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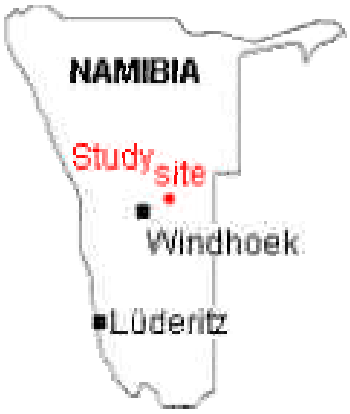
Expedition report

Population ecology and long-term monitoring of the Namibian cheetah.



Expedition dates: 20 October – 14 December 2003

Report published: December 2003

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Abstract

This expedition to Namibia, run by Biosphere Expeditions and Okatumba Wildlife Research from 20 October to 14 December 2002, 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 guided by one local scientist or volunteer. 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 also set in the study area and capture activities took place on 42 days. Five different cheetahs were caught, one of them twice. In addition to these study animals, 32 porcupines, 5 aardvarks, 5 warthogs, 1 honey badger, 1 caracal, 1 turtle and 1 cattle calf 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. 75 cheetah tracks, 18 leopard tracks and 2 caracal tracks were found. Jackal tracks were not counted, because they were too abundant. Many of the cheetah tracks were followed on foot, and in some cases they led researchers to marking trees that had been hitherto unknown to them.

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

Diese Expedition wurde von Biosphere Expeditions und Okatumba Wildlife Research durchgeführt und fand in der Zeit vom 20. Oktober bis zum 14. Dezember 2002 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 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 42 Tagen scharf gestellt wurden. Es wurden fünf verschiedene Geparden gefangen, einer von ihnen zweimal. Zusätzlich zu diesen Studientieren gingen 32 Stachelschweine, 5 Erdferkel, 5 Warzenschweine, 1 Honigdachs, 1 Karakal (Wüstenluchs), 1 Schildkröte und 1 Rinderkalb in die Fallen.

Außer Fang- und Wiederfang sowie Radiotelemetrie kann das Zählen von Spuren genutzt werden, um Indikatoren für Gepardendichte zu ermitteln. Deshalb wurden täglich Spuren gesucht. Während der Expedition wurden 75 Gepardenspuren, 18 Leopardenspuren und zwei Karakalspuren gefunden. Spuren von Jackalen gab es täglich überall, sie wurden wegen ihrer Häufigkeit aber nicht gezählt. Viele der Gepardenspuren wurden zu Fuß verfolgt, einige von ihnen führten zu Markierungsbäumen, die den Wissenschaftlern vorher noch nicht bekannt waren.

Wildzählungen nach dem Line-Transekt-Verfahren und Beobachtungen an Wasserstellen wurden durchgeführt, um Informationen über das Beutespektrum der Geparden zu erhalten.

Contents

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.

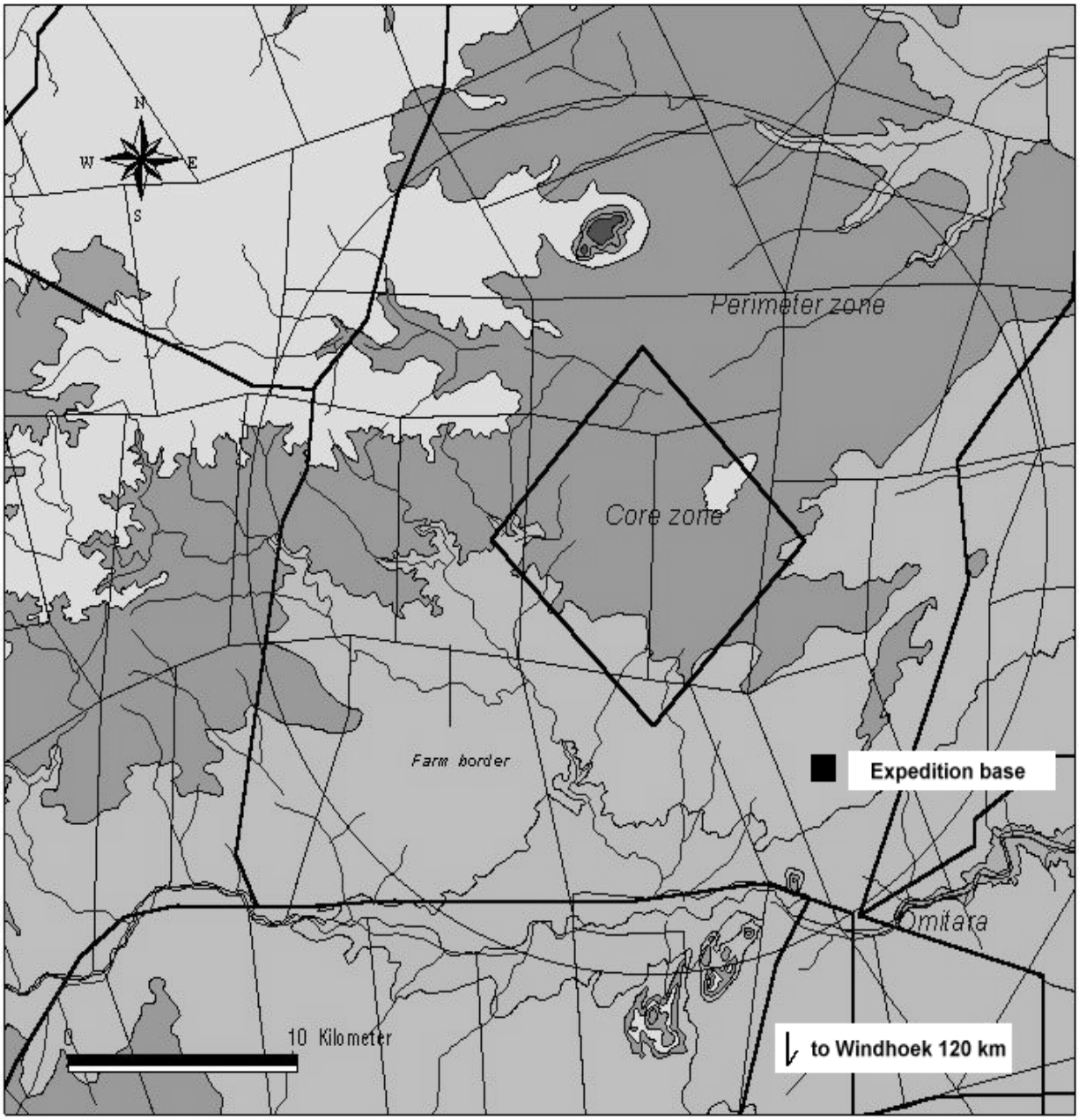
This expedition report deals with an expedition to Namibia that ran from 20 October to 14 December 2002. The expedition was part of a long-term research project on the Namibian cheetah with an emphasis on capture activities, radio-tracking, counting cheetah track frequencies and on recording cheetah prey animals by hide-based observations at water points and on game drives. A number of cheetahs were also captured, immobilised, sampled, and released, and some of them radio collared.

