Report on surveying and catching Black-footed cats (*Felis nigripes*) on Benfontein Game Farm, November 8th – 22nd 2006

compiled by Alexander Sliwa, Wuppertal Zoo

Study Area

Benfontein Game Farm, owned by De Beers Consolidated Mines, lies 10 km SE of Kimberley on the border of the Northern Cape and Free State Provinces in central South Africa. The majority of the 11.400 ha of arid plant communities have been the subject of the first in-depth field study on the black-footed cat (Sliwa 1993, 1994, 2004; 2006, Olbricht & Sliwa 1997), which defines the present day knowledge on densities and habitat preference of the species.

As part of a multidisciplinary study with the aim of capturing black-footed cats for biological sampling, several methods were employed to survey areas, previously known to hold black-footed cats. In 2005 a similar capture operation was conducted. Three reports are available on this period by the author.

Methods:

(A) Spot-lamp searching: For 9 nights a 4x4 vehicle (2.2 litre Diesel Toyota Hi-Lux, owned by South African National Parks Board Game Capture Unit, Kimberley) drove a route of 20-40 km in length (see Fig. 1&2) along dirt roads at a speed of between 20-40 km/ hr whilst looking for the characteristic bright eye shine of cats. Usually two people would stand on the open back of the vehicle operating two spot lamps (1 million candle power Lightforce®) and additional people assisted in the search.

(B) Catching via searching and chasing: Once black-footed cats were located using their eye-shine with the spot lamps, their species identity was swiftly confirmed with 10x42 binoculars. If positively identified, they were pursued quickly by vehicle for a short distance, of between 100-600m which resulted in the cat squatting low on the ground in front of the stopped vehicle. One or two people with fish landing nets got off the vehicle and netted the cats. On other occasions the cats would find a den system (dug by aardvark, ground squirrel, springhare) and were either captured by exposing them after digging or were lost to the capture team by escaping deep into the den system. All accessible cats were subsequently anesthetized with an intramuscular injection of medetomidine, ketamine, and butorphanol and covered with a blanket to shield them from the lights and sounds. After bringing them back to the research house, they were examined, sampled, and measured. The anesthetic drugs were antagonized with inramuscular atipamezole and naltrexone and the cats were placed in a small plastic crate for recovery. All black-footed cats were released back into a den, close to their capture locations. A blanket was used to cover the den entrance, keeping them inside until they were fit for leaving on their own account.

(C) Live-trapping

For 11 days 40 live traps were set out approximately 500m apart (Map 1). The traps covered an area of more then 50 km² when adding a 1 km radius to the outermost edge traps. The trapline was 31.6 km long, and only in the second week 5 traps were shifted to some alternative trap positions that were used in 2005. Traps were of two basic designs. One had a fixed frame covered with galvanized mesh, the trap door consisting of a solid metal plate triggered by a baited hook. These same traps were used previously during Sliwa's ecological study. The second type of trap used was a Tomahawk®-style foldable trap constructed using thin galvanized wire. They were likewise triggered through the animal pulling on the baited hook. For bait we used either small dead birds (Passeriformes) or large pieces of rock pigeons (*Columba guinea*), laughing doves (*Streptopelia senegalensis*) and springhares (*Pedetes capensis*), helmeted guineafowl (*Numida meleagris*) and Northern black korhaan (*Afrotis afraoides*). These were freshly defrosted before being affixed onto the triggering mechanism of the traps. For lure, we used shredded pilchards, sardines in oil, cod-liver oil, and urine from oestral domestic cats. These were smeared on the outside structure of

the traps, or sprinkled inside the trap. Each trap was serviced twice a day. In the evening traps were set and baited during the last 1-3 hours of daylight (1600-1900). Bait that was not taken was replaced every second day, due to desiccation. All traps were checked during the first two hours (05:15-07:30) after sunrise and those not yet triggered, closed for the daylight hours.

