in Namibia is fenced in, either with stock-proof fences on cattle farms, or with game-proof fences on game farms. Many farmers substitute their decreasing revenues from livestock breeding by consumptive and non-consumptive use of wildlife (Barnes & de Jager 1996). These farmers have a mixture of both types of fencing on their properties. Stock-proof fences are 1.40 m high and consist of five wires that are stretched between wooden poles. These fences are no barrier for the local wildlife and only serve to keep cattle within a certain area. Game-proof fences are either 1.40 m high and consist of eight to eleven wires, or 2.20 m high and consist of 18 to more than 20 wires. The first type is game-proof for "crawling" game like hartebeest or oryx (who crawl under fences), but it can be crossed by "jumping" game like kudu or eland. The second fence type prevents movement of jumping species too. However, warthogs dig holes under all types of fences and these holes are also used by some other species like steenbok, duiker and several carnivores, including the cheetah (personal observation).

Carnivores and population density

Namibia is one of the few African countries, which hosts six species of large carnivores. While lions, spotted hyenas and wild dogs are mainly restricted to protected areas, cheetahs, leopards and brown hyenas still occur on areas with intensive livestock and/or game farming (Berry et al. 1997). Kraus & Marker-Kraus (1991) and Morsbach (1987) have estimated that Namibia hosts the largest population of cheetahs in the world, but to date no reliable population density estimates exist and Namibian cheetah ecology is poorly understood. This lack of scientific data makes management and conservation of the species difficult. The frequently used and well published figure of 2,000 to 3,000 cheetahs for Namibia (Marker et al. 1996, Morsbach 1987) has been quoted for the past 15 years, but is probably inaccurate. More recent data from the *Large Carnivore Atlas Programme* indicate that cheetah numbers might be double or even more than this (Stander 2001).

Direct assessments of population density depend on recognition of individuals and groups, and as such are very expensive and time-consuming (Stander 1998). Indirect sampling methods (Becker et al. 1998, Martin & de Meulenaer 1988, Mills et al. 2001, Panwar 1979, Smallwood & Fitzhugh 1995) are cost-effective, objective and repeatable, but are questioned by some (Norton 1990). Stander (1998) criticises a general lack of understanding of results of indirect sampling, because only a few studies have combined both, direct and indirect measurements. In his study on lions, leopards and wild dogs he found a strong linear correlation between spoor density and true population density. The current cheetah project aims to provide reliable data on cheetah density in three different habitat types, prevalent in Namibia, and to extrapolate from this data on cheetah density for all of Namibia.

Predation and conflict with farmers

Conflict between farmers and predators has resulted in large numbers of cheetahs being captured and sold, or shot (Marker et al. 1996, Morsbach 1987). Because of this, national and international conservationists tend to see farmers as a serious threat to the Namibian cheetah population (Marker 2000, Nowell et al. 1997), but the farmers' impact on the population will remain speculative until it is rigorously investigated.

Cheetahs do kill livestock, but the extent of losses and financial damage to farmers has to date not been quantified. One aim of the current study is to provide reliable information on the cheetah's diet and to quantify stock losses.

The phenonemon of marking trees

Some authors (Hanström 1949, Joubert 1984, McVittie 1979), as well as many Namibian farmers (personal communication) report on so-called play trees that are frequently used by cheetahs. Play trees appear to be a poorly understood, but very important means of communication, especially through scent-marking (Hanström 1949, McVittie 1979). Because of their importance as marking, rather than playing sites, the current study renamed 'play trees' into the more appropriate term of 'marking trees'.

Capture data indicate that marking trees are used more frequently by males than by females (McVittie 1979). Usually two-thirds of cheetahs caught at marking trees are males. Females also visit marking trees and appear to do so in all reproductive statuses. In the current study they were caught during estrus (either alone or with a male), whilst being pregnant or whilst with juveniles of different ages.

2.2. Methodology

Study area

OWR has established three study sites that differ in landscape type, geology and soils, annual rainfalls, composition of plant species, population densities of various game species as well as other carnivores (see table 2.2a). Hunting pressure on the prey base is similar in all study sites, and persecution of predators by humans is relatively low.

Table 2.2a. Study sites and habitat differences.

	Hochberg	SEEIS *	Omitara
Climate	semi-arid	semi-arid	semi-arid
Annual rainfalls	400 - 450 mm	300 - 350 mm	350 - 400 mm
Landscape	very flat	hills and mountains	flat with hills
Geology and soils	sandstone, limestone	granite, quartzite, slate	sand, schist, quartzite
Vegetation	thornbush savannah (dense vegetation)	highland savannah (open habitat)	camelthorn savannah (open - dense)
Prey base	high density	medium density	medium density
Dominant species	hartebeest, kudu, springbok	oryx, springbok, hartebeest	kudu, hartebeest, oryx
Additional species	oryx, warthog, steenbok, duiker, hares, birds	warthog, kudu, zebra, hares, birds	warthog, steenbok, duiker, springbok, hares, birds
Competitors	low leopard density, few brown hyenas	high leopard density, low hyena density	medium leopard density, few brown hyenas

* in 2003 Biosphere Expeditions assisted OWR at the Seeis study site (see map page 4).

Each study site has a core area of about 100 km² where most research activities like capture, mark and release, sample collection, telemetry, spoor tracking, investigation of marking trees and counting prey animals took place. The surrounding area, where interviews with farmers, aerial radio tracking, post mortems etc. were conducted, is much larger.

Sampling Methods

Due to persecution by humans, cheetahs on Namibian farmland live very secretive lives (Gaerdes 1974, McVittie 1979, personal observations). The difficulty of observation in the wild, especially in bushy areas, and the wariness of Namibian cheetahs require employment of indirect sampling methods, rather than direct observations.

Study animals were live-trapped using capture cages with trap release doors at each end and a trigger plate in the middle. Cheetahs captured were to be radio-collared (adults only), marked with ear tags and transponders (all animals), investigated, sampled and released at the place of capture. Radio collars are fitted with activity sensors, and radio telemetry on cheetahs already fitted with a radio collar was used to locate study animals in order to determine their space use (home range sizes, territories, dispersal of young adults) and activity rhythms.

Reliable data on population density can be gleaned through a combination of mark-recapture (Caughley 1977, Cormack 1968, Otis 1978), radio telemetry (MacDonald & Amlaner 1980, Sargeant 1980) and counting spoor frequencies (Stander 1998). All these techniques are employed by OWR.

Information on prey species was obtained by game counts using the line transect method (Buckland et al. 1993, Burnham et al., 1980). Continuous data collection by the expedition team led to large amounts of information on the cheetah's prey base, which helped to answer questions on prey availability and prey utilisation. Additional observations at water places were trialled with the first expedition team, but were not very successful and abandoned for later expedition teams.

Each expedition team was divided into four research activity teams as below. Each team consisted of three team members and one local scientist or member of staff. Each team had the use of a Land Rover Defender 110 Station Wagon, or a Land Rover Defender 130 Double Cab (a pick-up model). Team members rotated through the various activities daily.

Table 2.2b. Research activities and vehicles.

