

- Black-footed Cat Working Group -
Report on surveying and catching Black-footed cats (*Felis nigripes*)
on Benfontein Nature Reserve, 21 - 30 April 2008

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Introduction:



On 15th April 2008 the four authors founded the “Black-footed cat Working Group”. It has the goals of furthering awareness and research for this rare cat species, bringing together multidisciplinary expertise on the species biology. In preparation to this we were able to purchase our own dedicated working vehicle from funds by Renate Stock through Cologne Zoo, Cincinnati Zoo, Zoological Society of San Diego and Ebeltoft Zoo to the project in February 2008 – a Toyota Hi-Lux. The required insurance, running and maintenance costs for it are administered by the McGregor Museum, but the vehicle will solely be used for black-footed cat research.

Study Area:

Benfontein Nature Reserve, a Natural Heritage Site 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 and so far only in-depth field study on the black-footed cat (Sliwa 1993, 1994, 2004; 2006, Olbricht & Sliwa 1997), which largely defines the present day knowledge on densities, habitat preference, ecology and behaviour of the species.

This project is part of a multidisciplinary effort to study the distribution, ecology, health, and reproductive status of black-footed cats over an extended period. With the aim of repeatedly capturing black-footed cats for biological sampling, and radio-collaring for subsequent observation, several methods were employed to survey areas, previously known to hold black-footed cats. In 2005, 2006, and 2007 a similar capture operation was conducted on Benfontein Nature Reserve. Three reports are available on this period by the authors and on the website www.wild-cat.org.

Methods:

(A) Spot-lamp searching: For 7 nights a 4x4 vehicle (2.4 litre Diesel Toyota Hi-Lux Double cab vehicle, recently purchased by the Black-footed Cat Working group), drove a route of 20 -80 km in length (see Map 1) along dirt roads of Benfontein at a speed of between 20-30 km/ hr whilst looking for the characteristic bright eye shine of cats. Optimally two people, in this study period - Alex Sliwa and Jason Herrick, would stand on the open back of the vehicle operating two spotlights (1 million candle power Lightforce®). On 29th April we surveyed the DeBeers farm “Dronfield”, 6 km NE of Kimberley with no sighting success, and on 30th April the sheep farm “Joubertina”, owned by Isaac Joubert, 30 km SW of Benfontein with the successful sighting of one adult male black-footed cat.

(B) Catching via searching and chasing: Once black-footed cats were located using their eye-shine with the spotlights, 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 until the cat squatted low on the ground in front of the stopped vehicle. One or two people with fish landing nets then 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 ketamine, medetomidine, midazolam, and butorphanol and covered with a blanket to shield them from lights and sounds. After transporting them back to the research house, all animals were given complete physical examinations, had biological samples collected for disease and genetic studies,

had morphometric measurements obtained, and had radio-collars placed. The anesthetic drugs were antagonized with intramuscular 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 to leave on their own account. There were no complications associated with these procedures and all cats were confirmed alive and well on subsequent nights.

(C) Digging: A male and a female cat, radio-collared during the May 2007 trip (see report 2007) were localized via telemetry on 27th April in their respective daytime rests. After blocking the opening with a blanket to put the nets in place, the female bolted out of the springhare den when removing the blanket, straight into the net. The male was only sitting hiding in a depression amongst a system of low dry bushes at noon close to a den system, where he was captured with a net. The operations took only a few minutes each as opposed to the 3.5 hour digging operation in May 2007. The cats were injected through the net and subsequently extracted by hand.

(D) Live-trapping

In contrast to the year 2007, when no live trapping was conducted, we trapped on Benfontein for 8 nights as done in the previous years 2004-2006. On 22nd April we set 24 traps and baited every second trap with a new lure "Hawbaker's Wildcat No. 1". The following morning we had two male black-footed cats in the live traps, "Pole" and "Jimbo" (Fig.1 - trap positions, Table 1 – body measurements). Although trapping was conducted for 7 additional nights, we did not catch any more cats. Further carnivore species trapped included 2 bat-eared foxes (*Otocyon megalotis*), 2 cape foxes (*Vulpes chama*), but surprisingly no yellow mongoose (*Cynictis penicillata*) in the veldt. We did capture one mongoose at the research house. The "large predator" lure we used might have deterred the latter away from the traps. Time of day and temperature may have played a further role in addition to the lure.