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 the total area in 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 2,500-3,000 individuals has been quoted for the past 20 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 and cheetah capture took place, and a perimeter zone for radio-tracking.



Map showing the research area and expedition base.

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:

20 October – 2 November 2002
3 November – 16 November 2002
17 November – 30 November 2002
1 December – 14 December 2002

Dates were chosen at the beginning of the rainy season when vegetation is still sparse (and animal visibility therefore high) and cheetahs tend to congregate into groups, increasing the chances of capture and study opportunities.

1.4. Local Conditions & Support

Biosphere Expeditions assisted Okatumba Wildlife Research (OWR) 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 by OWR, and the expedition camp with all essential supplies and equipment was situated in the Omitara study site.

The climate is semi-arid with summer rainfalls, which peak from February to April. The dominating vegetation type is "camelthorn savannah". The characteristic plant species is camelthorn acacia. Large parts of the area also consist of "thornbush savannah" in which various acacia and grewia species occur. Thickbush areas, which are mainly found on little hills, are dominated by *Acacia mellifera*.

Expedition base

The expedition team was based at a former hunting camp near Omitara, about 120 km East of Windhoek in a remote region of savannah farmland. Transport to and from base camp, and around the study site was by four Land Rover Defenders.

The expedition base was a fixed camp consisting of a central house with kitchen and dining room, six two person cottage style bungalows and a number of staff and garage buildings. Team members paired up inside the bungalows. All meals were prepared for the team by the expedition cook. Vegetarians could be accommodated.

Field communications

There is was a relatively reliable telephone/fax/internet line at base. Two-way Motorola P030 radios were used for communication between teams around the study site. There was also irregular mobile phone coverage at base.

Transport & vehicles

Team members made their own way to the Windhoek assembly point. For the expedition, the team had the use of six Land Rover Defender 110 Station Wagon, two Land Rover Defender 130 Double Cab, and various other vehicles.

Medical support & insurance

The expedition leader was a 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 semi-serious medical incident was the expedition cook contracting Hepatitis A from an unknown (probably food-related) source. Upon diagnosis by a doctor in Windhoek, he was isolated at the Windhoek Catholic hospital and completely recovered within three weeks. No other team member contracted the disease. There were also a few cases of minor stomach upset.

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 Leader

This expedition was led by Matthias Hammer, founder and Field Operations Director of Biosphere Expeditions. Born in Germany, he went to school there, before joining the Army at 18, and serving for several years amongst other units with the German Parachute Regiment. After active service he came to the UK and was educated at Christ Church, Oxford (studying for a BA in Biological Sciences), and King's College, Cambridge (studying for a PhD in Biological Anthropology). During his time at university he either organised or was involved in the running of several expeditions, some of which were conservation expeditions (for example to the Brazil Amazon, Madagascar, and the Indian Himalayas), whilst others were mountaineering/climbing expeditions (for example to the Russian Caucasus, the Alps, the Rocky Mountains, and the Seychelles). With Biosphere Expeditions he has led teams all over the globe. He is a ski instructor, mountain leader and survival skills instructor.

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:

20 October – 2 November 2002

Karen Bartlett (UK), Julia Chase Grey (UK), Sarah Green (UK), Eve Hills (UK), Gerd Johann (Germany), David Marsh (UK), Tony & Marion Mead (UK), Rick & Evelin Royston (Germany & USA), Dieter Selzer (Germany). Also: Andrea Leeb & Johannes Reck (Germany, journalists for "Tours" magazine). Staff (apart from expedition leader & scientists): Lisa Fenton, Carola Jotzo, Ben McNutt, Werner Pfeiffer, Elisabeth Scheiner, Susanne Weppner,

3 November – 16 November 2002

Katherine Bottomley (UK), Sarah Brooks (UK), Sibille Burkhardt (Germany), Eva Davey (UK), Ruth Eales (UK), Anne Evans (UK), Andrea Gschwend (Switzerland), Matthew Heap (UK), Eve Hills (UK), Peggy Kompalla (Germany), Andrew Marchant (UK), Andrea Rohlf (Germany). Also: Fritz Jantschke, Florian Leo, Alia Barwig (Germany, film team for "VOX" television). Temporary staff (apart from expedition leader & scientists and those named below): Elisabeth Scheiner, Susanne Weppner.

17 November – 30 November 2002

Stewart Ellett (UK), Sam Elson (UK), Anne Evans (UK), Lars Hankammer (Germany), Eve Hills (UK), Stacy Hoover (USA), Susan Humphrey (UK), Geraldine Illien (France), Martyn Roberts (UK), Janine Wainwright (UK), David Youldon (UK), Sabine Zok (Germany). Also: Andreas Wenderoth & Edgar Rodtmann (Germany, journalist & photographer for "GEO Saison" magazine).

1 December – 14 December 2002

Mascha Brinkkoetter (Germany), Keith & Lauren Crozier (UK), Eve Hills (UK), Christer Hoffren (Norway), Antje Krafft (Germany), Corinne Lendon (UK), Ralph Obst (Germany), Martyn Shire (UK), Franz Steininger (Germany), Morag Urquhart (UK), Hendrik Wolf (Germany). Also: Eve Challeton, Frederic Febvre & Eric Desnos (France, film team for "Animaux TV"), Karin Johannson & Kai Lacheiner (South Africa, film team for "Summit TV"), Mark Walton (UK, journalist for "Conde Nast Traveller"). Temporary staff (apart from expedition leader & scientists and those named below): Susanne Weppner.

Staff (throughout the above period):

Gideon Amawalo (tracker), Matthias Kavari (tracker), Werner Pfeiffer (scientific assistant), Stefanie Schwetscher (scientific assistant), Harald Schüren (cook and supplies), Lazarus (cook and supplies), Paulus and Albernto (kitchen staff), Petrus (camp warden), Wilhelmina and Elisabeth (laundry).

1.8. Expedition Budget

Each team member paid towards expedition costs a contribution of £1180 per person per two week slot. The contribution covered accommodation and meals, supervision and induction, 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	59,544	
Expenditure		% of which spent directly on project
Camp includes accommodation, food, gas, wood, phone and other comms	10,340	100
Staff includes salaries, travel and expenses to camp, tips, gifts	16,551	100
Vehicles includes fuel, spare parts, repairs, insurance	6,150	100
Equipment and hardware includes research materials, research gear, camp gear	3,292	80
Team recruitment Namibia as estimated % of PR costs for Biosphere Expeditions	5,500	100
Income – Expenditure (unadjusted)	17,711	
Income – Expenditure (adjusted to % spent on project)	18,369	
Total percentage spent directly on project	69%	

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, 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 in their endeavours to increase knowledge about the Namibian cheetah and to contribute to a successful co-existence of this endangered species with Namibian people.