Team 1	Team 2	Team 3	Team 4
checking box traps	spoor tracking along northern farm boundaries	spoor tracking along southern farm boundaries	radio telemetry
data entry	game count	area survey (searching for marking trees)	area survey (searching for marking trees)
Land Rover Defender 110 Station Wagon	Land Rover Defender 130 Double Cab	Land Rover Defender 130 Double Cab	Land Rover Defender 110 Station Wagon

Every morning the **box trap team** drove a predetermined route to check all box traps and to search for cheetah tracks around the traps. After the check, the area around the trap was 'swept' clear of old tracks with a broom or branches, and so each day tracks could not be more than 24 hours old. Box traps were either found open, or closed without an animal inside, or closed with an animal inside. Captured animals other than cheetahs were released immediately. One cheetah that was already radio-collared was released with all expedition team members present. In the afternoon the box trap team **entered all data** collected by the expedition from the previous afternoon and from the morning into a customised Excel database.

The **Northern spoor team** was joined by a local tracker (Kxoe Bushman). During the morning hours the vehicle was driven at low speed (<20 km/h) along the Northern parts of the farm boundary. The tracker and one expedition team member sat on the front of the Land Rover to better detect spoors. Usually tracks either ran along the path, or crossed the path before/after a warthog crawling hole. If a cheetah or leopard track was found, the GPS position was recorded using a Silva Multi-Navigator and track data

(species, number of animals, sex, age class, description of spoor, etc.) were collected. In some cases tracks were followed up on foot. In the afternoon this team conducted **game counts** by using the road strip method. With this method the predetermined counting route should be as random as possible, covering all types of habitat of the study site without going along farm boundaries. For data analysis it is important to cover various habitats and to record total km. Per 5,000 ha, 20 kilometres should be driven. The game count Land Rover was manned by one driver in the cab, and three observers and a tracker on the pick-up platform on the back. The driver then operated the Land Rover at very low speed (walking pace to about 20 km/h) and observers on the back counted all animals they detected on both sides of the road, no matter how far away from the Land Rover they were detected. Observers also had to ensure that every single animal occurring on the transect line (angle = 0) was seen. When animals were detected, the observers signalled the driver, who stopped the vehicle immediately. Observers then attempted to identify and count all animals detected and recorded their distance to the Land Rover, their angle from the midline of the Land Rover, number of animals and, if possible, their sex and group composition. Every day the same route was covered. From the data obtained game densities were estimated using the Distance Sampling programme (see below).

The **Southern spoor team** was also joined by a local tracker and given the same assignment as the Northern spoor team, but the vehicle was driven along the Southern parts of the farm boundary. In the afternoon this team **searched for marking trees** of the Seeis study site. During the eight weeks of the expedition 100 km² were covered on foot. Depending on the type of habitat, expedition team members walked 50-100 m from each other in a line through the bush and tried to detect marking trees that were not yet known by the local scientists. The survey group was joined by one of the two bushmen, and it was equipped with Motorola hand-held radios for communication. If one of the team members thought s/he had found a marking tree, s/he called the others, and the whole group investigated the tree. For each tree a GPS position was recorded using a Silva Multi-Navigator GPS.

The **telemetry team** conducted radio telemetry on a daily basis. During the morning hours the team drove along a predetermined route of about 30 km, covering central parts of the study area. To locate collared animals, the team would stop at vantage points and attempt to detect signals emanating from the surrounding area with the radio telemetry antenna. If a signal was detected, the vantage point GPS position was recorded using a Silva Multi-Navigator, as well as signal bearings using a Silva compass. Where possible, records were taken in three different locations (the more the better) to be able to glean reliable information on cheetah position and movements. In the afternoon the telemetry team joined the **marking tree survey**.

2.3. Results

Capture activities in the current study site started in April 2003. Four cheetahs and one leopard had already been captured, marked and released before the beginning of the expedition. All four cheetahs were caught at the same marking tree, and three of them were males: one single male and one group of two males, probably brothers. The fourth cheetah was a female that was in estrus at the time of capture (middle of September 2003).

Capture activities

Eight box traps were set throughout the study site. Each trap which is set active is counted as one trap night, so one night with eight active box traps is counted as eight trap nights. During the expedition, box traps were active on 45 days with a total of 360 trap nights.

Unfortunately, during the eight weeks of the expedition only one cheetah was caught, and this one was already collared. It was “Moritz“, one of two brothers (called Max and Moritz), and whilst Moritz was in the trap, Max was always nearby. Moritz was released with all expedition team members present, and then followed by his telemetry signals (“ground follow“). In addition to the cheetah, eight porcupines, three aardwolfs, two baboons, two aardvarks, one warthog and one bat-eared fox were captured.

Table 2.3a. Expedition trapping results.

	Group 1	Group 2	Group 3	Group 4	Total
Number of trap nights	88	88	96	88	360
- open traps	77	66	88	77	308
- closed but empty traps	6	16	6	6	34
- captures	5	6	2	5	18

Sadly one infant baboon died as a result of capture activities. This animal was caught without its mother, and consequently suffered badly due to dehydration. There were no other baboons around when the infant was discovered, so it appered the group had already abandoned it. The infant was cooled down with water and put into the shade, but did not recover from dehyradtion and overheating and died soon after.

Spoor tracking

On 33 days spoor tracking was conducted in an effort to throw some light on cheetah density within the study site.

During the expedition. 15 cheetah tracks were detected around traps. In addition to this 27 cheetah tracks and 7 leopard tracks were found along farm boundaries. On the basis of these tracks at least seven individual cheetahs and three individual leopards were identified.

Table 2.3b. Number of individuals identified on the basis of tracks found during the expedition.

	Males	Females	Juveniles	Sex unknown	Total
Cheetah	3	2	1	1	7
Leopard	2	1	0	0	3

This indicated that cheetah density on the farms Eorondemba and Okatumba West (the core area within the Seeis study site) is much lower than on the previous Omitara study site where more than 20 individual cheetahs were identified during the expedition in 2002.

Radio telemetry

Radio telemetry was conducted on 33 days, and radio-collared cheetahs were located on 19 days.

Table 2.3c. Radio telemetry results.

	Group 1	Group 2	Group 3	Group 4	Total
No. of tracking days	8	8	9	8	33
No. of days with signals	6	4	4	5	19

Most frequently (on 18 days) signals from Max and Moritz were received. This group appears to use a small home range, large parts of which covered the neighbouring farms North and East of Eorondemba.

