



The Leopard - a Key Umbrella Species for Biodiversity Conservation and Environmental Education in the Western and Northern Cape

**By:
Quinton Martins**

To the Rufford Foundation

I am especially proud and honoured to be writing to you at this exciting time in the history of the Cape Leopard Trust. With your support, the project has evolved from the dreams of one man wandering around the Cederberg Mountains into a credible, fully-fledged NGO with three regional projects and several exciting new sub-projects. Of course, it's not all been plain sailing for the CLT. We've endured many trials and tribulations since our inception 4 years ago. Yet, through the dedicated efforts of Quinton Martins and his team, we've managed to convert unwarranted adversary into notable triumphs.

Our quest, ultimately, is to ensure the survival of the remaining population of leopards in the Cape mountain region. Following Quinton's success in initiating a rigorous scientific study in the Cederberg (now contributing towards a Doctoral thesis), two sister projects were initiated in the early part of 2008. The Critical Ecosystem Partnership Fund (CEPF) provided funding for the Namaqualand Uplands Project, which is being conducted in close collaboration with Conservation International (CI), SANParks and Northern Cape Nature Conservation (NCNC). The third project is based in the Gouritz Corridor and is being managed in partnership with CapeNature, the conservation authority in the area.

We are delighted to report that all three projects are contributing invaluable information in respect of leopard ecology – and from this, we are now able to formulate holistic conservation strategies based on credible scientific facts. We've also recognized the critical importance of educating people (farmers, communities, school children and interest groups) on the socio-economic importance of maintaining a sustainable ecosystem, using the leopard as an iconic indicator of ecosystem health.

On behalf of the trustees and all the members of the CLT, I wish to thank you for your loyal support.

Best wishes,

Dr. Andrew Baxter

Chairman: The Cape Leopard Trust

1. Introduction

The Cape Leopard Trust (CLT) was established with the primary objective of facilitating and promoting research in support of conserving predator diversity in the Western Cape. The conservation strategies include *inter alia* several bio-geographical research projects, advisory services relating to farmer-predator interactions and support of an environmental education component. The latter includes a programme of community involvement with future emphasis being on job creation among disadvantaged communities within the Cederberg and other study areas. In order to fulfill our education mandate further, we are creating an Education Centre in 2009, with a particular emphasis on providing educational camps for school children. We consider it imperative that this opportunity to experience the wilderness and learn about the environment be available to children from all backgrounds

2. Study Area

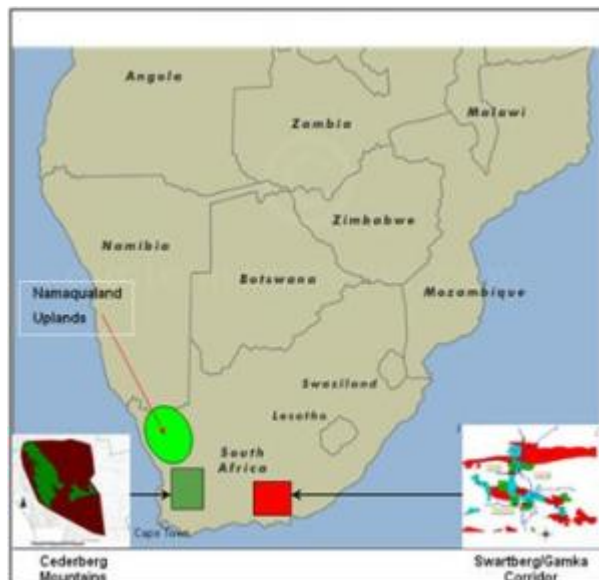


Fig. 1. Cape Leopard Trust Study Areas

2.1. Cederberg

The Cederberg Mountains, Western Cape, lie some 200km north of Cape Town and encompass approximately 300 000 hectares (3000km²) of rugged mountainous terrain, stretching from the Pakhuis Pass in the north to Grootrivier in the south, and including the Cederberg Wilderness area, as well as parts of the mountainous Karoo, Matjiesrivier Nature Reserve and the Koue Bokkeveld range.

The Cederberg occurs entirely within the Cape Floral Kingdom, the smallest of the six Floral Kingdoms in the world. Within this area, there occur two biomes; the Fynbos Biome (comprising two separate classifications, Fynbos vegetation & Renosterveld vegetation) and the Karoo Biome. It is a rugged

mountainous area interspersed with open valleys and densely wooded ravines (or 'kloofs'). Extremes in temperature (below 0° C up to 50° C) as well as annual rainfall (1000mm per annum in the west; 200mm per annum 40km to the east). Recently declared a World Heritage Site, it is now also part of the Greater Cederberg Biodiversity Corridor (GCBC).