The capture via vehicle was conducted and staffed by:

Ms. Beryl Wilson, Ethologist, McGregor Museum, South Africa (berylwa@museumsnc.co.za)

Dr. Alexander Sliwa, Behavioural Ecologist and Curator, Cologne (Kölner) Zoo, Germany (sliwa@koelnerzoo.de)

Dr. Nadine Lamberski, Veterinary Clinical Operations Manager, San Diego Wild Animal Park, USA (nlamberski@sandiegozoo.org)

Dr. Jason Herrick, Assistant Professor, Department of Veterinary Biosciences at the University of Illinois at Urbana-Champaign and Center for Conservation and Research of Endangered Wildlife at the Cincinnati Zoo and Botanical Garden, USA (jherrick@illinois.edu).

Results:

Trapping: It is remarkable that after more than 1070 trap nights after the last capture of a black-footed cat in a live trap, in September 2004, we caught two male cats on our first night. This has improved our overall trapping success substantially to 357 trap nights/cat. Despite our continued effort for a further 7 nights with 24 baited traps we caught no more cats and also our trapping success with the abundant yellow mongoose decreased to zero, despite their continued presence close to the traps. We set all traps in positions we have set them before, having marked them with GPS. These two phenomena are probably due to the effect of the new lure used, attracting black-footed cats, maybe male cats especially so, and repelling smaller carnivores, like the yellow mongoose. Altogether we logged another 191 trap nights on Benfontein during this trip.

Spot-lamp searching: In total, there were 8 black-footed cat sightings during 7 nights. The number of sightings varied between 0-2 per night. Black-footed cats were seen during 6 out of 7 nights (86%), with just one night driven without any black-footed cat sightings on Benfontein.

All areas that were part of the previous ecological study of Sliwa from 1992-1998, and during previous capture trips were searched during at least three nights, with some being covered on all 7 nights.

During these night drives we consistently observed other carnivores including aardwolves (*Proteles cristatus*), two families of black-backed jackals (*Canis mesomelas*), and several small groups of bat-eared foxes every night. During one or two drives, Cape fox and small-spotted genet (*Genetta genetta*) were also seen. Some other nocturnal mammals we recorded were: armadillo (*Orycteropus afer*) and porcupine (*Hystrix africaeaustralis*). On only several occasions, a spotted eagle owl (*Bubo africanus*) was seen.

Catching via searching and chasing: Out of the above 8 sightings we pursued five black-footed cats (Maps 1 & 2). Unfortunately we caught males “Jimbo” and “Pole” via netting again after we had radio-collared them with our initial trapping success. Both were in areas where we did not expect their presence, hence the error. Both cats were monitored during the following nights to ensure their well-being.

On another occasion we pursued male “Jimbo” until he ran into a den and also saw male “Okko” without pursuing him. The other 4 sightings resulted in two pursuits without catching the cats. These two different cats were likely the two males before they were caught in the traps. Thus our capture “success” was two out of 5 attempts – unfortunately both times already radio-marked animals. After the last repeated capture we decided to stop chasing for the field period in order not to stress the black-footed cats on Benfontein any further.

Locating the radio-collared cats:

Subsequent to their respective capture we attempted to get a location fix of each cat in its den during daylight each day and then another fix during the course of the nights. Altogether 78 such fixes were obtained for the four cats. Due to the short duration of the field trip we were only able to collect a limited number of fixes, and thus to arrive at incomplete estimated ranges (Table 1; Fig. 2). Further work continued by Beryl Wilson following the trip, and these additional location fixes will give a clearer picture of the ranges by the advent of the next trip in early 2009.