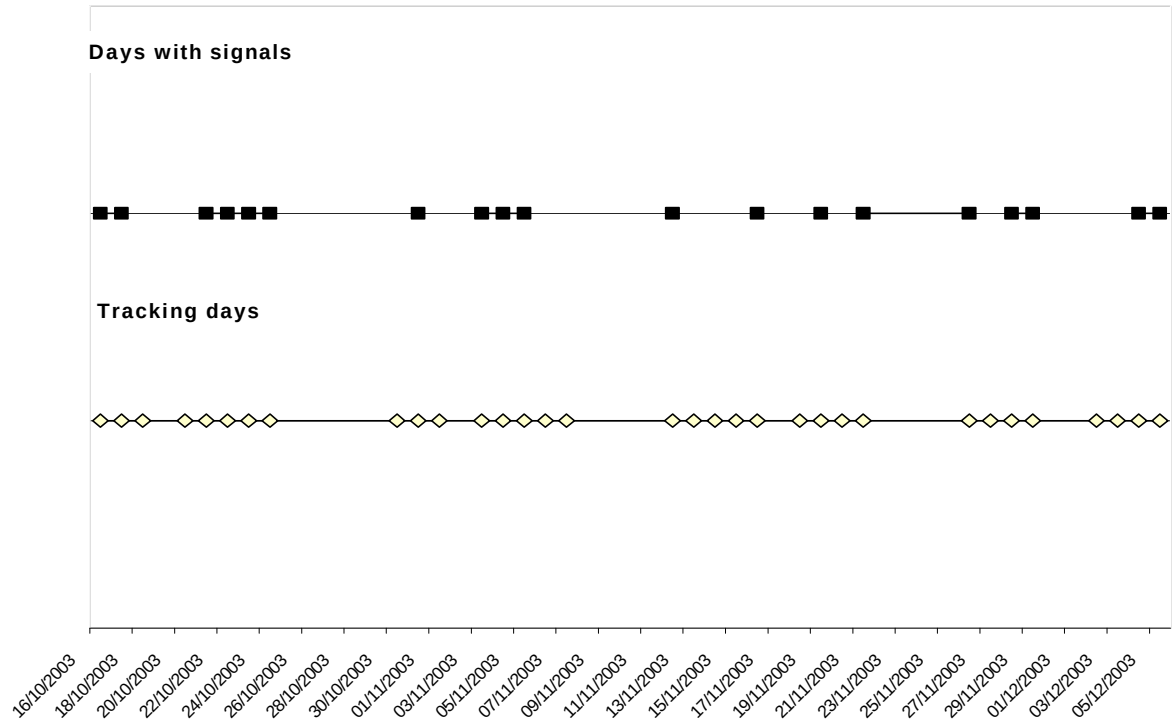


Figure 2.3a. Radio telemetry: total tracking days (diamonds) and days with signals (squares).

On 23 October Moritz was caught in the trap at “Terry’s Tree”, and after his release a ground follow of Max and Moritz was conducted. The members of the observation group changed every two hours, and telemetry data were recorded every 15 minutes. This ground follow took place from 12:00 to 22:00. On the next morning signals were picked up again, and Max and Moritz were followed while leaving Eorondemba farm and entering a neighbouring farm.

Game counts

On 33 days game counts using the line transect method were conducted to assess availability of the cheetah’s prey base. The counting route covered large parts of the farm Okatumba West. The route was about 15 km, and usually took the team up to three hours to complete. A total of 497 km were covered, and 8136 animals were detected. The second group were fortunate in having the highest average of 280 animals detected per counting day.

Table 2.3d. Game count results.

	Group 1	Group 2	Group 3	Group 4	Total
No. of counting days	7	8	10	8	33
Total km driven	101	124	153	119	497
Total no. of animals sighted	1824	2237	1992	2083	8136
Average no. of animals per day	261	280	199	260	247

The most numerous species were oryx (2604 animals) and hartebeest (2509 animals), followed by springbok (1337 animals), warthog (533 animals) and kudu (379 animals).

Table 2.3e. Animals per species sighted during the four different expedition groups.

	Kudu	Oryx	Harte beest	Wart hog	Spring bock	Steen bock	Water buck	Eland	Zebra	Giraffe	Bab oon	Ostrich	Jack al	TOTAL
Group 1	103	681	385	138	303	20	59	8	77	2	38	3	4	1821
Group 2	100	772	678	114	404	22	32	41	70	1	0	1	1	2236
Group 3	86	439	757	164	353	16	13	74	79	3	5	0	1	1990
Group 4	90	712	770	117	277	18	1	63	29	0	0	0	5	2082
TOTAL	379	2604	2590	533	1337	76	105	186	255	6	43	4	11	8129

Game densities (number of animals per unit area) were estimated using the Distance Sampling Programme (Buckland et al. 1993). The sample data are a set of distances of detected animals, which are distributed sparsely across a large area, and there is no competing method to analyse those data. One of the major advantages of distance sampling is that some, or even many, of the objects may go undetected. Central to the concept of this method is the detection function. Generally, detectability decreases with increasing distance from the transect line.

Distance sampling theory considers certain variables like average group size, spatial distribution, etc. of the animals. These factors are different between species, and this is the reason why, for example, population densities of oryx and hartebeest are different although as many oryx as hartebeest were detected during expedition.

Table 2.3f. Estimated game densities (No. of animals per 10 km²) for the dominant species.

	Group 1	Group 2	Group 3	Group 4	Entire expedition
Kudu	19.86	62.35	25.18	11.75	29.78
Oryx	59.58	106.60	32.37	209.12	101.92
Hartebeest	47.17	64.36	30.58	79.89	55.50
Warthog	42.20	24.14	50.36	54.04	42.69
Springbok	39.72	50.28	104.32	54.04	62.09

Game densities were estimated for each expedition group, as well as for the entire expedition. There were large fluctuations from group to group in all species, which are mainly due to migratory patterns within the study site.

