

**- Black-footed Cat Working Group -**  
**Report on surveying and catching Black-footed cats (*Felis nigripes*)**  
**on Benfontein Nature Reserve / Nuwejaarsfontein, 2-20 February 2009**

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**Introduction:**



The Black-footed cat Working Group has the goals of furthering awareness and research for this rare cat, bringing together multidisciplinary expertise on the species biology. It owns a Toyota Hilux as a dedicated working vehicle purchased by funds donated from Cologne Zoo, Cincinnati Zoo, Zoological Society of San Diego and Ebeltoft Zoo to the project in February 2008. The required insurance, running and maintenance costs for it are administered by the McGregor Museum, while the vehicle is solely used for black-footed cat research. The specialized equipment required for our research is likewise stored at the McGregor Museum, Kimberley. This year we worked in two study areas, for an initial period from 2<sup>nd</sup> -7<sup>th</sup> and

then 13<sup>th</sup> - 20<sup>th</sup> February on Benfontein Nature Reserve, Kimberley and in between these periods in a second study area on Nuwejaarsfontein, De Aar from 7<sup>th</sup> -13<sup>th</sup> February 2009.

**Study Areas**

**1 - Benfontein Nature Reserve:**

A Natural Heritage Site owned by De Beers Consolidated Mines, located 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. Benfontein receives average annual rainfalls of 450 mm.

**2- Nuwejaarsfontein Farm:**

Situated 24 km south of De Aar in the Northern Cape Province we visited this sheep and game farm owned by Sterrie Marais, for the first time this year from 7-13th February. The 13.000 ha farm receives an average of 300 mm rain annually and the Karoo plant community is fenced into 300-400 ha camps both sides of the secondary road parallel and between the R348 and N10.

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, 2007, and 2008 similar capture operations were conducted on Benfontein Nature Reserve. Four reports are available on these periods by the authors and on the website [www.wild-cat.org](http://www.wild-cat.org).

**Methods:**

**(A) Spot-lamp searching:** For 7 nights on Benfontein and 5 nights on Nuwejaarsfontein a 4x4 vehicle (2.4 litre Diesel Toyota Hilux Double cab vehicle), drove a route of 20-80 km in length along dirt roads of Benfontein and Nuwejaarsfontein at a speed of between 20-30 km/ hr whilst looking for the characteristic bright eye shine of cats. Optimally two people would stand on the open back of the vehicle operating two spotlights (1 million candle power Lightforce®).

**(B) Catching via searching and chasing:** Once black-footed cats or African wildcats 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 anaesthetic 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:** this method could not be employed this year as two of the previous year's cats were found dead (female "Gogo" and male "Jimbo") and the collar of a third (male "Okko") was not working any more. The fourth cat's collar, the male "Pole", was still working but he eluded capture on the last days in the field due to a combination of heavy rains (> 150 mm in 3 days) which left the farm roads too soft for driving and difficulties in finding him with his erratic movement patterns.

(D) **Live-trapping**

We employed this method for 4 nights on the part of Nuwejaarsfontein that is called Taaiboschpoort working with 21 traps. We only caught a striped polecat *Ictonyx striatus* for a trapping success rate of 1.19% (1/84). This is significantly decreased from previous years. Surprisingly, as during last year and despite power-hose cleaning the traps before, only a single yellow mongoose was caught in the veldt on Benfontein (20 traps set over 4 nights, 1.25% success rate). We did capture three more mongooses (one escaped) and a domestic cat (twice) close to the research house on Benfontein. The "large predator" lure we used on the traps previously might have deterred the mongooses 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

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Dr. Nadine Lamberski, Veterinary Clinical Operations Manager, San Diego Wild Animal Park, USA

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Dr. Arne Lawrenz, Zoo veterinarian, Wuppertal Zoo, Germany (a.lawrenz@zoo-wuppertal.de)

Mr. Sterrie Marais, farm owner of Nuwejaarsfontein and Taaibosfontein, De Aar.