A camera-trapping study in the area has revealed 31 mammal species. Five small-medium sized antelope species occur naturally, all of which have a mass less than 20kg. Of these, grey rhebok *Pelea capreolus* is the largest, occurring in small herds up to 12 individuals. The smallest of the antelope is the solitary grysbok *Raphicerus melanotis* with a mass of 10kg. The most common antelope species in these rugged mountains is klipspringer *Oreotragus oreotragus*, usually seen in couples or with a juvenile or sub-adult accompanying them.

Most of the fauna are cryptic in this rocky environment. Many of the smaller species are also nocturnal and are rarely observed by people. Some species, such as black-backed jackal *Canis mesomelas* have yet to be encountered during the course of the study other than through the capturing of camera trap photographs.

The establishment of "nature reserves" or "game reserves" has resulted in the re-introduction of animals which historically were known to occur in this area. This has resulted in some larger herbivores, such as, gemsbok *Oryx gazelle*, springbok *Antidorcas marsupialis* and Cape mountain zebra *Equus zebra* being re-introduced. Of these three, only springbok form part of leopard diet here.

Intensive farming with small livestock was prevalent in the Cederberg over 4 decades ago. An estimated twenty six thousand sheep and goats grazed in the mountains. Grazing was seasonal where livestock were moved from the sourveld of the Fynbos in summer to the sweetveld of the Karoo in winter. Evidence of overgrazing is still seen in the Karoo veld. Research on the vegetation in the area suggests that it takes twenty or thirty years for this sensitive habitat to recover from overgrazing.

2.2. Gouritz Corridor

The Gouritz Corridor situated in the Southern Cape region covers 3 of South Africa's vegetation biomes, being the Fynbos, Succulent Karoo and Thicket biomes. As a result, the diverse vegetation and habitat is home to many different fauna species, such as leopard and various small antelope species, to reptiles (e.g. leopard tortoise) and many birds.

The Gouritz Corridor region (Research base: Gamkaberg Nature Reserve S 33° 43' E 21° 53') where leopard research is concentrated comprises about 100 000ha of both privately-owned and conservation land and ranges from Gamkaberg Nature Reserve in the south to Swartberg Nature Reserve in the north; and west from Gamkaberg Nature Reserve over the Rooiberg mountain range towards Ladismith.

2.3. Namaqua Uplands

Namaqualand is an arid wilderness area where surface water is practically non-existent and subterranean water is brackish and hard to find. However, it is an area rich in mineral wealth, plant and animal diversity, including the region's apex predator, the leopard.

This region is made up primarily of Succulent Karoo, and contains about 3500 vegetation species in 135 families and 724 genera, with about 25% of this flora endemic to the area.

Namaqualand is a winter rainfall semi desert (the second most important arid biodiversity hotspot worldwide) located in north-western South Africa. Rainfall, although reliable, is low (50–250 mm pa).

The escarpment separating the low lying Strandveld in the west, from the higher Bushmanland in the east, is predominantly made up of granite metamorphic rock, with quartz and sandy patches in between. These form the Kamiesberg uplands, an area approximately 50km wide. This mountainous area of over 4000km² serves as our Northern Cape study site.

Stock farming is predominant in the area, but wheat is also grown in areas with sufficient rainfall higher up in the escarpment. Abandoned wheat-lands and other disturbed lands are where Namaqualand's famous wildflowers mainly occur. The area comprises of private, communal, conservation and commercially (e.g. mining) owned land.

3. Background

The CLT was launched in 2004 as an active predator conservation working group in the Cape and is registered as an NGO, IT 2720/2004. From the outset the objectives of the trust have revolved around adopting the leopard *Panthera pardus* as a 'flagship species', to study, understand and highlight the plight of these animals, as well as other threatened predators, and to find effective and sustainable ways to alleviate farmer-predator conflict in the Cape. This work is of crucial benefit to the statutory conservation bodies such as South African National Parks (SANParks), CapeNature (CN) and Northern Cape Nature Conservation in their future predator management strategies, as well as to the general health of the natural environment as a whole.

The project started with limited resources ensuring that we conducted projects well within our means. The leopard population density study was the first study to be initiated by the CLT, a continuation of Quinton Martins' studies initiated in 2003. This camera trapping project was run with the bare minimum in terms of "luxuries". Freezing temperatures in the winter of 2004, as well as old, broken down vehicles were only some of the hardships endured on the project during this time.