Result from last years’ capture efforts: Recently, Jason Herrick and Bill Swanson (Cincinnati Zoo and Botanical Garden) transferred four embryos into a female black-footed cat at the Louisville Zoo. These embryos were produced from oocytes collected from a female black-footed cat at Utah’s Hogle Zoo and spermatozoa collected from the male “Pole” in November 2005 - now recaptured and radio-collared. If successful, this would represent the first black-footed cat produced by in vitro fertilization and embryo transfer, and perhaps more importantly, the first time this technology was used to incorporate the genetics of wild animals into a captive population. Fecal samples will be analysed in late September for concentrations of progesterone metabolites, in hopes of diagnosing pregnancy. If the female is indeed pregnant, kittens would be due in early October.

Biological specimens collected (2004-2008) and results to date:

- Small skin samples from 28 carnivores stored in the Frozen Zoo[®] at the Zoological Society of San Diego. Fifteen of these samples, including 4 from black-footed cats, were used to generate cell lines that can be used for advanced genetic studies.
- Small skin samples from 17 museum specimens for future genetic studies using ancient DNA
- Blood samples from 58 carnivores, including 11 black-footed cats, for future genetic studies.
- Serum samples from 38 carnivores have been tested and found to be negative for antibodies to Rabies virus. One sample from a black-backed jackal pup was positive in 2005.
- Sera from 64 carnivores were tested for evidence of exposure to viruses that commonly affect canids and felids. The results are interesting and investigations are ongoing. It does appear that domestic dogs and cats on the periphery of Benfontein have been exposed to viruses that may be detrimental to other small carnivore populations.
- In addition to the above samples, pharyngeal swabs, rectal swabs, and feces were collected for future disease studies.

Discussion and Conclusions:

Valuable data on censusing and catching have been collected again on this trip in the area, which was intensively studied between 1992 -1998. Only a worrying low number of 4 black-footed cats were seen and captured over and over again during the 7 nights of spotting. The spotting frequency was the same as during the previous field trips (see progress reports 2005, 2006, 2007 – available from the authors and as downloadable PDF-files on www.wild-cat.org). The difference in 2008 was that we saw the same 4 cats – no new cats – on Benfontein.

On average, one can expect that experienced observers, using the described spotting method, would be able to spot a black-footed cat almost every night, the latest every second night, in an area with a good black-footed cat population. So far we have only Benfontein as a good reference and we fear that other areas within habitat, that we would deem suitable, have much lower cat densities.

As in the previous years we recorded 2 families of black-backed jackals with their offspring. However, no caracal was observed this year. With high densities of at least the black-backed jackal, black-footed cats may be negatively affected in their densities and may alter their behaviour. We hope to test this hypothesis in the future with comparative study sites.

It is worrying that in comparison to the estimate of last year with a minimum of eight different black-footed cats sighted we only managed to find 4 different individuals and were seeing and capturing them all over again until we decided to stop any more spot-lamp searching. Another worrying aspect of this years spotting and capture results is that no young cats or females, apart from “Gogo” were captured. We hope that we are not witnessing a low in the population leading to the local extinction of the species in the area.

The recapture of males, however provides very interesting data. “Pole” weighed 1.8 kg when captured as a young adult in November 2005. Two and half years later in April 2008 he still had clean un-chipped teeth and the same body mass. His nose colour changed from dark to pink. With this new data it may have been that some of the cats Sliwa (2004, 2006) caught during his study may have been underestimated in age. It may be that males stay at a low body weight for several years, before becoming resident and establishing a territory. Likewise “Jimbo”, who was caught as an independent kitten in the same general area in May 2007. He only added another 0.4 kg of body mass during the course of one year.

The estimated range sizes of the four cats were already surprisingly large, considering that the data was collected only over a maximum period of 8 days for each cat. All three males had ranges larger than 10 km² and the female close to 5 km². It is likely that with the same tracking effort as during Sliwa’s study (2004) range sizes would be comparable or even larger than 10 years ago in the same study area.

Altogether the trip was very successful, with the capture rate similar to the capture success obtained during the previous field trips. We continued with our decision from last year to radio-collar any captured cat that was large enough (> 1 kg) in order to get repeated biological samples during future trips and allowing for the comparison of home ranges to the sizes estimated by Sliwa (2004). Beryl Wilson will be able to collect more location fixes on a regular basis for each of the four radio-collared cats.