2.1.1. 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” differs from the habitat “Farmland” in various aspects (see table 2.1.1a). Cheetahs are very adaptable to changing environmental conditions, so it is expected that the ecology of cheetahs living on farmland and in protected areas will differ. For example, cheetahs on Namibian farmland exhibit unusually large group sizes (Gaerdes 1974, Joubert 1984, McVittie 1979), as well as prey and litter sizes larger than those of 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 2.1.1a. Differences between protected areas and commercial farmland.

Protected areas	Commercial 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

2.1.2. 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 95% 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 are situated, one camp is about 200 to 400 ha (own results, unpublished), and four to six camps are supplied with one watering place, usually of water pumped from the ground through wind power. One herd of livestock is rotated from camp to camp, dependent on season and quality of grass.

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 in height 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 in height and consist of eight to eleven wires, or 2.20 m in height 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 hence enable crawling game to cross them, unless the farmer blocks the warthog holes. Warthog holes are also used by other species like steenbok, duiker and several carnivores, including the cheetah (personal observation).

2.1.3. 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 2000 to 3000 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 they 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 the 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 habitats.

2.1.4. 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 proposed study is to provide reliable information on the cheetah's diet and to quantify stock losses.

2.1.5. 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 'marking trees'.

Capture data indicate that marking trees are used more frequently by males than by females (McVittie 1979). About 74% of 298 cheetahs caught by one farmer during the last 20 years at marking trees were males. Females are only captured at marking trees when they join a male or when they are accompanied by juveniles.

2.2. Methodology

2.2.1. Study area

OWR established three study sites that differ in landscape types, geology and soils, annual rainfalls, composition of plant species, population densities of various game species as well as other carnivores (see table 2.2.1a). Hunting pressure on prey base is similar in all study sites, and persecution of predators by humans is relatively low.

Table 2.2.1a. Study sites and habitat differences.

	Hochberg	**Khomas**	**Omitara***
Climate	semi-arid	arid	semi-arid
Annual rainfalls	400 - 500 mm	200 - 300 mm	300 - 400 mm
Landscape	very flat	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	high density
Dominant species	hartebeest, kudu, springbok	kudu, oryx, zebra	kudu, hartebeest, oryx
Additional species	oryx, warthog, steenbok, duiker, hares	springbok, klippspringer, dassies, warthog, hares	warthog, steenbok, duiker, springbok, hares, dassies
Competitors	low leopard density, few brown hyenas	high leopard density, medium hyena density	medium leopard density, few brown hyenas

*Biosphere Expeditions assisted OWR at the Omitara study site. The study site consisted of a core area of about 10.000 ha where capture activities, spoor tracking, game counts, observations at water holes, etc. took place and a surrounding area, which was mainly used for radio tracking (see also page 4).

2.2.2. 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 bushy areas, and the wariness of Namibian cheetahs require employment of indirect sampling methods, rather than depending on direct observations.

Radio collars with activity sensors and ear tags were fitted to animals wherever possible and radio telemetry was then used to locate collared study animals, to determine their space use (home range size, territory, dispersal of young adults) and activity rhythms. Animals were captured for radio collaring by identifying marking trees with the help of the expedition team and two Kxoe Bushmen, and then setting box traps at those trees.

Reliable data on population density can then 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 were employed by the expedition.

Information on game prey species was obtained by game counts using the line transect method (Buckland et al. 1993, Burnham et al., 1980) and by observations at water places (Altmann 1979). Continuous data collection by the expedition team led to large amounts of information on the cheetah's prey base, which will help to answer questions on prey availability and prey utilisation.

The 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).

Table 2.2.2a. Research activities and vehicles.

"Box traps"	**"Game count"**	**"Observations"**	**"Telemetry"**
checking box traps and searching for cheetah tracks in the morning	counting game on two different routes, one in the morning and one in the afternoon	observation at two different water places (two people observing one watering place)	radio telemetry (driving a certain route to locate radio-collared cheetahs in the morning, follow-up the signals by vehicle and by foot in the afternoon)
entry of data collected by the whole expedition team into a computer in the afternoon			
Land Rover Defender 110 Station Wagon	Land Rover Defender 130 Double Cab	Land Rover Defender 110 Station Wagon	Land Rover Defender 130 Double Cab

Every morning the **box trap team** drove a predetermined route to check box traps and to search for cheetah tracks along farm boundaries. This group was joined by a local tracker. Box traps were either found open, or closed without animal, or closed with an animal inside. Captured animals others than cheetahs were released immediately. Cheetahs that were already radio-collared were released in the afternoon with all expedition team members present. Cheetahs without a radio-collar were immobilised, sampled, marked and released. In the afternoon the box trap team entered all data collected by the expedition from the previous afternoon and from the morning into a laptop. Data were entered into a customised Excel database.

The **game count 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 identified and counted 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. In the morning, Southern parts of the study area were covered, in the afternoon central and Northern parts were covered.

Additional information on prey availability was collected by the **observations team**, who sat in hides cut from thorn bushes and observed animal movements at various water places. In the morning and in the afternoon two different water places were covered by two observers each. For successful data sampling it was important that observers placed themselves against the wind, wore clothes that blended in with their natural surroundings, remained totally quiet and moved as little as possible. Dark clothes worked well, even if it was a dark red or orange, as animals can not see colour. Light clothes did not have the desired camouflage effect.

The **telemetry team** conducted radio telemetry on a daily basis. During the morning hours the team drove along a predetermined route of about 80 km, covering large parts of the study site perimeter zone, which surrounded the central study area. In the afternoon either animals located in the morning were followed-up, or (if no signals were detected in the morning) radio telemetry was conducted in 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. This information was then analysed to ascertain cheetah position and movements.

2.3. Results

Capture activities in the Omitara study site started in July 2002. Eight cheetahs had already been captured, marked and released before the beginning of the expedition. All of them were caught at the same marking tree, and all eight cheetahs were males: two single males and two groups of three males, probably brothers.

2.3.1. 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 42 days with a total of 331 trap nights.

Five different cheetahs were captured. One of them from group of three adult males, had already been radio-collared previously. During the expedition this animal (called *Idefix*) was caught and released twice. Another adult male cheetah was immobilised, sampled, radio-collared and released. One group of two males and one female cheetah, probably siblings, were captured but deemed too immature to be collared. They were immobilised, sampled, marked with ear tags and transponders, and released. In addition to these five cheetahs, 32 porcupines, five aardvarks, five warthogs, one honey badger, one caracal, one turtle and one cattle calf were captured.

Sadly one baby porcupine died as a result of capture activities. This animal was caught together with its mother. After release the female porcupine fled, but the juvenile got stuck in a bush. For some reason the mother did not come back to search for the juvenile. On the next day it was found in the same place, and the research team took it with them to camp. Although it was eating and drinking well, it died after two days, probably as a consequence of stress.

2.3.2. Spoor tracking

Spoor tracking was conducted in an effort to throw some light on cheetah density within the Omitara study site, and this method was considered to be a real success. During the expedition 75 cheetah tracks, 18 leopard tracks and two caracal tracks were. Jackal tracks were not recorded, because they were too abundant.