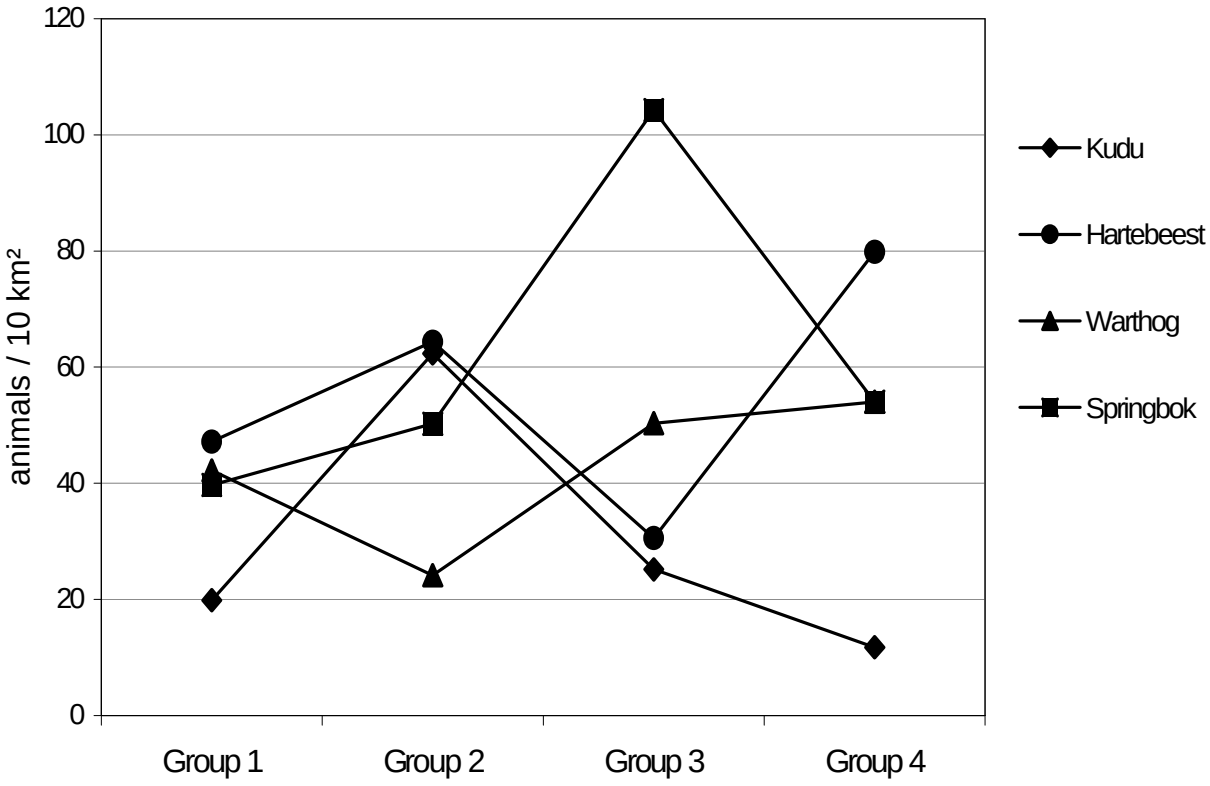


Figure 2.3b. Estimated population densities (number of animals per 10 km²) of kudu, hartebeest, warthog and springbok per expedition group.

On the basis of population densities (number of animals per 10 km²) total numbers of the dominant species were calculated for the farms Eorondemba and Okatumba West that cover an area of 100 km². There were about 300 kudu, 1000 oryx, 555 hartebeest, 430 warthog and 620 springbok on the two farms.

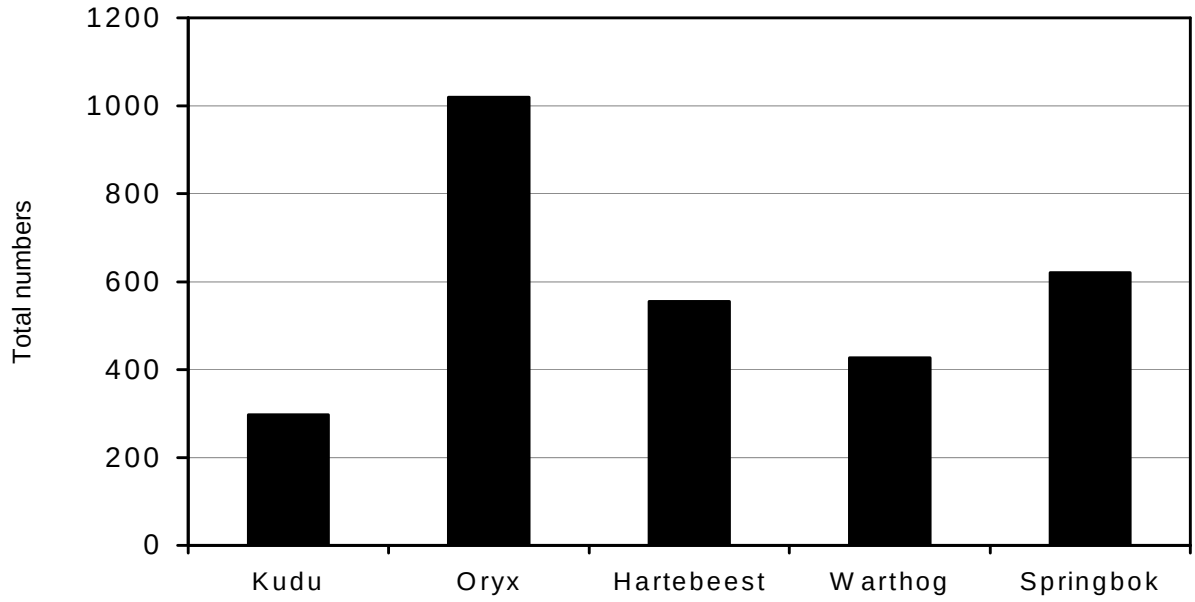


Figure 2.3c. Total numbers of kudu, oryx, hartebeest, warthog and springbok on 100 km² (farms Eorondemba and Okatumba West). Numbers are calculated on the basis of estimated population densities during the expedition (33 counting days in eight weeks).

Marking trees

In April 2003 the local scientists had to abandon their previous study site (due to a serious conflict with a local farmer) and establish a new study area at Eorondemba and Okatumba West. Mapping of several factors like fences, farm roads, water holes, vegetation, etc. was already completed before the beginning of the expedition, but locating cheetah marking trees was an important contribution the expedition made to the overal study site mapping project.

Generally, marking trees are situated on top of a hill where they provide an excellent view of the surrounding area. Marking trees may also be found along riverbeds or near water places. By the end of September 2003 the local scientists had already located nine marking trees within the new study site. During the expedition 14 additional marking trees were found. Most of these were shepherd's trees (*Boscia albitrunca*); only a few of them were camelthorn (*Acacia erioloba*).