Mr. Frederick van Dyk, private

Mr. Steve Wing, general curator, Louisville Zoo, USA

Mrs. Liz Harmon, curator Kansas City Zoo, USA

**Results:**

**Trapping:**

**Benfontein-** we did not conduct intensive trapping during this trip, discouraged by already low trapping success with yellow mongooses, which seemed to be as abundant and continually present close to the traps, as during the past trips. Only a few selected traps were set in positions used before (Map 2). Most likely this phenomenon was due to the effect of the new lure used consisting of anal sac secretions from North American bobcats (*Lynx rufus*), which repelled smaller carnivores and even black-footed cats. Altogether we logged another 7 trap nights on Benfontein during this trip.

**Nuwejaarsfontein-** we ran 21 traps for 4 nights (84 traps) and only caught one striped polecat.

**Spot-lamp searching:**

**Benfontein-** we saw 7-8 different black-footed cats during 7 nights. The number of sightings varied between 0-2 per night. Black-footed cats were seen during all 7 nights (100%).

The entire area was part of the previous ecological study of Sliwa from 1992-1998, and the same that we searched during previous capture trips.

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

**Nuwejaarsfontein-** we saw two different black-footed cats during 5 nights. We only saw a black-footed cats on average every second night with a 40% sighting rate (both of them we caught).

During these night drives we observed other carnivore species like aardwolves, at least 4 different black-backed jackals, and several groups of bat-eared foxes every night. Also a minimum of two Cape foxes, a small spotted genet, aardvark as well as porcupines and a Cape eagle owl (*Bubo capensis*).

**Catching via searching and chasing:**

**Benfontein-** out of the above 9 sightings we pursued all but two of the 7-8 black-footed cats (Map 2). We caught two males new to us (Jason and Edwin), which have never been caught before, via netting and a short dig. We also caught the male “Okko” again after a chase and dig, after his collar has been dysfunctional for several months (from late September 2008, B. Wilson pers. comm.). The other 6 sightings resulted in four pursuits without catching the cats. All of those latter were likely one large male in the east central area of Benfontein, who escaped capture on two nights, twice each. So altogether there are 3-4 un-collared cats on Benfontein. The radio-collared male “Pole” was not sighted during our spotlamp searches and we also did not manage to exchange his collar. Thus our capture “success” was 3 out of 7 attempts (43%).

**Nuwejaarsfontein-** we caught both black-footed cats sighted, an adult female and a 1.5 month old female kitten (100%). The kitten’s age was estimated based on mass from known age captive kittens (Armstrong 1975, Olbricht & Sliwa 1995). From the minimum of 3 African wildcats sighted we caught one young adult female (33%) in skinny condition. The two other cats escaped our capture via running from the flat pan into the rock-covered hillsides.

**Finding two dead cats:**

Upon arrival in the study area we realized that the female “Gogo” (Cat 3 08, see report May 2008) did not move from her location during the night. We found her remains, chewed by jackals, through locating the radio-collar via its fast beating mortality signal (Map 2). We estimated her having died only 2-3 weeks ago, as the grass was still green underneath her carcass, consisting of matted skin and partly fleshed bones and skull. The next day we also located the remains of the male “Jimbo” (Cat 1-07, then an independent kitten, and then caught as Cat 2-08 again), whom we radio-collared in May 2008. We found him underneath 1 m of sandy soil in a large den system (Map 2). This den collapsed in several places probably in a strong storm at the beginning of January 2009. We found his bones seemingly untouched and close together so hinting to his death through suffocation after the den roof collapsed onto him (Fig. 9).

**Locating the radio-collared cats:**

**Benfontein and Nuwejaarsfontein-** subsequent to their respective capture we attempted to acquire location fixes of all radio-marked cats in their dens during daylight each day and then more fixes during the course of the nights. Altogether 82 such fixes were obtained for the four cats on Benfontein (Map 2) and the female on Nuwejaarsfontein (Map 1). Unfortunately due to frequent rains, rendering roads impassable, it was not possible to find each cat every day/night. The short duration of the field trip allowed only for the collection of a limited number of fixes, and thus to arrive at incomplete estimated ranges (Table 1). We foresee that through further work following the joint trip additional location fixes will give a clearer picture of the ranges.