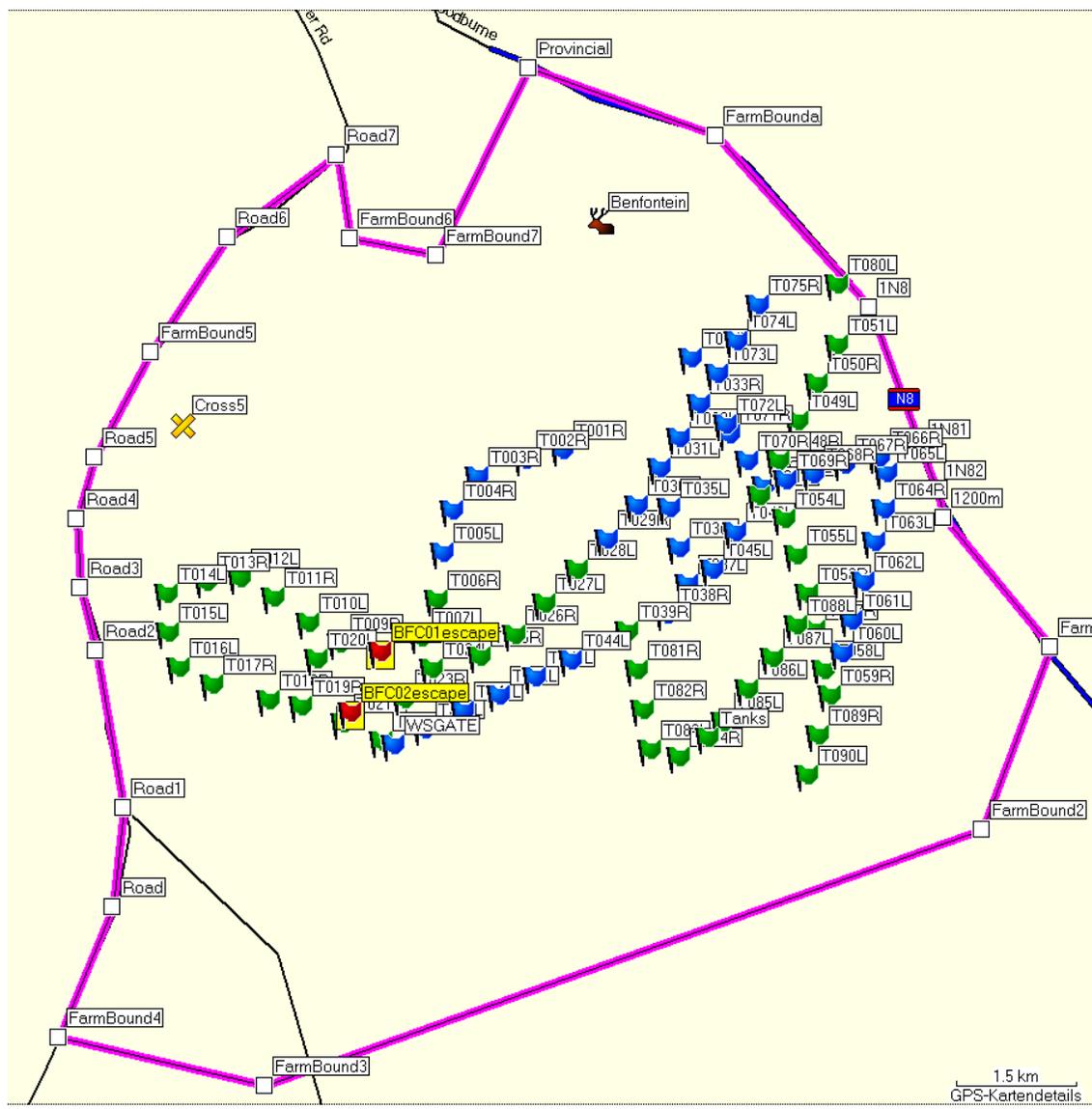
We hope to return to Benfontein for further capturing and sampling of wild black-footed cats in February 2009. On our next visit we will also attempt to work further afield in the Karoo around Victoria West.