The trapping and capture via vehicle was conducted by:
Ms. Beryl Wilson, Ethologist, McGregor Museum, South Africa
Dr. Nadine Lamberski, Senior Veterinarian, San Diego Wild Animal Park, USA
Dr. Alexander Sliwa, Curator, Wuppertal Zoo, Germany
Dr. Jason Herrick, Post - Doctoral Research Fellow, Cincinnati Zoo and Botanical Garden, USA
Mr. Philipp Zimmermann, PhD Student of veterinary science, University Leipzig, Wuppertal Zoo
Mr. Peter Gibbs, former Farms manager, Benfontein, South Africa
Mr. Pat Callahan, Head Keeper, Cat Section, Cincinnati Zoo, USA
Mrs. Emma Parkin, private capacity
Mr. Frikkie van Dyk, private capacity

Results:

Spot-lamp searching: Altogether, there were 9 black-footed cat sightings during 9 nights. The number of sightings varied between 0-2 per night. Black-footed cats were seen during six out of 9 nights (67%), with three nights driven without any black-footed cat sightings.
All areas that were part of the previous ecological study of Sliwa from 1992-1998, and during last years capture trip were searched during at least three nights, with some being covered on all 9 nights. Several areas, which were previously considered excellent black-footed cat habitat, notably the area between the two windmills (Map 1 & 2) on the western side of the farm, produced only a single sighting of a male cat (Sighting 2*).* This area was previously a "hotspot" of black-footed cat activity where the home ranges of 5 different black-footed cats overlapped.
During these night drives we consistently observed other carnivores including aardwolves (*Proteles cristatus*), two families of black-backed jackals (*Canis mesomelas*), and small groups of bat-eared foxes (*Otocyon megalotis*) every night. During one or two drives caracal (*Caracal caracal*), Cape fox (*Vulpes cana*), striped polecat (*Ictonyx striatus*), and small-spotted genet (*Genetta genetta*) were also seen. Some other nocturnal mammals we recorded were: aardvark (*Orycteropus afer*), porcupine (*Hystrix africaeaustralis*), and South African hedgehog (*Atelerix frontalis*). Only on one occasion, a spotted eagle owl (*Bubo africanus*) was seen.

Catching via searching and chasing: Out of the above 9 sightings we caught four different black-footed cats via chasing on (Maps 1 & 2). We also chased the black-footed cats indicated as Sightings 2/ 3/ 4 but were not able to dig them out of the very extensive den systems they managed to escape into.
The first capture was a kitten (Cat 1 06), about 1,5 months old when compared to data from hand-raised black-footed cats, judging from its milk dentition, small size and low body mass (Table 1) (Leyhausen & Tonkin 1966, Armstrong 1975, Olbricht & Sliwa 1995). The next black-footed cat we caught was a young adult male (Cat 2 06), within the same area, only 1.6 km away. Judging from his mass (1,55 kg) and the white un-chipped teeth he was not territorial. The third cat (Cat 3 06), an adult male, was captured the next night again only 1.7 km away. The last cat captured (Cat 4 06), a male we named "Panga" after radio-collaring him, since we discovered and caught him inside the large northern pan. He was an adult male in his prime. Again his capture location was only 1.4 km away from where we caught male Cat 3. All four captures were relatively close to each other, between 1.1 – 1.7 km from each other. If one connects all four captures locations, the area in between covers only 2 km².
We spotted and then tried to capture an African wildcat, which managed to escape, despite appearing not fully grown. Finally, we saw a caracal close to the Windmill gate (Windmill G).

Live-trapping: In 440 trap nights, we caught 30 yellow mongoose (*Cynictis penicillata*), one Cape fox, and two bat-eared foxes (*Otocyon megalotis*). No cats were caught. On some mornings we had as many as

four yellow mongoose in the 40 traps, amounting to 10 % capture success and a further five traps tripped, with the bait either missing or still on the release-hook.