**Behavioural Observations of radio-collared cats:** On the night of the 18<sup>th</sup> February the team didn't search and catch cats, thus Alex Sliwa went with project visitors Grégory Breton (curator of Parc-des-Felins, Paris) and his companion Sophie out to track the radio-collared cats. After trailing "Okko" for several hundred meters, while keeping him in the beam of the headlights, strong wind and simultaneous rain set in. Shortly afterwards they watched a Cape hare (*Lepus capensis*) loping disorientedly towards the male cat, who immediately rushed from about 3m on it and took about 30 seconds to kill the kicking prey holding onto it by its head. The observers left the feeding cat after several minutes. When locating Okko early next evening he was already surprisingly far away from the kill site.

On the night of 19<sup>th</sup> February the same observers found the male "Jason" deep in the southern sandveld. After seeing his eyes reflect from the dense long bushman grass they saw him jump up a camelthorn tree (*Acacia erioloba*) taking refuge at 2.5 m above the ground while still about 100 m away. When 20 m away Alex started taking pictures, driving slowly closer. The cat felt so safe amongst the thorns that he only jumped off from his perch after 15 minutes and many pictures later and allowing the photographer to approach up to only 2 m. These are presumed to be the first pictures of a wild black-footed cat in a tree (Figs. 11&12).

**Visitors to project:** The team was delighted to welcome Steve Wing, the North American Species Survival Programme (SSP) co-ordinator for the black-footed cat and general curator of Louisville Zoo, as well as Liz Harmon, North American regional studbook keeper and curator at Kansas Zoo to Benfontein. They joined us on a productive three days of radio-tracking cats, setting traps, spotting at night, helped during the capture of "Okko" and brainstorming on the mission statement of the Black-footed Cat Working Group (Figs. 7 & 8). We are very grateful for a generous donation to the Working Group's budget.

In our second field period to Benfontein, Grégory Breton, deputy director and curator at the Parc-des-Felins, Nesles, France and his friend Sophie came to visit for two days and were incredibly lucky to observe many different nocturnal mammals and witnessing rarely seen behaviour of radio-collared cats while joining Alex tracking. Their time is documented under the following weblink "[http://www.parc-des-felins.com/en/2.2\\_actualites.php](http://www.parc-des-felins.com/en/2.2_actualites.php)" for March 10th, can be chosen as English text. Again we are most grateful for the contribution of Parc des Felins to our research funds.

## **Discussion and Conclusions:**

Valuable data on censusing and catching have been collected again on this trip on Benfontein Nature Reserve, which was intensively studied between 1992 -1998. A good number of 8-9 black-footed cats were seen or captured and collared during the 7 nights of spotting. The spotting frequency was similar or even better than during the previous field trips (see progress reports 2005-2008 – downloadable as PDF-files on [www.wild-cat.org](http://www.wild-cat.org)). The difference to last year (2008) was that we captured two so far unmarked cats on Benfontein – although again only males.

Comparing the sighting frequencies between the two study areas we saw at least one cat every night on Benfontein (9 sightings on 7 nights = 129% sighting frequency) compared to one black-footed cat every second night on Nuwejaarsfontein (2 sightings on 5 nights = 40% sighting frequency). We assume that the chance of detection was similar between the two sites as both had open habitats with good visibility.

As in previous years on Benfontein we recorded numerous black-backed jackals, also on Nuwejaarsfontein. However, no caracal was observed this year. With high numbers 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 further in the two and possibly a third study site.

Benfontein held 8-9 different black-footed cats, more than last years four. Although we captured two new cats this year, it was again only males. The absence of females and kittens is worrying. With the loss of the adult female "Gogo" we hope that this is not the end of the population and that we either missed a female or that one will immigrate soon. There are several hypotheses for the current situation, with a population density similar to one documented for 1998 on Benfontein (Sliwa 2004), however currently

composed entirely of males ranging from young adult to fully adult males. The longitudinal data on adult males is especially interesting, male “Okko is resident in the north western area for at least the past 2.5 years, while male “Pole” used much of the entire northern half of the study area over the past 3.5 years. One hypothesis would be that the high jackal and previously also caracal population acted selectively via predation on smaller, slower, less experienced and thus more vulnerable kittens and female cats than on adult males. We recorded the last kitten in May 2007, the male “Jimbo”, whom died in the collapsed den. A second hypothesis is a disease epidemic, canine distemper, swept through Benfontein in 2005-2006 (N. Lamberski, pers. comm.). This virus may have caused higher morbidity and mortality in some species over others thus altering the balance of the carnivore populations. We currently may be seeing the re-colonization of the study area by young adult dispersing males and hope that we are not witnessing a trend leading to the local extinction of the species in the area.