Table 2.3.2a: Number of tracks (spoors) found during the expedition.

	Males	Females	Juveniles	Sex unknown	Total
Caracal	2	-	-	-	*2*
Cheetah	13	4	4	54	*75*
Leopard	2	9	4	3	*18*

Many of the cheetah tracks were followed on foot, and in some cases they led the expedition team to marking trees that were unknown to OWR previously. Spoor tracking indicated that the farm De Hoop (the central farm on the Omitara study site) was entered by at least 22 different cheetahs. While some of them like “The Three Musketeers” (a group of three brothers) spent large amounts of their time at De Hoop

and a few neighbouring farms, other cheetahs just passed through the farm without staying there. Unfortunately, this high cheetah density lead to a serious conflict with the owner of the farm De Hoop, and as a consequence this study area had to be abandoned shortly after the expedition (see Epilogue).

2.3.3. Radio telemetry

Radio telemetry was conducted on 34 days, and radio-collared cheetahs were located on 21 days.

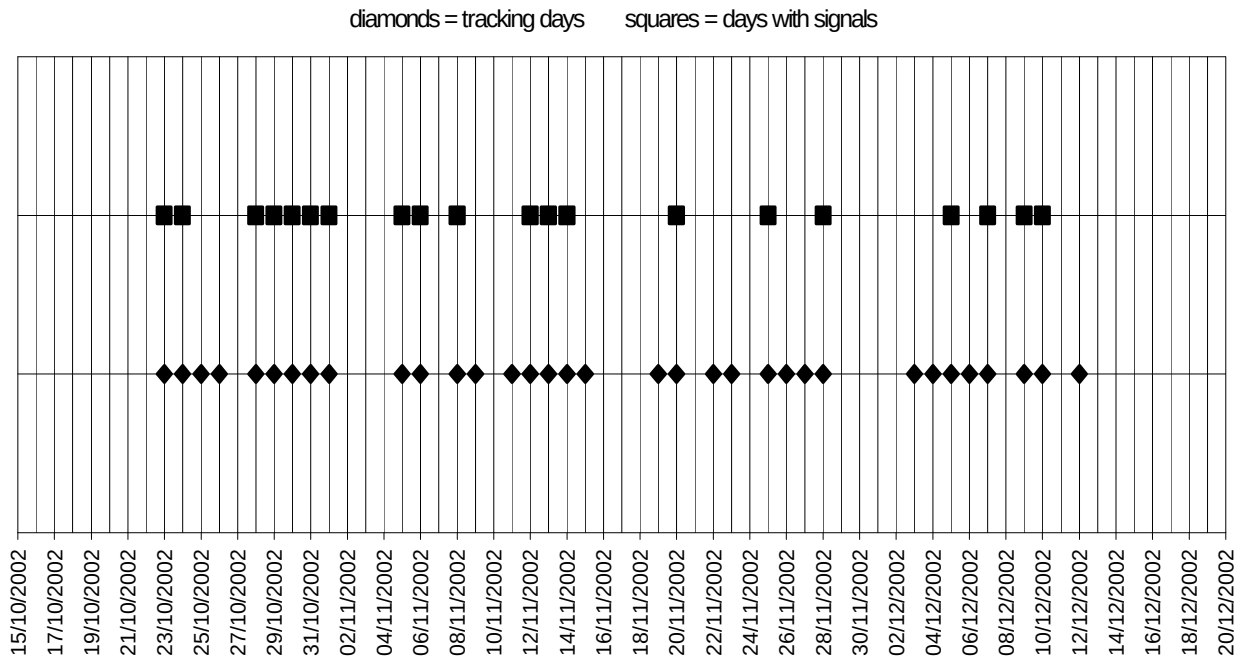


Figure 2.3.3a. Radio telemetry: total tracking days (diamonds) and days with signals (squares).

Most frequently (on 17 days) signals from one group of three males (*The Three Musketeers*) were received. This group appears to use a small home range. In the first week of the expedition the team managed to follow these cheetahs on foot and observe them resting under a bush. The team could approach *The Three Musketeers* up to about 30 metres before they ran away. Although this kind of tracking on foot was subsequently repeated several times during the expedition, a second sighting was not achieved. The only other sighting as a result of telemetry followed by tracking was of a male cheetah called *Methuselah*. This animal was sighted whilst tracking him in two vehicles.

2.3.4. Game counts

On 31 days game counts were conducted to assess prey base. 1057 km were driven, and 4207 animals were detected. The most numerous species were kudu (1356 animals counted), oryx (1315 animals) and hartebest (725 animals). The figure below shows data for the 25 days on which game counts took place in the morning and in the afternoon (there were six days on which game counts were conducted in the morning, or in the afternoon).

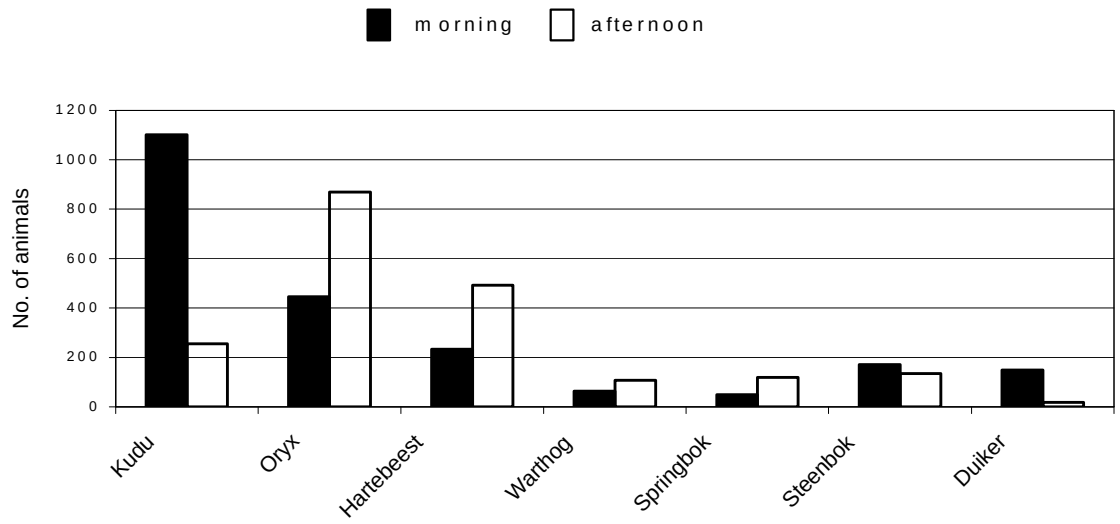


Fig. 2.3.4a. Number of animals detected during morning hours compared to those detected in the afternoon during a total of 25 observation days.

While kudu and duiker were mainly seen in the morning, hartebeest and oryx were encountered more frequently in the afternoon. For warthog, springbok and steenbok, time of the day did not make a significant difference.