Discussion and Conclusions

Valuable data on censusing and trapping has been collected again on this trip in the area, which was intensively studied between 1992 -1998. Last years trend (Nov. 2005) continued in that only a single male cat was seen where 1-2 black-footed cats were routinely observed during previous fieldwork. This area is a short grass area on the pan slope close to the two windmills at the Koppie with the beacon (Map 1&2). Previously a "hotspot" of black-footed cat activity with up to 5 territories overlapping here (Sliwa 2004), the area may have become less suitable to black-footed cats. One reason could be shifts in weather patterns. On the other hand, a good number of cats were seen and/or captured in other parts of the former study area during this trip. On average, one can expect that an experienced observer, using the described spotting methods, would be able to spot a black-footed cat every second night in an area with a good cat population. We were able to repeat the spotting rate achieved last years (see progress report 2005 – available from the author).

There may have been eight different black-footed cats sighted and/or captured. Apart from the four individuals captured, the males chased into dens (Sighting 2/3/4) were 2.5 – 5 km from where the 4 cats were captured. Also "Sighting 5", was possibly the mother of the kitten we captured. Only "Sighting 1" was likely one of the males we later captured. Taking all the sighted and captured cats as different individuals, there may well have been a many as 9 cats in the 45 km² area covered by our traps.

We recorded at least 2 families of black-backed jackals with their offspring of between 3-5 pups, in accordance with Dr. Jan Kamler, a researcher studying the canid community on Benfontein since 2004. The observation of a caracal was repeated from last year's observation. During Sliwa's study, both of these medium-sized predators were very rarely seen.

We can estimate the age of the captured female kitten by her mass. Mother-raised captive and hand-raised kittens reached a mass of 480-600 g between 40-50 days of age (Olbricht & Sliwa 1995). Taking the average of 45 days we can estimate the age of our captured kitten at 1,5 months. At this age she would have been born sometime in late September 2006. This would be spring which, is in accordance with previously observed mating activity in late July on Benfontein (Sliwa, pers. Obs.).

Altogether the trip was successful, with the capture rate improved and even exceeding the capture success obtained during the previous field trips. The reason for the failure to catch any black-footed cats via trapping, despite the intensive effort, is unclear. Previous trapping periods, with the same trap spacing, placement, trapping season, and use of bait and lure, were usually successful after 2-8 days using 10-20 traps. Trap avoidance after the unpleasant trapping experience is discounted as a reason for failure, as the current population was not recently trapped. The last two cats trapped on Benfontein during previous trapping trips were two males, one in September 2004 and another one in September 2005. Both captures occurred close to the windmills.

The radio-collaring of male "Cat 4 06", later named "Panga" arose from the opportunity that a suitable small carnivore collar became available from Dr. Jan Kamler. The 40 g collar was attached and the adult cat has since been located several times up to 4 km to the south of the capture location. We may have caught him on an excursion into the pan from his usual core range further in the south, where he was found in a den close to WWG (Map 1). We anticipate that Jan Kamler will be able to collect more location fixes and that we capture "Panga" on our next planned visit to the study area.

We hope to return to Benfontein for further capturing and sampling of wild black-footed cats in May 2007. On our next visit we will also attempt to work on properties close to Kimberley or further afield in the Karoo.

Acknowledgements: We thank DeBeers Consolidated Mines for permission to work on Benfontein and the use of the research house for accommodation and lab facilities. We are grateful for the use of the campground. Morgan Hauptfleisch gave us permission for the sampling, and supported us in employing the pursuit method, while live-trapping failed to procure black-footed cats. The use of the Toyota Hilux, lend to the project by Dr. David Zimmermann of South African National Parks Board Game Capture Unit, Kimberly free of charge (!), was crucial in catching the four cats. We thank Arne Lawrenz for the use of his Land Rover for baiting and checking traps, and Edwin and Gisela Sliwa for the use of their Land Rover for checking traps and for searching for cats at night with spot lamps, both vehicles were likewise provided free of charge. Funds for fieldwork came from the In Situ Conservation Fund of the Cincinnati Zoo and Botanical Garden, San Diego Wild Animal Park and Mrs. Renate Stock's donation through Wuppertal Zoo. We also want to thank our respective employers for letting us carry out this field work.

References:

Armstrong, J. 1975. Hand rearing black-footed cats (*Felis nigripes*) at the National Zoo Park, Washington D,C. . Int. Zoo. Yb. 15: 245-249.