The estimated range sizes of the four cats on Benfontein are comparable to last years, bearing in mind that data was collected for only very short periods for each cat during this trip. The range size (9.0 km<sup>2</sup> 100% Minimum Convex Polygon, N= 33 location fixes) estimated for female “Ilse” on Nuwejaarsfontein was similar or is even expected to be larger than the ranges of females on Benfontein in 1998 (Sliwa 2004), when more fixes are collected for her in the course of the year.

Altogether the trip was very successful, with the capture rate similar to the capture success obtained during the previous field trips and the establishment of a second comparative study area in the Karoo. We continued with our decision 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 and maybe further researchers will be able to collect more location fixes on a regular basis for each of the five radio-collared cats. This year’s capture and tracking operation was made difficult by several strong downpours, which greatly hampered our mobility and access to the study areas (Fig. 10). Despite this we were able to collect new data on natural mortality (den collapse) and predator avoidance (climbing trees) in black-footed cats. The ability of these cats to kill relatively large mammalian prey was confirmed with the kill of a Cape hare as previously reported (Sliwa 2006).

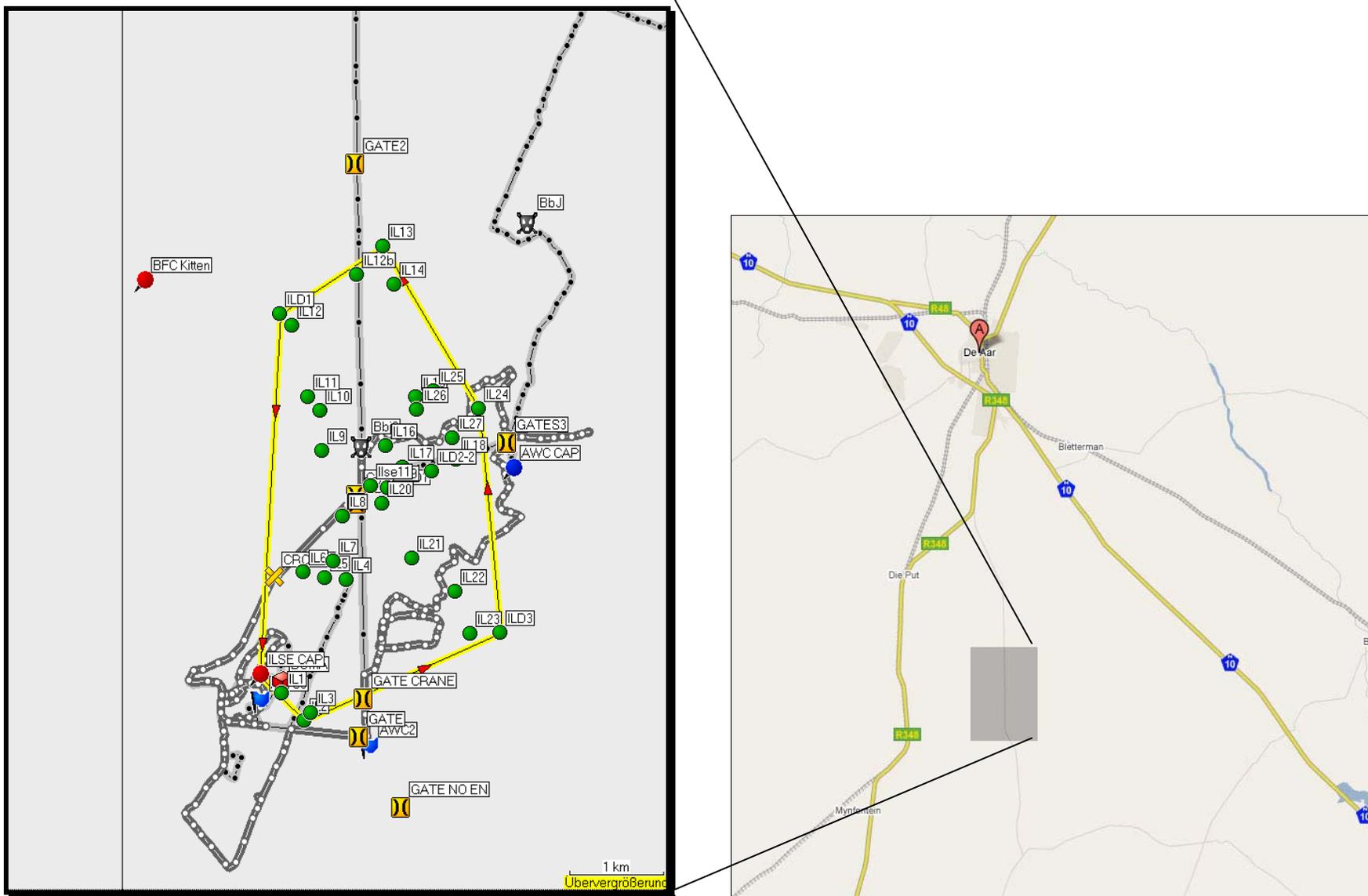
We hope to return to Benfontein and Nuwejaarsfontein for further capturing and sampling of wild black-footed cats in November 2009. On our next visit we will also attempt to work around Victoria West.