2.3.5. Observations at water places

Observations at water places were conducted on 35 days. On 24 days observations were conducted during the morning as well as in the afternoon, on eight days observations took place in the morning only, and on three days in the afternoon only. Warthogs and jackals are difficult to detect in road strip counts and since warthog was by far the most abundant species during observations at water places, this supplemented missing data well. In total 928 warthogs, 199 kudus, 98 hartebeests, 91 oryx, 84 jackals and some other animals were observed.

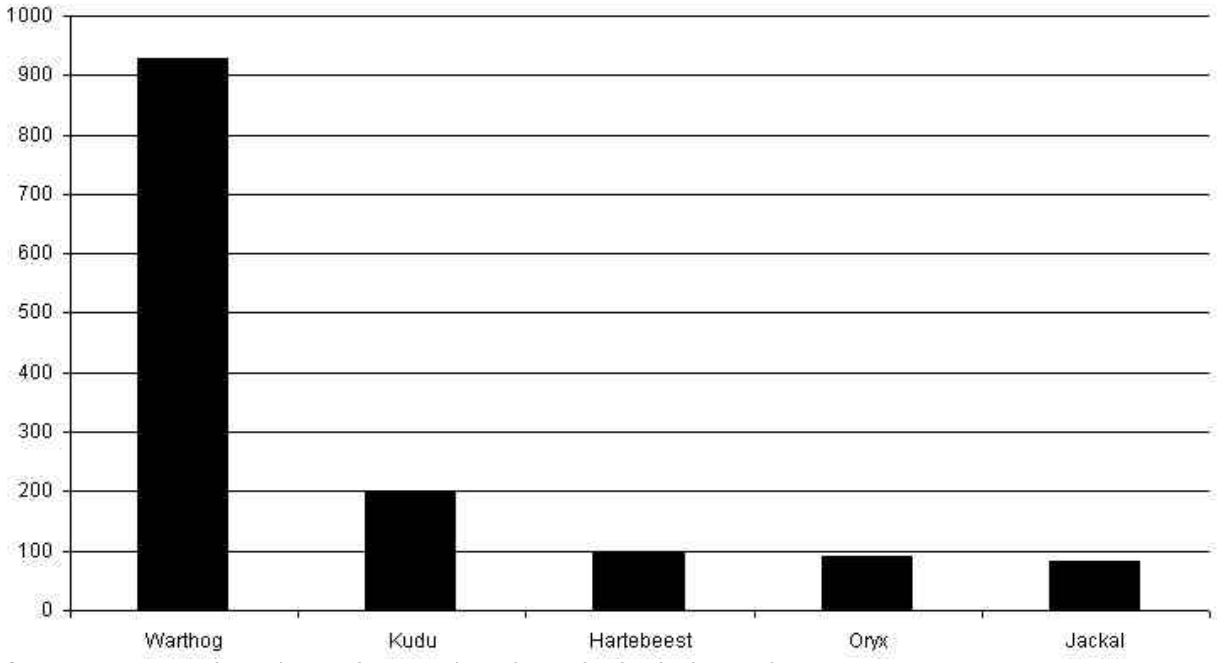


Fig. 2.3.5a. Water place observations: total numbers of animals detected.

Usually observations were conducted from about 08:00 to 12:00 and from 15:00 to 19:00, but on 21 November and on 11 December longer (16 hour) observations were conducted to ascertain activity patterns throughout the day. During the 16 hour observation periods, four different water places were covered concurrently. Observations were conducted by two persons per water place with pairs changing every four hours. Observations began just before sunrise (05:30) and ended about half an hour after sunset (20:00).

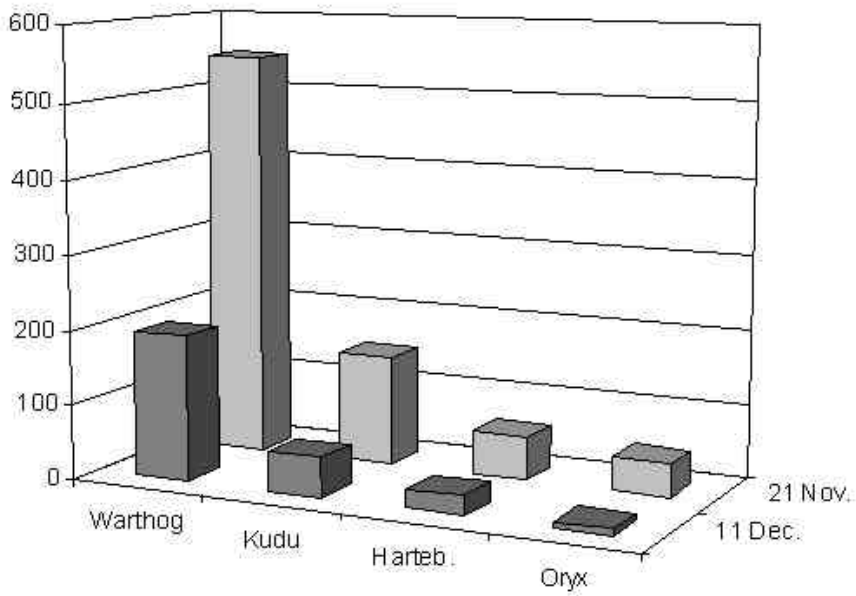


Fig. 2.3.5b. Long-term (16h) water place observations on 21 November and 11 December 2002: total number of animals detected.

The relationship between species was similar on both days, but the total number of animals was higher on 21 November. This decrease in abundance was probably due to rainfalls between 22 November and 11 December, which made most wildlife species less dependent on artificial water places.

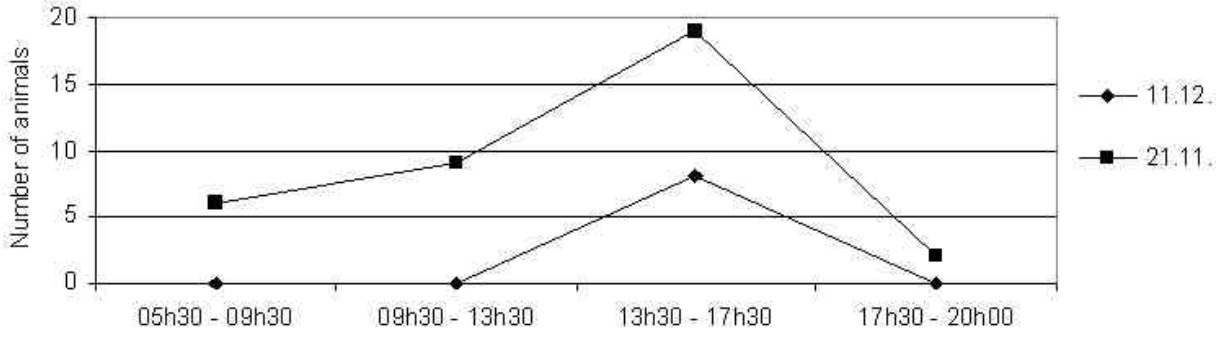


Fig. 2.3.5c. Oryx drinking activity during 16h observations.