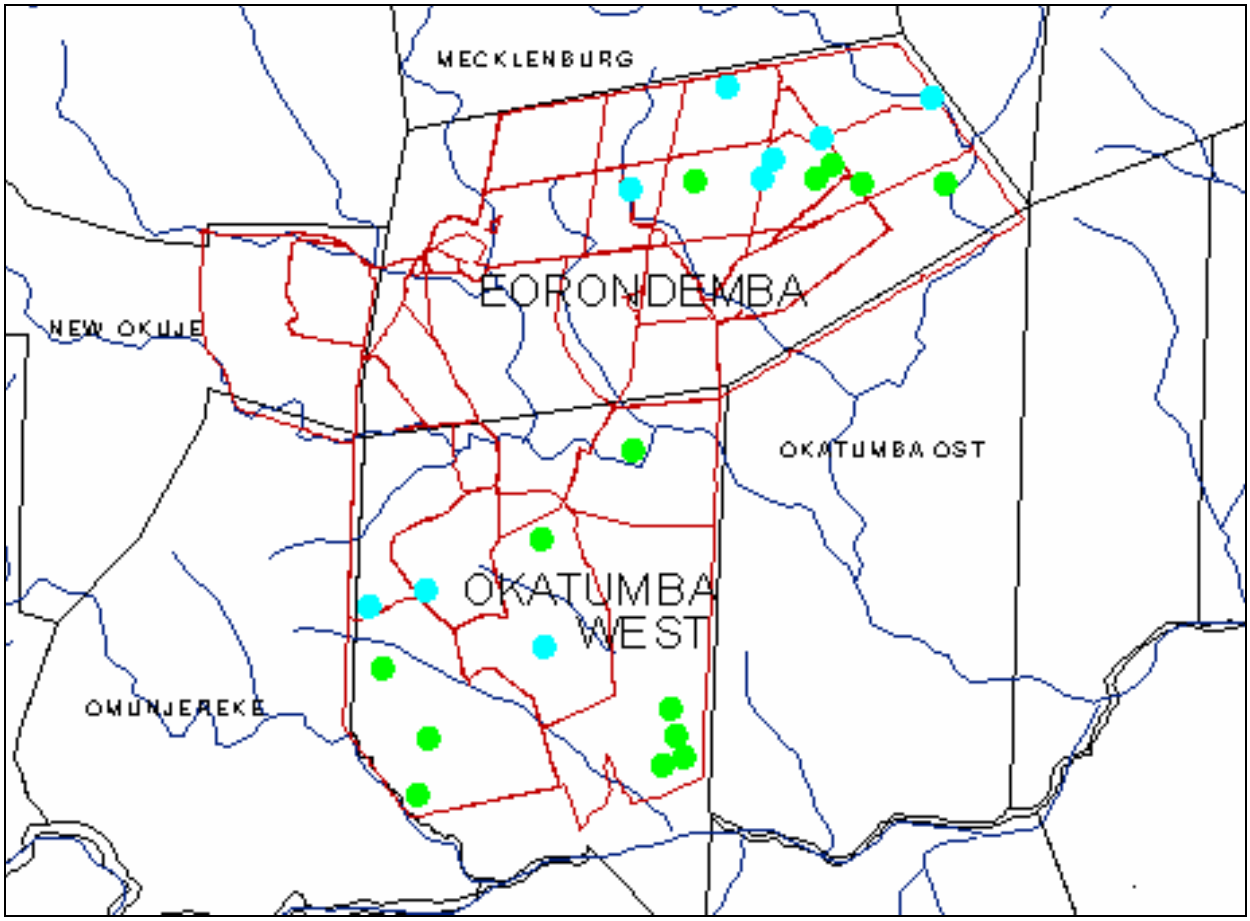


Figure 2.3d. Marking trees already known by the local scientists (blue dots), as well as trees found during the expediton (green dots). The red lines are roads.

Not all of the marking trees within the study site showed evidence of current use, but some of the trees detected by expedition team members looked very promising. Four box traps were relocated to the most promising trees during the expedition. With the first expedition group trap no. 6 was relocated to “Terry’s Tree” (named after its “discoverer“ Terry James) and two days later the one and only cheetah was caught in this trap. The second group relocated box trap no. 2 to a marking tree that was found by one of the bushmen (“Piet’s Tree”), as well as trap no. 4 to “Carole’s Tree” (found by Carole Mahoney). Box trap no. 7 was relocated with the third group to “Bungu’s Tree”.

Cheetah sightings

During the expedition four cheetah encounters took place. One cheetah was seen on the first day in the field (15 October) by Ben McNutt and Lisa Fenton (the expedition leaders) whilst their group was searching for marking trees on Okatumba West. The cheetah, considered to be subadult, was sitting under a tree, but soon ran away as it became aware of its observers.

On 7 November (second last day of the second expedition group) a female and a juvenile cheetah were observed passing the farm boundary between Eorondemba and the Eastern neighbouring farm, called Randjes. The female cheetah was observed by the Northern spoor tracking group, and about 20 minutes later the telemetry group came across the juvenile.

On the last day in the field (5 December) the game counting group observed a single cheetah as it was running away from the group.

All cheetahs sighted during the expedition were still uncollared.

After the expedition, in the middle of February 2004, one of the two male cheetahs (Max) was found dead in the field. The reason for mortality could not be determined due to advanced body decomposition. One day later a female cheetah was captured in box trap no. 8. This cheetah was collared in the early stages of pregnancy, so a litter is expected for the beginning of May 2004. Since telemetry signals are regularly received from this female often on or around Okatumba West, the hope is that the cubs will be born within the study site. Moritz is doing well, and the female that was already collared by the time the expedition arrived now has four cubs. At the end of March 2004 a female leopard was caught in box trap no. 1, and this female now also has two cubs.

2.4. Discussion

Expedition concept

Since 1998 Okatumba Wildlife Research was accustomed to work with students who have certain skills and already know how to conduct scientific work. The co-operation with Biosphere Expeditions was our very first experience with paying and largely untrained people from all walks of life and of all ages. Before the start of the first expedition in 2002 we were sceptical, but now after our second year we consider the expedition concept to be an excellent one. Expeditions run by Biosphere Expeditions are a real asset for all concerned: local scientists gain important assistance for their conservation work, team members increase their knowledge about habitats and/or species and gain some real hands-on research experience.

Usually we do not have the manpower, time and money to conduct game counts, radio telemetry or spoor tracking on a daily basis, and we are genuinely grateful for the additional data gained from eight weeks of intensive research. Besides that we receive financial and in-kind support such as, for example, the Land Rovers and this allows us to work with equipment or to employ specific sampling methods, which would not be possible without Biosphere Expeditions.

Data quality

The expedition team consisted of highly motivated people who came in their holiday time to work with us on a research project. The work they put in and their expedition contribution helped us to gather large amounts of data, which would not have been collected without this expedition.

As regards data quality, one must be aware that data sampling was conducted by people with little or no training apart from that given during the expedition's introductory and training period. Errors in data collection are a human attribute and not limited to expedition team members. Furthermore, the kind of standardisation whereby one person always samples the same data is impossible during an expedition, because all team members understandably want to take part in all research activities.

Some field techniques like checking box traps or searching for marking trees are easy to learn, whilst others like game counts, spoor tracking or radio telemetry require the acquisition of some specialised skills. For this reason some data are more vulnerable to errors and quality problems than others and each expedition data set needs to be assessed on a case-by-case basis.

In general, however, this is not a significant problem, because the cheetah project is a long-term study, and most of the key questions require continuous data collection over a time period of several month or even years. Data gathered during the expedition(s) will be included in long-term data analyses, rather than being analysed as single data sets in this report. For example, it is not possible within the scope of this expedition report to determine home range sizes or territories out of eight weeks of data collection. Having said that, all data gathered during the expedition are important and useful. For example, telemetry data gathered during the expedition are very important, because they make a major contribution to interpretation of aerial radio tracking data and additional ground tracking conducted throughout the year. Game count data sampled during the expedition will, over time, give us additional information on spatial distribution of various prey species, which is important for interpretation of the space use patterns of our study animals. Population densities estimated from data collected during the expedition correspond with results obtained from quarterly game counts conducted on Eorondemba and Okatumba West since November 1998.

Conclusions and outlook

First of all we would like to state that we have consistently made very good experiences with the “research assistants“ that come to us through Biosphere Expeditions. We intend to conduct expeditions during the entire duration of the cheetah project. During the first expedition in 2002 we learnt a great deal, which helped us to improve data sheets, methodology, sampling effort, etc. During the second expedition in 2003 we wanted to make sure that:

- ✓ introduction to the project and research activities is conducted comprehensively,
- ✓ sampling methods are transparent and understandable for everybody,
- ✓ activities need to be as interesting as possible (and where they are repetitive or not particularly exciting, it has to be very clear why they are as important as the more exciting ones),
- ✓ team members are kept highly motivated and thus continuously concentrate on the task in hand,
- ✓ data sampling is correct and continuous,
- ✓ data quality is as high as possible,
- ✓ data entry is transparent, intuitive and easy to understand and therefore works well.