Incredible support from sponsors, including the Rufford Foundation, and the public soon changed things. The current work of the CLT now includes several research projects involving leopards and smaller predators in the Western Cape and elsewhere in South Africa, including a comprehensive conservation genetics project estimating gene flow, genetic variability and genetic relatedness among South African leopard populations. A key aim of the genetics study is to determine whether the leopards of the Western Cape region should be considered as a unique genetic unit, since they have consistently been shown to be considerably smaller than most of their northern cousins.

Quinton (the project manager), is in the process of completing his PhD at the University of Bristol (U.K.), with his thesis topic being: “The ecology and conservation of the Cape Mountain Leopard - a threatened population”. He has been researching the topic for over five years and registered his thesis two years ago. There are presently twelve leopards in the Cederberg that have been collared with GPS transmitters and these are revealing remarkable information on home range and activity patterns. A two year leopard population density study using camera traps has been undertaken providing valuable information on these elusive predators. The use of microsatellite DNA analysis of leopard rectal mucosa fragments collected from fresh scat samples, allowing for identification of individual animals, will eventually complement the camera trapping study as a means to determine leopard densities.

To date, research has taken place primarily in the Cederberg Mountains. Recent projects have been established in the Gouritz Corridor as well as in Namaqualand. Research is presently conducted in collaboration with the University of Bristol (U.K.) and CapeNature. Research projects are also being funded by the CLT in collaboration with Nelson Mandela Metropolitan University, Stellenbosch University and the University of Cape Town.

The leopard currently fills the role of apex predator in the Western Cape as well as parts of the Northern Cape; and yet its conservation status remains uncertain. The species is regularly removed or exterminated from farms with little knowledge of population or genetic status, whether these removals are sustainable or the factors giving rise to the conflict are established. Preliminary studies show that (i) leopards in the Cape differ morphologically as well as genetically from leopards elsewhere in Southern Africa and (ii) leopard home range sizes in the Cederberg Mountains may be as much as 10 times larger than those reported in earlier research, illustrating that population sizes are far smaller than previously estimated. The results of these studies will provide the most comprehensive understanding of the conservation status and needs of the leopard in the Western and Northern Cape.

4. Predator Research

In-depth studies by the CLT and principal researcher Martins, with the use of modern technology, such as infrared camera devices and GPS satellite tracking devices has provided valuable insight into the ecology of these elusive animals. Data obtained has highlighted various facets of these predators as well as aspects of the ecology of other smaller predators in the region.

4.1. Leopard Home Range and Population Densities

One of the first ways we were able to establish population estimates of leopards was by using infra-red camera trap photographs.