Leyhausen, P & Tonkin, B. 1966. Breeding the black-footed cat. . Int. Zoo. Yb. 6: 178-182

Olbricht, G. & Sliwa, A. 1995. Comparative development of juvenile black-footed cats at Wuppertal Zoo and elsewhere. International Studbook for the Black-footed cat (*Felis nigripes*). Wuppertal 1995: 8- 20.

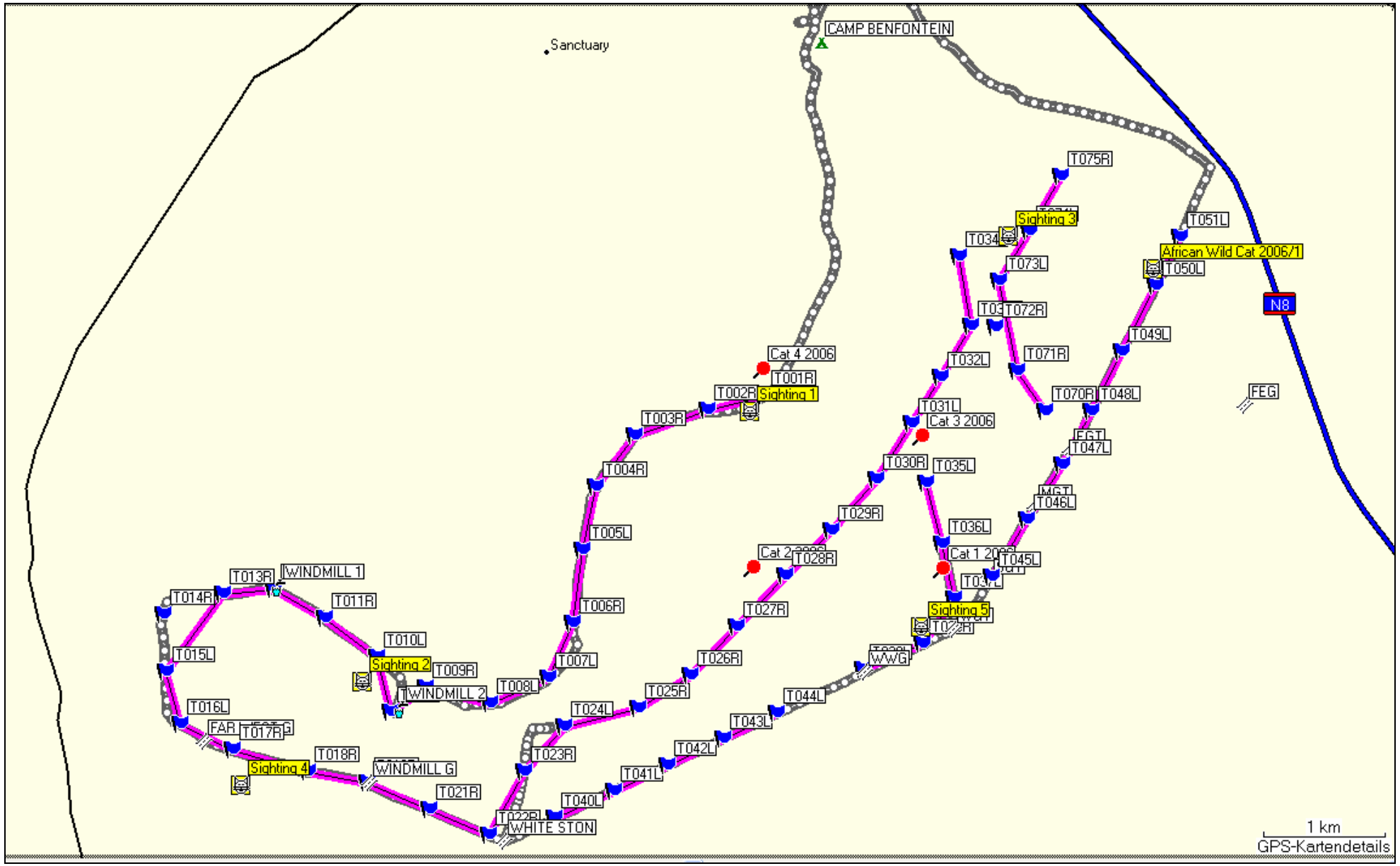
Olbricht, G. & Sliwa, A. 1997. In situ and ex situ observations and management of black-footed cats *Felis nigripes.* Int. Zoo. Yb. 35: 81-89.