On both observation days, oryx and warthog were observed to visit the water places mainly around midday. Drinking activity of other species like kudu or hartebeest appears to have a larger variation. In order to get reliable data, more long-term observations are needed.

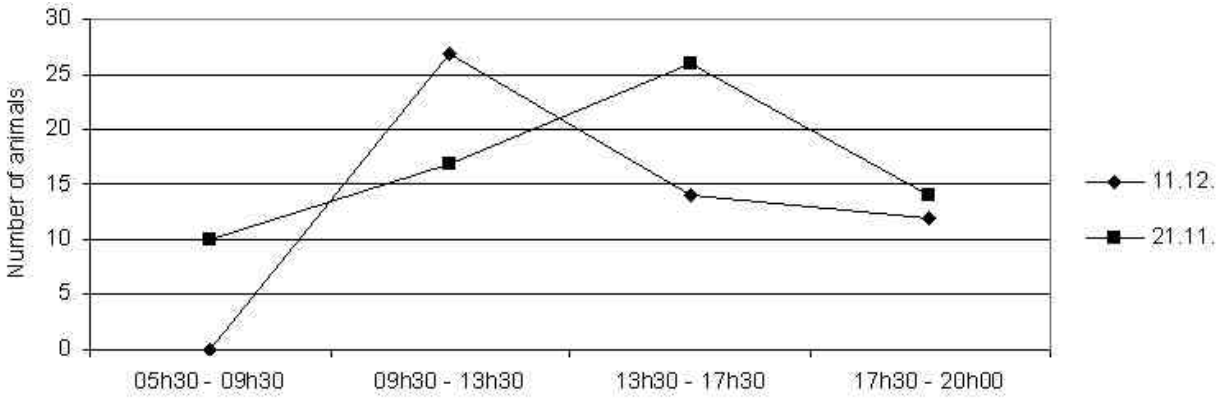


Fig. 2.3.5d. Kudu drinking activity during 16h observations.

2.3.6. Cheetah sightings

During the entire expedition six cheetah encounters took place. As mentioned above, *The Three Musketeers* were seen by the telemetry team while following the animals on foot. The signals of the radio-collars indicated that the three cheetahs were inactive, and the telemetry group found them resting under a bush and could approach up to 30 metres. When the cheetahs became aware of the observers, they rose and fled.

One afternoon a single male cheetah (*Methusaleh*) was tracked after locating his signal by aerial radio tracking during the morning hours. Although the expedition team followed this animal with two vehicles and a large number of people, including a film team, they managed to get a short sighting of the cheetah while he was running through the bush. On the same day, driving back on a dirt road from the *Methusaleh* encounter, the expedition team came across three cheetahs sitting on the road, but soon running into the bush. Although it was already dark, observers could detect in the headlights that the animals were subadult and uncollared.

Two expedition team members had the good fortune of observing the second radio-collared group of three adult male cheetahs (*Obelix*, *Asterix* and *Idefix*) for some minutes when these animals came to a water place.

Another single cheetah, probably a female and uncollared, was seen during the 16 hour observation period on 21 November, also at a water place. Both sightings took place shortly before sunset, and in both cases the cheetahs drank.

One afternoon the game count team detected a single cheetah without a collar resting under a bush not far from their game count route. When the vehicle came closer, the cheetah rose and fled. Later its tracks were followed.

2.4. Discussion

2.4.1. Expedition concept

Since 1998 we were accustomed to work with students who have certain skills and already know how to conduct scientific work. The 2002 expedition was our very first experience with paying and largely untrained people from all walks of life and of all ages. Before start of the expedition we were sceptical, but now after our first 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, observations at water places, radio telemetry or spoor tracking on a daily basis, and we are really thankful 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 certain equipment or to employ certain sampling methods, which would not be possible without Biosphere Expeditions.

2.4.2. 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 induction period. Although all groups were assisted by a local scientist, student and/or tracker, it is very difficult to avoid various mistakes. 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 observations at water places 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, as we have to be aware that 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. Future reports will provide more details and results on this.

2.4.3. Conclusions and outlook

As mentioned above, the 2002 expedition was our first experience with this kind of assistance. We learned a great deal during this period, which helped us improve data sheets, methodology, sampling effort, etc. from the first up to the last week. Team members should not feel bad about this, because we learnt as we went and the process continuously improved the project in its early and crucial stages. For future expeditions we have to make sure that:

- ✓ introduction to the project and research activities is conducted comprehensively,
- ✓ sampling methods are transparent and understandable for everybody,
- ✓ activities are not be boring (or if so, 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.

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2.6. Epilogue

Some of the expedition members may already be aware of some very sad news: shortly after the 2002 expedition we got into serious trouble with the owner of farm De Hoop. The farmer lost some cattle calves, and for some reason he made us and our cheetah project responsible for these problems. He asked for compensation, and he started setting box traps to capture and kill cheetahs. One day in January the farmer took three of our box traps without permission and we had to fight a hard battle to get them back. During the first half of 2003 the farmer managed to capture and kill more than 20 cheetahs, amongst them sadly *The Three Musketeers*, *Asterix*, *Obelix* and *Idefix* as well as *Balu* and *Methuselah*.

Despite this tragedy there is one item of good news: the male cheetah that was radio-collared during the expedition is still alive and uses a very large home range. The three youngsters that were immobilised, sampled, marked and released during expedition were also captured by the owner of De Hoop in June 2003, but luckily they could be translocated.

Because we had lost the co-operation of De Hoop's owner, in April 2003 we decided to move to a farm named Eorondemba („coloured ground") where we had to set up a new study site and to start again from the beginning. Eorondemba is situated half-way between Windhoek International Airport and De Hoop. It is a 10,000 ha game farm without cattle and without internal fences. The habitat is more rocky, cheetah density is lower, but the farmer is much more co-operative and has a much more enlightened attitude towards cheetahs on his land.

More good news was that after all this trouble our son Arne Nils was born on 27 May 2003 (the photo shows him at five months).

Up to now at least, he is a very happy baby and is easy to handle. Naturally we had some sleepless nights at the beginning, and we needed some time to re-organise our life. Arne already immobilised, sampled, radio-collared and released 18 cheetahs, and he attended a two week game capture and immobilisation course together with his parents. During this course he caught four giraffes as well as 100 hartebeest, and he immobilised several lions, leopards, cheetahs and wild dogs at Harnas Wildlife Foundation. Arne joined us during this year's expedition, and he appears to like this kind of life. Maybe he will tell us some day whether this assumption is true...

Last, but not least we would like to thank all expedition team as well as staff members for their amazing effort. This expedition made a major contribution to the cheetah project and really assisted us in increasing our knowledge about Namibian cheetah ecology, which is a long-term project (especially since we had to change study sites in between).