The post-expedition questionnaires gave strong evidence that most of these goals were reached, but some of them (like making clear why certain activities are as important as other ones) still need to be worked on for future expeditions.

Although everybody was informed that the probability to see or even to capture a cheetah in the space of two weeks is low, most of the expedition members understandably hoped to get a glimpse. Unfortunately cheetah density on the study site appeared to be low, as shown by only one capture and the spoor data above. This was disappointing for expedition team members as well as scientsts, but has to be seen in the context of working with genuinely “wild“ wildlife. Having said that, there are plans to adapt capture activities to increase likelihood of capture for the future.

2.5. Acknowledgements

Last but not least we would like to thank all expedition team members, as well as staff members for their amazing effort. This expediton made a major contribution to the cheetah project and really assisted us in increasing our knowledge about Namibian cheetah ecology.

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3. Bird list

Various expedition team members and staff compiled a list of 102 birds observed during the expedition. We are very grateful to everyone who helped with the list's compilation, especially Alan Lyne, Neil Bowman and Carole Mahoney.

Table 3a. Birds observed by the expedition by date.

No.	English Name	Scientific Name	German Name
27 October to 8 November			
1	White-browed Sparrow Weaver	*Plocepasser mahali*	Mahaliweber
2	Groundscraper thrush	*Turdus litsitsirupa*	Akaziendrossel
3	Grey Heron	*Ardea cinerea*	Graureiher
4	African Spoonbill	*Platalea alba*	Afrikanischer Löffler
5	Redbilled Teal	*Anas erythrorhyncha*	Rotschnabelente
6	Blacksmith Plover	*Vanellus armatus*	Waffenkiebitz
7	Redbilled Francolin	*Francolinus adspersus*	Rotschnabel Frankolin
8	Helmeted Guineafowl	*Numida meleagris*	Perlhuhn
9	Northern Black Korhaan	*Eupodotis afraoides*	Gackeltrappe
10	Ashy Tit	*Parus cinerascens*	Aschenmeise
11	Blackchested Prinia	*Prinia flavicans*	Brustbandprinie
12	Burchell`s Glossy Starling	*Lamprotornis australis*	Riesenglanzstar
13	Glossy Starling	*Lamprotornis chalybaeus*	Rotschulterglanzstar
14	Melba Finch	*Pytilia melba*	Buntastrild
15	Cape Turtle Dove	*Streptopelia capicola*	Kapturteltaube
16	Laughing Palm Dove	*Streptopelia senegalensis*	Senegal- (Palmen)taube
17	Namaqua Dove	*Oena capensis*	Kaptäubchen
18	Eastern white Pelican	*Pelecanus onocrotalus*	Rosapelikan
19	Martial Eagle	*Polemaetus hellicosus*	Kampfadler
20	Pale-chanting Goshawk	*Melierax canorus*	Weißbürzel Singhabicht
21	Red-crested Korhaan	*Eupodotis melanogaster*	Rotschopftrappe
22	Crowned Plover	*Vanellus coronatus*	Kronenkiebitz
23	Namaqua Sandgrouse	*Pterocles namaqua*	Namaflughuhn
24	Burchell`s Sandgrouse	*Pterocles burchelli*	Fleckenflughuhn
25	Grey Lourie	*Corythaixoides concolor*	Graulärmvogel
26	White-backed Mousebird	*Colius colius*	Weißrückenmausvogel
27	Swallowtailed Bee-eater	*Merops hirundineus*	Schwalbenschwanz-Bienenfresser
28	Monteiro`s Hornbill	*Tockus monteiri*	Monteirotoko
29	Yellow-billed Hornbill	*Tockus leucomelas*	Gelbschnabeltoko
30	Rock Martin	*Hirundo fuligula*	Felsenschwalbe
31	Forktailed Drongo	*Dicrurus adsimiilis*	Trauerdrongo
32	Southern Pied Babbler	*Turdoides bicolor*	Elsterdrossling
33	Redeyed Bulbul	*Pycnonotus nigricans*	Maskenbülbül
34	Kalahari Robin	*Erythropygia paena*	Kalahariheckensänger
35	Crimsonbreasted Shrike (Boubou)	*Laniarius atrococcineus*	Rotbauchwürger
36	Cape Sparrow	*Passer melanurus*	Kapsperling

Table 3a. Birds observed by the expedition by date (continued).

37	Greyheaded Sparrow	*Passer diffusus*	Graukopfsperling
38	Redbilled buffalo Weaver	*Bubalornis niger*	Büffelweber
39	Violeteared Waxbill	*Uraeginthus granatinus*	Granatastrild (Balubäckchen)
40	Blackcheeked Waxbill	*Estrilda erythronotos*	Elfenastrild
41	Yellow canary	*Serinus flaviventris*	Gelbbauchgirlitz
42	Scalyfeathered finch	*Sporopipes squamifrons*	Schnurrbärtchen
43	Kittlitz´s plover	*Charadrius pecuarius*	Hirtenregenpfeifer
44	Egyptian goose	*Alopochen aegyptiacus*	Nilgans
45	Ostrich	*Struthio camelus*	Strauß
46	White-backed Vulture	*Gyps africanus*	Weißrückengeier
47	Rosy faced Lovebird	*Agapornis roseicollis*	Rosenpapgei
48	Little Bee-eater	*Merops pusillus*	Zwergbienenfresser
49	Hoopoe (African)	*Upupa africana*	Wiedehopf
50	Redbreasted Swallow	*Hirundo semirufa*	Rotbauchschwalbe
51	Pearlbreasted Swallow	*Hirundo dimidiata*	Perlbrustschwalbe
52	Southern Anteating Chat	*Myrmecocichla formicivora*	Termitenschmätzer
53	Great Sparrow	*Passer motitensis*	Rotbrauner Sperling
54	Greater Scimitarbill	*Rhinopomastus cyanomelas*	Sichelhopf
55	Cardinal Woodpecker	*Dendropicos fuscescens*	Kardinalspecht
56	Chestnutvented Titbabbler	*Parisoma subcaeruleum*	Meisensänger
57	Cape Wagtail	*Motacilla capensis*	Kapstelze
58	Redbacked Shrike	*Lanius collurio*	Neuntöter
59	Southern Masked Weaver	*Plocius velatus*	Maskenweber
60	Sociable Weaver	*Philetarius socius*	Siedelweber
61	Longbilled Crombec	*Sylvietta rufescens*	Langschnabel-Sylvietta
62	Alpine Swift	*Tachymarptis melba*	Alpensegler
63	Lilac-breasted Roller	*Coracias caudata*	Gabelracke
64	Tawny Eagle	*Aquilla rapax*	Raubadler (Savannenadler)
65	Three-banded Plover	*Charadrius tricollaris*	Dreibandregenpfeifer
66	Grassveld Pipit	*Anthus cinnamomeus*	Spornpieper
67	Lappet-faced Vulture	*Torgos tracheliotus*	Ohrengeier
68	Acacia Pied Barbet	*Tricholaema leucomelas*	Rotstirnbartvogel
69	Marico Flycatcher	*Bradornis mariquensis*	Maricoschnäpper
70	Pririt Batis	*Batis pririt*	Piritschnäpper
71	African Cuckoo	*Cuculus gularis*	Afrikanischer Kuckuck
72	Redbilled Woodhoopoe	*Phoeniculus purpureus*	Damara Baumhopf
73	Rock Kestrel	*Falco naumanni*	Turmfalke
74	Ludwig´s Bustard	*Neotis ludwigii*	Ludwigs Trappe
75	Kori Bustard	*Ardeotis kori*	Riesentrappe
76	European Swallow	*Hirundo rustica*	Rauchschwalbe
77	Common Fiscal Shrike	*Lanius collaris*	Fiskalwürger

Table 3a. Birds observed by the expedition by date (continued).