Sliwa, A. 1993. A habitat description and first data on ecology and behaviour of the black-footed cat (*Felis nigripes*) in the Kimberley area, South Africa. International Studbook for the Black-footed cat (*Felis nigripes*). Wuppertal 1993: 8-11.

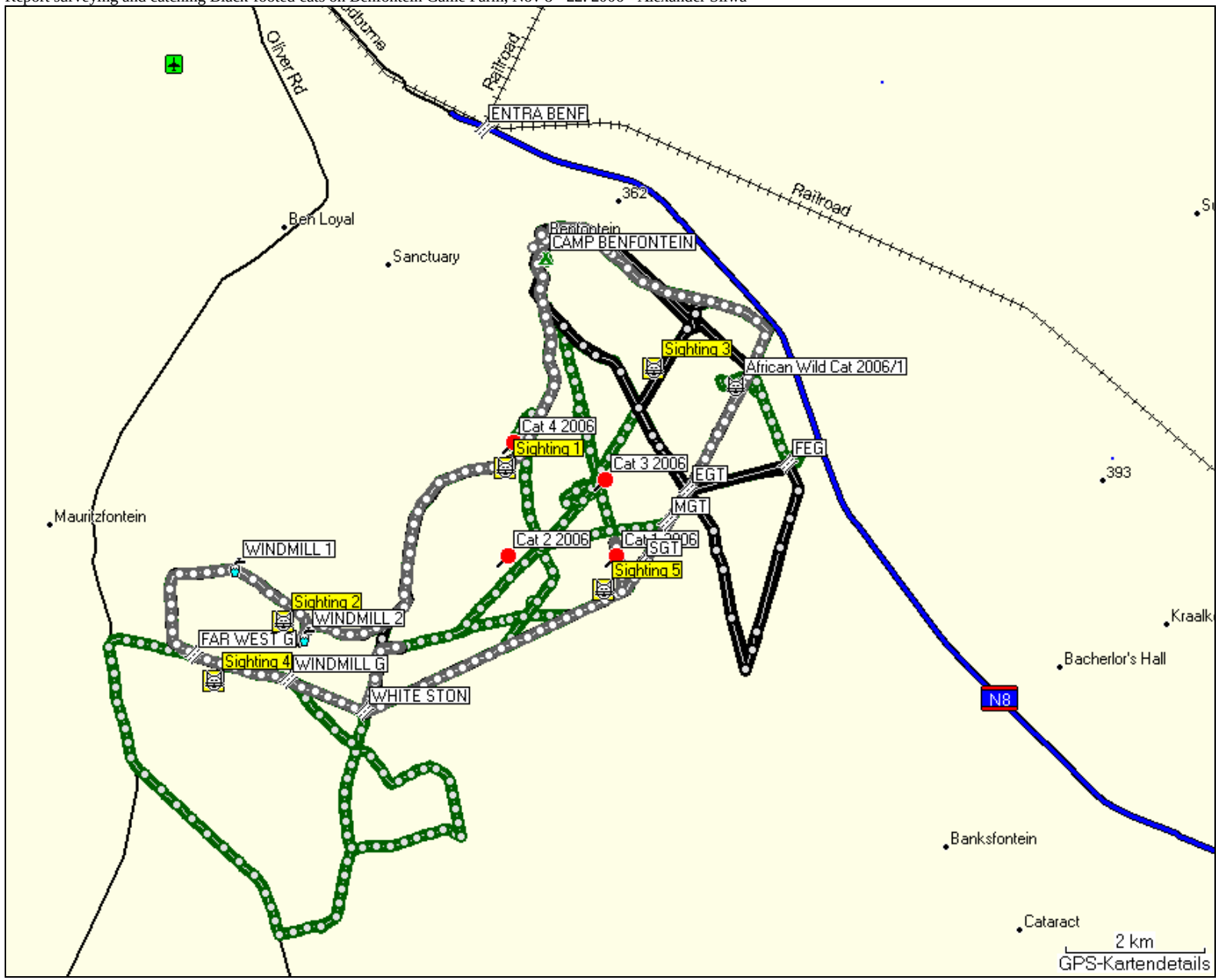
Sliwa, A. 1994. Diet and Feeding Behaviour of the Black-footed Cat (*Felis nigripes* Burchell, 1824) in the Kimberley Region, South Africa. Zool. Garten 64 (1): 83-96.