From the editor: The De Hoop tragedy serves to highlight the farmer/cheetah conflict that undoubtedly exists and the need for more research work and education on how commercial farming interests and endemic wildlife can co-exist on Namibian farmland. The expedition collected very valuable data, the importance of which is not reduced because of the change of study site. The death of our study animals, whom we got to know so well, although a very sad story, has not been in vain. The data they provided will live on.

3. Expedition leader's diary: Namibia 2002

22 October

We've been here for five days but our feet have not touched the ground. First there was the rush to get (more or less) everything in place for the team's arrival and then the expedition team itself a couple of days ago. Harald & Birgit, our scientists, have made a great effort to get everything ready. The farm is newly painted, posters are produced, talks arranged, box traps ready etc etc. It's been absolutely lots of work, but it's also nice to see it all come together now. Harald & Birgit have assembled an illustrious team of helpers. There is another Harald, the cook, Steffi, Susanne, Carola and Elli, all students who will be leading research groups, there is Werner, a conservationist, a couple of bushman trackers and quite a few more support staff. Expedition base is ready and set up, complete with our own little library, barbecue outside and Harald (the cook's) den, where he has been producing great food over the last few days. Fruit salads, pasta bake, real banana milk shakes – you name it – all true to his slightly adapted motto that "an expedition team marches on its stomach".

The team arrived on Sunday and by 16.00 we had made it to base. Dinner, introductions, an African sunset and then bed for most of them. Monday we had introductory talks about Namibia, cheetahs and the research we will be doing, a driver brief for those who are going to help out driving the Land Rovers and a drive round the study site in the afternoon.

Today we erected thorn circles around the eight box traps we have distributed around the site. The point being to restrict access to cheetah play trees (trees where they like to congregate) to one point (the box trap). The theory is that a (usually) male cheetah who wants to get to his favourite tree will be stupid enough to walk through the box trap to get there, and then, bang, we have another cheetah ready for radio-collaring. In practice it works quite well too, as H&B have already caught quite a few that way. From tomorrow onwards one team will check the traps each morning and whilst they drive around the study site doing that, will also look for cheetah tracks. So a couple of lucky (?!) team members will get to sit on the bonnet looking for tracks.

Iodine was in high demand after our thorn circle fest and all the other teams will be glad to hear that they will not have to do another eight circles again (though it might still be a good idea to bring strong gardening gloves if we have to shift a trap!).

23 October

Our radio telemetry group saw two honey badgers and three cheetahs (!) in the field today. How lucky can you get on your first full day! None of our local staff had ever seen two honey badgers together and seeing a group of three cheetahs in the field is almost as rare. We are now asking them to pay triple.

My group spent several hours on the back of the pick-up zig-zagging through the study site and spotting game. Once you have spotted an individual or a group, you have to note down the angle to the car and the distance from the car. We usually get distance estimates from anything between 50 to 300 metres for an animal that is, say, 150 m away, but luckily we have laser rangefinders. Developed for the military they look like binoculars - you look through them and put an animal or object in the crosshairs, press a button, and, hey pronto, it gives you the exact distance. Quite good fun to let everyone estimate distance and then get a reading through the rangefinder.

We spot jackal, steenbok, hartebeest, oryx, warthog and lots of brids and a few more small mammals. We also free a calf which was stupid enough to walk into a box trap!

In the afternoon we have a thunderstorm and for the first time have to have dinner inside, rather than on the balcony.

27 October

No more cheetahs, but lots of other wildlife. The water hole surveys are proving very popular. Sit by a watering place in comfy chairs for a few hours, record birds, warthogs, kudu, oryx coming by to drink… not bad for a day's work. The radio telemetry groups, on the other hand, have not been so lucky with very few signals from the cheetah radio collars despite quite a lot of driving around in the heat. No so popular, that one. Game counts is more fun with people standing on the back of the pick-up, trying to spot game and recording all sightings. It's nice and breezy up there and there's always lots to do. We see oryx, harebeest, kudu, warthog, meerkats, jackals, but no cats so far. We also come across thirty or so vultures sitting in the trees and on inspection find a dead oryx. Gideon, our Owambo tracker, thinks it's died of old age, rather than anything else, although the jackals, vultures and other animals have already had their fill.

The box trap checking group also find a dead oryx which has been killed only fewer than two hours earlier by a leopard. Perhaps they even disturbed the cat whilst approaching – there were lots of fresh tracks around, the blood had not yet clotted and the body was still warm. Matthias, our bushman tracker, cuts himself a few spare ribs and then the head is left in the box trap as bait, but in the next couple of days nothing takes to it and the box trap is left undisturbed, much to the disappointment of everyone. The other traps are also mostly empty and so far we only have a porcupine and a calf to show for our efforts. But we live in hope and every time you approach one of the eight box traps, you cannot help but being excited. Sometimes you can see from afar that the trap is shut. Then two people approach and look what (if anything) is inside, but so far either the strong winds or a hare or a bird have released the traps and slipped out again between the bars.

Today, on Sunday rest day, everyone's gone to a game park to look at some of the other animals that do not occur naturally around here, like giraffe, buffalo et al.

31 October

Over the last few days we've had plenty of game, but no luck with the baited leopard traps. We also had a few porcupines in the trap and an aardvark. A couple of days ago we counted the tracks of seven cheetahs coming onto the study site, so expectations were high. A day later they were dashed twice when we had tracks around one trap that was already occupied by a porcupine,

and also tracks around an empty trap with one paw print INSIDE the trap but not enough to trigger the closing mechanism (damn!).

Spirits were still high amongst the team, though. Then today – success! A cheetah in a trap. It was a male which our scientists had already collared a while back, but it was still really exciting. The whole team gathered and drove in convoy up to the trap. Harald explained how we had to approach (against the wind, in one tight group, no talking etc) to minimise stress. When we were within 5 metres of the trap, he started growling and trying to escape. Everyone took their pictures and then Harald jumped onto the box trap with the cheetah protesting and trying to get out. Harald opened the door and after a second or two of hesitation, he was off at incredible, elegant speed. What an experience ! – there were tears. And to top it all off I had more luck than sense and took a half decent picture of him escaping from the trap.

4 November

We had an almighty thunderstorm on the last day of the outgoing team. It rained about 50 mm in half an hours or so! Some of us got a thorough soaking, but most just enjoyed the experience (inside) and the rainbows afterwards. Everyone seemed sad to leave – the new team now seems glad to be here, especially since some of them had some epic travelling to get here (flights delayed, flights cancelled etc.).

6 November

The weather has gone decidedly cold, with an icy wind blowing (very unusually for this time of year) from the Pacific. Last night we measured 5 degrees at night (!), so lots of extra blankets at night and jumpers for groups exposed on the back of the pick-up or sitting in the open for the observations. Spirits are still high though.

Harald, our scientists, took one of his regular fly-overs in a little fixed wing aircraft today and found quite a few cheetah signals with his aircraft-mounted telemetry equipment. He dropped some coordinates out of the plane down to a waiting research team, but they failed to pick up the signal in the morning. In the afternoon they had more luck and came within a few metres of a cheetah, only for it to escape from view through the bushes! Still very exciting for those lucky enough to have been on telemetry duty today.