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the telemetry equipment. The International Society of Endangered Cats (ISEC) Canada Branch sponsored further six ATS® radio-collars, telemetry equipment and running costs of the vehicle. Our thanks go out to Dr. Jim Sanderson who recommended the use for the successful new lure. We also want to thank our respective employers for supporting us and granting us leave of absence from our busy work schedules to carry out this field work.

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Map 1. GPS map of Benfontein Farm with boundary in magenta, all trap positions and locations of two black-footed cats that escaped capture via pursuit (red flags).



Fig.1. Setting and baiting traps (B.Wilson)



Fig. 2. The Lure (Alex Sliwa)



Fig. 3. Nadine Lamberski, injecting the cat (A. Sliwa)



Fig 4. Beryl Wilson extracting "Jimbo" from Trap (A.Sliwa)



Fig 5. Jason Herrick, checking sperm quality (B. Wilson)



Fig. 6. Working on the cat in the field (B. Wilson)



Fig. 7. Capture team with female “Gogo” (Photos Erik van Dyk)



Fig. 8. Male “Pole” re-captured via pursuit and netting (B.Wilson)



Fig. 9 Releasing male “Okko” into a den (B. Wilson)



Fig. 10. Alex Sliwa, finding the cats in their daytime resting spots (J. Herrick)

Table. 1: Body measurements, range size and remarks on the 4 captured black-footed cats – Benfontein, April 2008.

Date	23.04.08	23.04.08	27.04.08	27.04.08
Name (also on Map)	Pole	Jimbo	Gogo	Okko
No. captured	Cat 1 08	Cat 2 08	Cat 3 08	Cat 4 08
Sex	M	M	F	M
Age	adult	adult	adult	adult
Microchip #.	TRV 00-0676-D916	TRV 00-068A-119F	TVN 00-0689-561F	TRV 00-0689-5205
Mass (kg)	1,84	1,32	1,28	2,04
Ear (cm)	5,30	4,90	4,85	4,90
Shoulder (cm)	25,00	23,00	23	26,00
Total Length (cm)	60,00	58,50	56,50	59,00
Hind foot (cm)	9,40	9,3	9,1	9,40
Front foot (cm)	2,10	1,80	1,96	2,00
Tail (cm)	18,00	17,00	17,00	17,00
Neck (cm)	14,00	11,00	10,00	14,00
Canine UR (cm)	1,04	1,00	0,84	1,01
Canine LR (cm)	0,86	0,79	0,70	0,91
Canine UL (cm)	1,04	0,97	0,83	1,04
Canine LL (cm)	0,82	0,84	0,74	0,91
Testes RL (cm)	1.6	1.5	/	1.6
Testes RW (cm)	1.1	1.0	/	1.0
Testes LL (cm)	1.7	1.5	/	1.6
Testes LW (cm)	1.1	1.0	/	1.0
Number of fixes	16	16	24	22
Range size (100%)	15,8 km ²	10,5 km ²	4.6 km ²	10,0 km ²

REMARKS

Adult male, recapture from 2.11.05 (Cat 3 MC1, then young adult), good condition, some tartar on M¹, all canines un-chipped, **radio-collared**

Pole Cat 1-08 - same mass as in 2005.

Jimbo Cat 2-08 Young adult male, recapture from 9.5.07 (Cat 1 07, then independent kitten), thin, many ticks in ears, some tartar on M¹, all canines un-chipped, **radio-collared**

Gogo Cat 3 08 Adult female, recapture from 13.5.07 lean, smooth coat, no fat, used nipples, teeth clean, un-chipped canines, some tartar on M¹ **radio-collared**

Okko Cat 4 08 Adult male, recapture from 11.06 & 13.11.5.07 (Cat 3 06/ Cat 2 07), good condition, some tartar on M¹, all canines un-chipped, **radio-collared**