9 November to 22 November			
78	Bearded Woodpecker	*Dendropicos namaquus*	Namaspecht
79	Redbilled Hornbill	*Tokus erythrorhynchus*	Rotschnabel-Toko
80	Greybacked Bleating Warbler	*Cameroptera brevicaudata*	Meckergrasmücke
81	Common Greenshank	*Tringa nebularia*	Grünschenkel
82	Redheaded Finch	*Amadina erythrocephala*	Rotkopfamadine
83	Greybacked Finchlark	*Eremopterix verticalis*	Nonnenlerche
84	European Swift	*Apus apus*	Mauersegler
85	African Barred Warbler	*Calamonastes fasciolatus*	Bindensänger
86	Giant Eagle Owl	*Bubo lacteus*	Milchuhu
87	Hammerkop	*Scopus umbretta*	Hammerkopf
88	Wahlberg`s Eagle	*Aquilla wahlbergi*	Wahlberg`s Adler (Siberadler)
89	Brubru	*Nilaus afer*	Brubu(-würger)
90	Marabou Stork	*Leptoptilos crumeniferus*	Marabu
91	Pearlspotted Owl	*Glaucidium perlatum*	Perlkautz
92	Common Sandpiper	*Actitis hypoleucos*	Flussuferläufer
93	Black Stork	*Ciconia nigra*	Schwarzstorch
94	Orange River Francolin	*Scleroptila levaillantodies*	Rebhuhn Frankolin
95	Secretary Bird	*Sagittarius serpentarius*	Sekretärvogel
96	European Bee-eater	*Merops apiaster*	(europäischer) Bienenfresser
97	Greater Striped Swallow	*Hirundo cucullata*	Streifenschwalbe
98	Rufous-naped Lark	*Mirafra africana*	Spornlerche
99	Yellow billed Kite	*Milvus aegyptius*	Schmarotzermilan
100	Wattled Starling	*Creatophra cinerea*	Lappenstar
101	White Faced Duck	*Dendrocygna viduata*	Witwenente (Pfeifgans)
102	South African Shellduck	*Tadorna cana*	Graukopfrostgans

4. Expedition leaders' diary: Namibia 2003

18 October

Today sees the end of our first week of expedition work in Namibia.

So far the expedition has been very successful - I have just heard on the two-way radio, that some of the team members have just found another 'marking tree' (a place where cheetahs socialize, mark and scent), that makes four new trees in as many days, and possible new locations for our box traps. Harald and Birgit, the resident scientists, are really pleased, as prior to our arrival it took them four months to locate just eight trees. Now with the Biosphere team on the scene, they plan to survey all of the farms 10,000 hectares, to locate all of the cheetah's 'marking trees'.

Whilst carrying out a marking tree survey, Lisa and I were lucky enough to catch sight of a cheetah!!! At first I thought it was a just a jackal, as it was about 300 meters away, then as it came into full view we realised it was a young Cheetah, especially when it sped away from us at an incredible speed! We tracked it with the help of one of the Bushman trackers – Josef, who confirmed it was the tracks of a year old cheetah - what a great first day in the bush!

Unfortunately we have had no luck as yet on trapping a cheetah in one of our box traps, we have however caught a porcupine, who was rather reluctant to leave the trap, forcing a couple of team members to 'tip' the porcupine out.

We are working on a different farm from last year, and the new location is literally teaming with wildlife - So far, we have seen kudu, oryx, hartebeest, springbok, waterbuck, steenbok, jackal, baboon, warthog, eland, giraffe, zebra, suricate, African wild cat, aardwolf, springhare, mongoose, scrub hares, ostriche, aardvark, over 60 species of birds – and one cheetah!

Today we found a possible cheetah 'kill', the remains of a poor old hartebeest, although we can't be sure that it was not a leopard, as the vultures had obliterated any tracks that had been left in the sand. However, we have been finding fresh tracks of both cheetah and leopard, some very close to one of the traps. So next week we may have some luck!

23 October

Success at last! A cheetah caught in one of our box traps! One of our expedition members, Terry, discovered a freshly marked tree just a couple of days ago whilst carrying out a marking tree survey, on foot through the 'veld'. The tree looked as though it was frequently visited, so we spent a day moving one of our box traps to the new tree, and created a kraal of thorn bushes around it. The only way for the cheetahs to get to their marking tree was through the tunnel trap.

The cheetah we caught today turned out to be one that Harald and Birgit had already collared. A 4 year old male cheetah, weighing about 49 kilos, and one of two brothers who are companions. As this cheetah had already been collared and had samples taken, we just needed to release it. We all approached as quietly as we could and stood about 20 meters from the trap as Harald climbed on the cage to lift the gate. Within about three seconds it was all over, as our cheetah sped out of the trap and off into the bush! To be that close to such a large wild predator was a real privilege, and an experience that all those in attendance will remember for a long time to come!

31October

Since my last diary entry our first group has departed, taking with them memories of long hot days, the ups and downs of field research, glorious sunsets and one wild cheetah.

Now, as our new group are getting stuck in to their first week, there have been a few events worth mention.

The beginning of the week saw some spectacular electrical storms and torrential downpours. The rains have now passed and we are all looking forward to the promise of new growth and dessert blooms.

However, the rain has also brought with it an increase in snake (and tortoise) activity. My briefing on 'what to do if you come face-to-face with a dangerous snake' has already proved to be useful! As one of our team members casually informed me that he almost stood on a large puff adder, while looking for 'play trees' in the bush. Luckily he heard the warning hiss and froze instantly (the correct thing to do, as a snake will not strike at an immobile object) and waited for the disgruntled puff adder to settle down, before edging away VERY slowly!

No cheetah sightings to report, but so far we have seen fresh tracks, an aardwolf, an African wild cat and a honey badger. Just today we had an aardvark and a porcupine in our box traps, so things are starting to come out again after the rain.

We have also moved one of the box traps to a new 'play tree' that Pete (one of the Bushman trackers) discovered last week. It sports some fine examples of fresh cheetah scat!

That's all for now, but I'll send some more 'tales from the bush' next week…..

5 November

At the weekend, we spent our day off visiting a traditional craft-market and a thermal spa to the North of Windhoek. On the way home we stopped off at the atmospheric 'Joe's Beer House' for some excellent food and refreshments.

The rains have returned, with cloudy skies and the occasional windy downpour during the last couple of days, but the cool air makes a refreshing change. It was 100 degrees Fahrenheit in the shade on Sunday! There is still a lot of electrical activity, and we are treated to spectacular light shows most nights, as the lightning jumps from cloud to cloud in the distant evening skies.