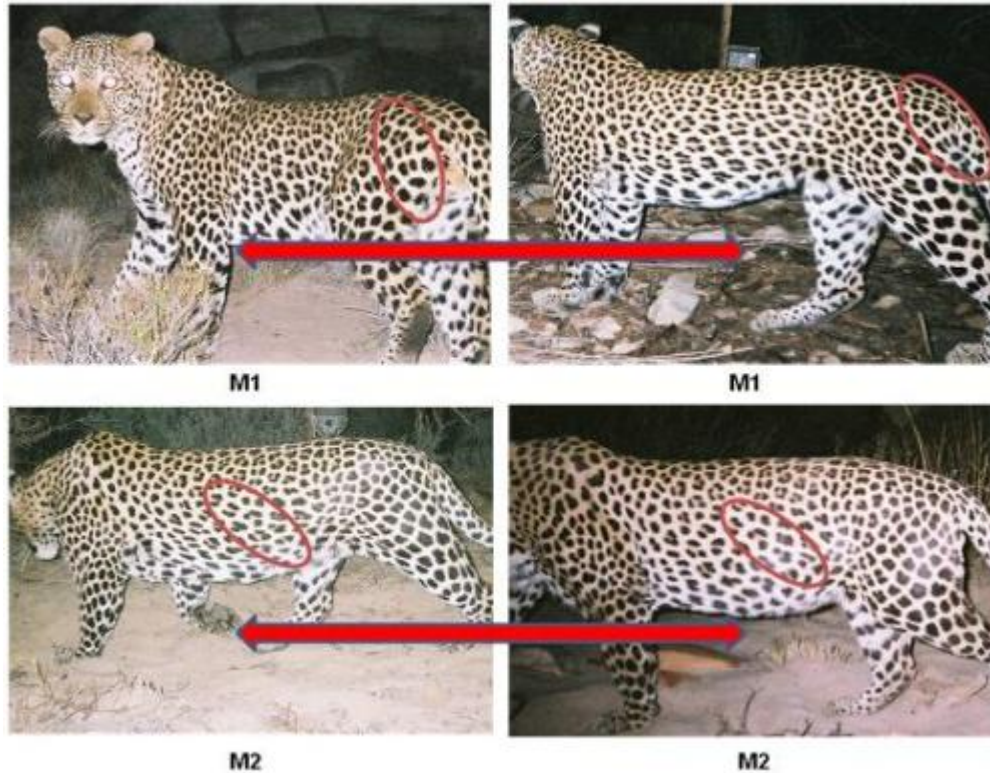


Fig. 2. How to I.D. a leopard using camera trap photographs

(a) Cederberg

The very first leopard photograph was captured on the 21st of May 2004 at 19h27. This was the beginning of a very successful population density study in the eastern Cederberg Mountains. A previous attempt by researchers in 1991 to photograph leopards here resulted in one photograph of a leopard tail after 1 year. Four years and hundreds of leopard photographs later, we are continuing to monitor the leopard populations in the Cederberg, as well as in the two new project regions.

Sufficient funding and innovative technology then led to us fitting GPS tracking collars on leopards in the Cederberg. To date, twelve leopards have been collared, 11 of which have provided detailed information on their whereabouts, daily activity, home ranges, breeding behaviour and feeding habits. In order to collar a leopard, one must first capture it in a cage trap. This can sometimes take several months or more of trap monitoring. The cages are carefully designed to ensure a safe capture. Once captured, the leopard will be tranquilised allowing the CLT to collect all valuable data (incl. mass, dimensions and tissue samples for DNA analyses). The collar is fitted to adult animals only (because of neck growth in subadults) and does not seem to affect their behaviour or condition that is after an initial period of irritation of possibly a few days or a week or two.