10 November

Lots of activity at the water holes these days. We've had groups seeing large hartebeest herds, warthog, oryx, kudu, all within a few hours. The German film team have also arrived. We've found another play tree and have moved one of the box traps there. Not much happening in terms of cats at the box traps, although we are catching plenty of porcupines, aardvarks and the like!

Today is rest day. Some people went to a nearby bat cave, which went down pretty well, others are chilling at base, and Harald, Birgit and I have shown the film team around, done the driving course and the briefings. Tomorrow it's back to the usual routine. Wish us luck for the week coming. Another cheetah would be nice!

14 November

Lots of activity over the last four days and a time-consuming film team. Quite a view porcupines, aardvarks and other small mammals in the traps, but unfortunately no cheetah for this slot. However, Harald went flying yesterday and picked up six radio signals from the collars of various cheetahs. He saw six from the air and then dropped off coordinates to telemetry groups waiting on the ground. They chased the signals all day and late into the evening and were rewarded with a fleeting look at a cheetah in full flight. On their way back after nightfall the two telemetry groups saw lots of game by the roadside and finally three cheetahs standing right on the gravel road! All three of them without a radio collar.

Two more groups chased them the next day, but were unlucky in not picking up any more signals. Another group went box trap checking with the film team and had one trap with an aardvark, one with a porcupine and the last one with a porcupine mother and young. Must be a new occupancy record.

24 November

Team two has been and gone, and team three arrived and settled in quickly. We had quite an eventful week with lots of action at the box traps (loads of porcupines, one honey badger, the odd aardvark, warthog and calf). We also conducted an 18 hour observation stint covering three watering places simultaneously from sunrise to sunset. In that period we saw 44 kudu, 36 oryx, 24 hartebeest, 17 jackals, 36 baboons and 165 (!) warthogs.

We also have a journalist and photographer for GEO Saison, a German travel magazine who turn out to be a credit to their profession, integrating themselves effortlessly into the team.

Then finally, on Saturday, another cheetah in the same trap as last time. It turns out it's the very same cheetah again we trapped in the first slot and his two friends are around. The group checking the box traps even see one of them lazing around in a tree nearby! Harald decides to put our regular customer in a holding trap by the playtree and set the box trap anew in an effort of capturing a second one of the three. This means transferring the cheetah from the box trap to the holding trap and carrying the holding trap, complete with cheetah inside, a few metres away inside the ring of thorns we have constructed around the playtree with the box trap as the only access point. Four lucky volunteers get to carry our cheetah around, which means you are only about 20 cm away from this wild animal issuing low growls but being otherwise quite calm. What an experience!

With the cheetah safely in the holding trap, in the shade with some water, we leave the whole setup over night. Next morning the whole group is back at the traps. Overnight the German VOX film team have returned to film the release, so we have quite a sizeable group driving up in excitement to the traps. We make a detailed plan on who does what and how to minimise stress. The box trap is empty, but our regular customer is still safely inside his holding trap. We approach in one tight group and line up

cameras ready. Four volunteers carry the holding trap to the box trap again, we transfer the animal, step away and Birgit climbs on the box trap. The cheetah growls quite a lot but otherwise is beautifully calm – as he should be since by now he should know the procedure! Birgit opens the trap with everyone standing by about 10 metres away. In a second he's gone in leaping strides to the sound of a multitude of camera shutters clicking away. Until next time!

26 November

Cheetahs galore! Believe it or not, but today we had TWO cheetahs in the traps, both without collars. One a single adult male, and the other a juvenile male, part of a completely uncollared group of three male juveniles and their adult mother. We are now trying to catch the entire group of four, so today we transferred the juvenile into a holding cage and set two box traps either side of it. The single male we tranquillised and collared today. The whole team was there when we darted him, watched him go under, carried him to a lab table and measured, collared, weighed him etc. The whole procedure takes about an hour with four of us working on the animal and the rest of the team standing around the table watching and taking pictures (no pressure to get everything right!). Right at the end, when he was still sound asleep, everyone was allowed to touch him before we carried him into the bush, injected the anti-sedative and watched him wake up slowly and stagger into the distance. It all went without a hitch and there were quite a few tears. Wish us luck for the next couple of days when we try to catch the group – if we are lucky we may have four more collars walking around the bush soon.

27 November

Cheetah update: two males in the traps, one male, one female to go.

29 November

Two males, one female. One to go.

30 November

It stayed at two males and one female (and a porcupine, which, believe it or not, walked into the trap wedged between two cheetahs). It is probably three siblings from the same litter. The female was in heat, so we also had tracks of the "Three Musketeers" (a group of three males) around the traps, but none inside. The adult mother, unfortunately, was too clever to be captured.

We sedated all three, one after the other, and took blood samples, measurements etc. All three were too young to have radio collars fitted, as growing into them might suffocate them. All sedations went well, although one male woke up in Harald's arms as he was carrying him to a shaded "waking up" spot, and the female in mine. Nothing much to worry about, really, as there is only some growling and body twisting involved. In his drowsy state and effort to get away from us and to his siblings, one of the males also walked straight back into the trap that was set next to his sister.

Four captured cheetahs in this slot. And some people saw three cheetahs in the wild on top! Must be the luckiest people on the planet. There'll probably be zero again in the next…

6 December

It's been pretty quiet for the last few days. No cheetahs (apart from their tracks), empty box traps (apart from a few porcupines and a warthog), weird weather (clouds and lightning moving in from Angola) and few telemetry signals. A good team, though, and an entertaining French film crew.

10 December

Still pretty quiet around here. We had an aardvark in the trap just as a Motorola film crew arrived for a day or two, but no cheetahs anywhere near the traps. We also had a flying termite invasion at camp and proceeded to roast them in a pan with some salt and oil. Almost everyone had a try, but amidst much laughter and screwed up faces it soon deteriorated from roasted termites to picking them up and eating them raw to licking them off the floor! Anyone would have thought we don't provide enough food!

13 December

Some cheetah sightings, but only for a few lucky ones. We had planned another day of constant water point observations and Franz decided to sit on a wind pump that overlooks a water point. From there he saw three cheetahs about 100 m away who were completely unaware of him, behaved naturally and trotted together through the bush. All three of them uncollared. Werner and Corinne saw one female coming to their water point to drink. She also had no collar and spent about 10 minutes there. Most other observers also had a really busy day with all sorts of game arriving at the water point (it's been hot and dry for the last few days). One group saw 47 warthogs over a period of three hours!

14 December

Our objects of desire had one last trick up their sleeves. When we went to collect all the box traps yesterday, a group of them had left their tracks all around the trap, including one animal which went through the trap, deftly jumping over the trap door, then doing his/her bit on the play tree and coming back the same way again, again jumping over the trap door! All this we could clearly see by the tracks. Still, it's been a great expedition, thank you to everyone (you know who you are), goodbye Namibia, see you again next year.