The guys have started a fresh bird list for this slot, and the current total is already at 73 species, with 17 African pelicans spotted at the water hole last night. The giraffes are also venturing closer to our base camp - they came within 500 meters last night.

There has been some fresh spoor (tracks) of a juvenile cheetah around two of the play trees in the south. The tracks went right up to one of the box traps, but then he decided against venturing inside. We have also found spoor of two adult cheetahs, and a leopard with her cub.

The telemetry groups have reported signals from 'Max and Moritz' two collared cheetahs)probably brothers) who are hiding out on a neighbouring farm. Hopefully they will return in the next few days.

The guys have found three new marking trees. 'Carole's tree' has very fresh scat, so last night we moved one of the box traps to the new tree – hopefully our efforts will prove to be fruitful, only time will tell.

9 November

Our second expedition group has just departed, with two separate cheetah sightings on the last day of the expedition!!! When the team members reported the cheetah sightings over the radio, the radio telemetry group were immediately on the case, to confirm whether the big cats were indeed our two collared cheetahs. There were no signals confirmed! This data meant that we now have two new visitors to the farm – Harald and Birgit are really pleased with this news, and we are keen to trap and collar these cheetahs

There have also been new leopard tracks discovered by our spoor tracking group – female and cub. One of the groups also spotted a caracal, only 20 meters from the vehicle. Werner (our resident white bushman) said that it was the second time he had ever seen a caracal, in thirty odd years of exploring the bush! On Friday's night-drive a civet cat was also sighted in a distant tree and a bat-eared fox was seen.

For those of you who were on the first expedition slot, it is with great regret that I must inform you that 'Peppe', the sexually repressed ostrich, is alas no more. He died in a worthy cause – as cheetah food – and has gone to the great ostrich harem in the sky! On the positive side, the 'Terry's tree' produced an aardvark for us yesterday, the group watched from a distance, as the little ant-bear was released, and sped off into the distance.

18 November

Our new group have immersed themselves in expedition life, getting into the routine of an early start and then out on one of the different daily activities – checking box traps, looking for fresh tracks, radio telemetry, searching for marking trees, counting game species and data entry . With regards to captures and sightings, things have gone very quiet on the feline front; however, we are still finding fresh tracks of both cheetah and leopard on a regular basis, so they are still there – just proving to be frustratingly elusive! (though I suppose that's a good thing).

Last week, Harald (the scientist) went on one of his regular fly-overs, he was searching the area to the north of the Biosphere Expeditions study site, using a light aircraft with specially mounted radio telemetry equipment. Of the eleven collared cheetahs that he was searching for, he managed to pick up signals for ten (and saw four) – not bad for an afternoon's work! He hopes to survey the area which includes our study area before the end of the expedition.

A couple of our team members have also added a new mammal species to our list of sightings today – a cape fox. Then Neil promptly spotted another two! Some of the guys also spotted an aardwolf the other night, just ten feet from the Landy, and not at all bothered by the spotlight. The giraffes have also been seen most days. The bird list is also growing by the day, with a giant eagle owl, a pair of hamerkops, a secretary bird, Walberg's eagle, and a prestigious marabou stork making an appearance.

The weather has been a real mixed bag, with lots of blazing hot days, some refreshingly overcast days and a couple of rain showers. On our day off in Windhoek, we even had a quick shower of hail stones!

23 November

Our third group of expedition team members have just departed, with the last group arriving tomorrow. This email is to bring you up to date with the events of the last few days, since my last diary entry.

We've had lots of action on the cheetah front, with lots of fresh tracks, and freshly marked marking trees. Frustratingly, we have also had fresh markings on one of the marking trees where we have set a box trap. One of the little 'dust devil' whirlwinds partially destroyed our kraal of thorns, and not one, but TWO cheetahs hopped over the lowered barrier to mark the tree. The kraal has been re-built, but I doubt that the two phantom markers will return to that particular tree for a few weeks.

We have also had a spectacular storm. We were all sitting up on an escarpment of rocks watching the sun set in a moody African sky, when we spotted thousands of swifts flying overhead, all moving away from the thunder clouds. Minutes later we saw a solid 'wall' of rain and wind advancing on us. It was travelling at such speed that we all ran for the Land Rovers, diving into the first available car as the storm broke on us. We were right in the middle of howling winds, driving rain, thunder and lightning, and then minutes later it was gone! It was a last night to remember!

30 November

The last group have arrived, and are getting to grips with the research activities. Their tracking and observation skills are improving, but they have yet to reach the standard set by our resident 'white bushman', Werner, of spotting a warthog at 3 km.

The first morning found two porcupines in the traps. Having been rudely awakened from their slumber by our arrival, they took a little encouragement with a broom in order to get them out. Since then the traps have been very quiet, although we found tracks from a cheetah chasing a hartebeest past one of the traps.

The weather has been unbelievably hot – reaching 45 degrees centigrade in the shade! Thankfully it broke last night and the rain has cooled things down again.

Spoor tracking groups have found evidence of cheetah and leopard crossing the farm. The marking tree groups have found some very clear spoor in the West of the farm, whilst searching for marking trees. One set was from a young leopard, which we found quite by chance when we parked the car beside it and the second set was from a large male cheetah. Both animals are uncollared, so we are ever hopeful that they will find their way into the traps.

6 December

Box trap groups had a good start to the week, with aardwolves in the trap at 'Carol's Tree', two days in a row. Cheetah spoor have been found around the traps on two occasions – in both cases the cheetah walked right up to the trap, then thought better of it. But sadly no cheetahs have ventured inside - they're just getting to be too smart.

Telemetry groups have found the brothers, Max and Moritz, in their usual hideout just to the NE of the farm border. They are so close, but impossible to see. Now that our eyes are trained, the antelopes seem to stand out so clearly against the bush background, but the cats are completely invisible.

The bird watchers amongst you will be interested to know that the marabou storks are back at the dam and that the secretary bird has been sighted again.

Night drives have seen bat-eared fox, jackal, spring hares, and one group had a really good sighting of an aardvark as it ran for cover.

One last marking tree has been found, down near the main river bed. At first we thought it was a leopard tree as the lowest branch was 4 metres from the ground (cheetahs are poor climbers so prefer to jump onto the tree rather than climbing), but Harald and Birgit think that it could be cheetah, thus confirming our belief that cheetahs can fly! Well how else do you explain the presence of two or three spoor tracks, then nothing for miles! Yesterday afternoon, the play tree groups re-visited all the trees found over the last two months to check for recent signs of activity.

The last game count group came back with excellent news – they had sighted a cheetah in the Southern part of the farm. It was only a fleeting glimpse, but the speed and the running posture made it unmistakeable. A great note to end on.

Sadly this is the end of this year's expedition and my last diary entry, but Harald and Birgit's work here will continue and Biosphere Expeditions will be back again next year to assist them.

So farewell from this year's expedition team.

Ben, Lisa, Ruth, Werner, Harald-the-cook, Steffi, Niko, Marcel, Harald, Birgit, Arne and Bungu.