Sliwa, A. 2004. Home range size and social organisation of black-footed cats (*Felis nigripes*). Mammalian Biology 69 (2): 96-107.

Sliwa, A. 2006. Seasonal and sex-specific prey-composition of Black-footed cats *Felis nigripes.* Acta Theriologica 51 (2): 195-206



Map 1. GPS map of Benfontein Farm with land marks and all traps set (blue flags) in November 2006 and both sightings (yellow) and capture locations (red beacons) of black-footed cats. Also the single sighting of an African Wildcat is indicated.



Map 2. GPS map of Benfontein Farm, with spotting routes (different colours), land marks and gates, sightings (yellow) and capture locations (red beacons) of black-footed cats, and a sighting of an African wildcat.

Fig.1. Setting traps at sunset (Photo Beryl Wilson)

Fig.2. Cape Fox in the trap (Photo Beryl Wilson)

Fig.3. Setup for spotlighting and chasing. (Photo Beryl Wilson)

Fig.4. Extracting human with anesthesized cat from hole. (Photo Beryl Wilson)

Fig.5. Posing with cat. (Photo Pat Callahan)

Fig.6. Taking a fat sample (Photo Alex Sliwa)

Fig. 7. Radio-collaring Cat 4 “Panga”

Fig. 8. Male cat 2 leaves the den (Photo Alex Sliwa)

Fig. 9. Male cat 4 “Panga” runs from den – radio-collar antenna visible. (Photo Alex Sliwa)

Table. 1: Measurements and remarks on the 4 captured black-footed cats.

Date	09.11.06	12.11.06	13.11.06	20.11.06
Name				**Panga**
Name on map 2	Cat1 06	Cat 2 06	Cat 3 06	Cat 4 06
Sex	F	M	M	M
Age	kitten	young adult	adult	adult
Chip #.	TRV 00-0689 600B	TRV 00-068A-0444	TRV 00-0689-5205	TRV00-0689-7006
Mass (kg)	0,50	1,55	1,95	2,00
Ear (cm)	4,00	4,50	5,10	5,30
Shoulder (cm)	14,00	24,00	26,00	26,00
Total Length (cm)	41,00	58,00	60,00	62,00
Hind foot (cm)	6,95	9,90	9,34	10,00
Front foot (cm)	1,64	2,10	2,20	2,12
Tail (cm)	13,00	18,50	18,00	18,50
Neck (cm)	8,00	12,00	14,00	14,00
Canine UR (cm)	0,47	0,96	1,03	1,00
Canine LR (cm)	0,40	0,89	0,94	0,94
Canine UL (cm)	0,47	0,93	1,00	0,96
Canine LL (cm)	0,38	0,88	0,90	0,85
Testes RL (cm)	/	1,4	1,8	1,7
Testes RW (cm)	/	0,9	1,0	1,1
Testes LL (cm)	/	1,4	1,8	1,7
Testes LW (cm)	/	0,9	1,0	1,1

REMARKS

Kitten	Kitten of about 1,5 months (full milk dentition), skinny, 1 tick
M1	Subadult male (due to mass), all canines un-chipped, clean white teeth
M2	Adult male, good condition, a few ticks and fleas
M3 (Panga)	Adult male, good condition but lean, muscular – radio-collared him (150.423 MHz), some ticks on ears and some fleas