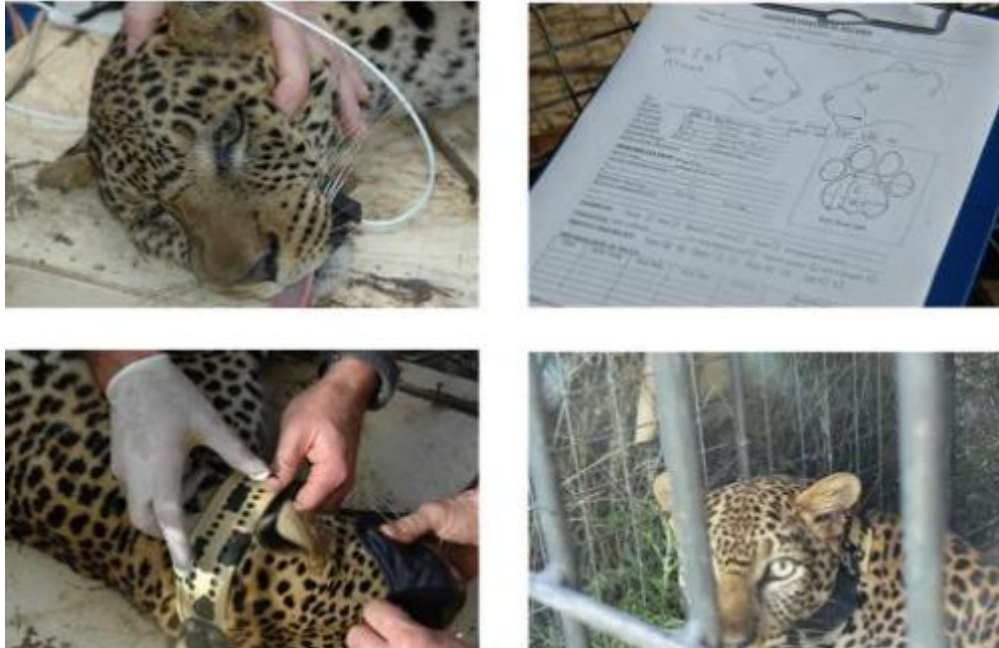


Figure 3. The capture and collaring process of a leopard

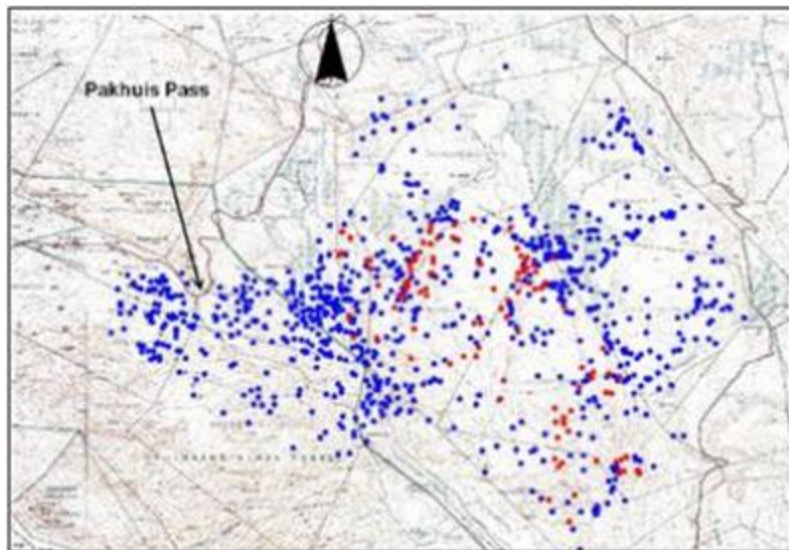


Figure 4. Data collected using GPS collars

We have been able to unequivocally demonstrate that leopard population densities, based both on camera trapping data as well as GPS home range data, are extremely low in the Cederberg study area. A combined population estimate (male and female leopards) of 0.75 per 100km² has been recorded here. That is, in an area of approximately 3000km², only 20-25 adult leopard exist. Home range estimates vary considerably between the mesic fynbos and the arid karoo areas. In the karoo, male leopard home ranges (which are predominantly exclusive to same sex individuals) are as large as 1000km². Males in the fynbos areas have smaller ranges of between 140 and 360km².

Although we had limited leopard-trapping success in 2008, we were very fortunate to capture the required number of female leopards. The females have been the most difficult of all to capture, and to date only four females have been collared compared to eight males. The two females collared this year, F10 and F5, are both revealing remarkable data on their daily movements, feeding habits and home ranges.

4.2. Leopard Diet

The CLT in collaboration with Nelson Mandela Metropolitan University organized a student to look at the dietary requirements and preference of leopard within the Cederberg and Gouritz regions of the Western Cape as part of her MSc. thesis. A bursary was provided for this study by the CLT.

Leopards scat was collected throughout the year by the project staff, CapeNature field rangers and volunteer members of the public and over 295 samples were sent in for analysis. Of these, 212 were established to be leopard scats, as a result of a combination of size (diameter greater than 2cm) and the presence of leopard hair.

It appears is evident that the preferred prey of leopard within the Gouritz and Cederberg regions is klipspringer, dassies, & rodents.

5. Human-wildlife conflict

Additionally, the CLT is working with farming communities to find ways to minimize any potential depredation of livestock by predators. Our objective of finding solutions for farmers who encounter “problems” with wildlife in their area includes encouraging the view that the tourism and conservation value of wildlife exceeds the perceived threat to livestock. Publicity created in this regard, together with the CLT’s facilitation of sponsorship of Anatolian shepherd dogs to conservation-minded farmers has significantly and favourably altered the views and perceptions of other farmers and landowners within the Cederberg study area. Further investigation in new and innovative means to alleviate human-wildlife conflict is constantly taking place.



The success of the CLT's work to-date has resulted in the Cederberg Conservancy being the first community to voluntarily ban the use of gin traps or hunting of wild animals in an area of

171 000 ha. This is an exceptional contribution to the conservation of our natural heritage. We have not had one leopard killed as a result of farmer-leopard conflict since this ban in March 2007.

6. Community Development

In addition to the "hard science" research component, the CLT is also actively involved in the training and empowering of local community residents.

Willem Titus, local community member and employee of the CLT, will receive further educational and practical training, including a first-aid course, to assist with the running of the children's camps. His invaluable contribution to collecting field data and brilliant tracking skills will make for first-class experiences for the children. He will also continue supervising international research volunteers in tracking and monitoring.

7. Academic achievements and scholarships for 2008

- a. Quinton Martins – Bristol University - Ph.D
- b. Therese Rautenbach – Nelson Mandela Metropolitan University – M.Sc "Diet of leopards"
- c. Lindsey Patterson – University of Cape Town – BSc Hons. "A Spatio-temporal analysis of the habitat use of leopards (*Panthera pardus*) in the Karoo biome of the Cederberg Mountains, South Africa"

8. Proposed studies from 2009

CLT scholarships and project funding will be provided for the following projects:

- a. **M.Sc Project** – Determining actual versus perceived livestock losses due to predators in the Northern Cape.
- b. **M.Sc Project** – Removing small livestock from the menu of small predators – altering the behavior of caracal and black-backed jackal using innovative technology.
- c. **M.Sc Project** – An assessment of the efficacy of small predator trapping devices in order to establish the most humane and effective means to selectively capture damage-causing individuals.

Final word of thanks.....

We sincerely hope that you have enjoyed reading about our past, present and future research and that you have gained as much from your association with the CLT as we have from your support.

Thank you again.

Yours in leopard and predator conservation,

Quinton Martins

Project Manager

The Cape Leopard Trust