**Acknowledgements:** We thank Sterrie Marais and his wife Ilse for permission to work on Nuwejaarsfontein and the cost-free use of their Landrover and spotlamps for field work during our working visit to the De Aar area. Likewise we thank De Beers Consolidated Mines for permission to work on Benfontein and the use of the research house for accommodation and lab facilities. Ecology Division of De Beers who gave us permission for the sampling, and supported us in employing the pursuit and live-trapping method. Funds for fieldwork came from Cologne Zoo (dedicated donation by Mr. and Mrs. Stock), Parc-des Felines, Paris, France; Ebeltoft Zoo (Ree Park), Denmark. San Diego Zoo’s Collection Health Research Initiation Fund, Riverbank’s Zoological Park and Botanical Garden Conservation Support Fund, the *In Situ* Conservation Fund of the Cincinnati Zoo and Botanical Garden, Omaha’s Henry Doorly Zoo, Louisville Zoo and Kansas City Zoo. The International Society of Endangered Cats (ISEC) Canada Branch for radio-collars and vehicle running costs. We sincerely thank our respective employers for supporting us and granting us leave of absence from our busy work schedules to 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.
- 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*. International Zoo Yearbook 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. Zoologischer 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 Nuwejaarsfontein Farm, with minimum convex polygon (9.0 km<sup>2</sup> =100% MCP in yellow) encompassing the locations (green dots) of the female black-footed cat “Ilse” collected during the field period 8.-13.2.09, land marks and gates, and capture locations (red beacons) of black-footed cats (Ilse and BFC Kitten) and capture (AWC Cap, blue beacon) and two further sightings of African wildcats (blue flags). The location where two black-backed jackals were shot during this period are marked as black skulls.





Fig.1. The capture team with male cat "Jason" (Lindsay Moore)



Fig. 2. Okko in his refuge (A.Lawrenz)



Fig 3. Digging for male "Okko" (Beryl Wilson)



Fig 4. The vets at work (Arne and Nadine) (A.Sliwa)



Fig 5. Beryl with 18 years of spotlamp evolution (A. Sliwa)



Fig. 6. Alex checking signals from a windmill at night. (A. Lawrenz)



Fig. 7. Okko is inserted for transport to his release site (A.Sliwa)



Fig. 8. Brainstorming for the BFCWG goals and mission statement (B. Wilson)



Fig. 9. Arne digging remains of Jimbo from collapsed den (A.Sliwa)



Fig. 10. Flooded road on Benfontein after heavy rains (A. Sliwa)



Fig. 11. "Jason" in a camelthorn tree (A. Sliwa)



Fig. 12. Portrait of "Jason" in the tree (A. Sliwa)



Fig. 13. Entrance to Nuwejaarsfontein (A.Sliwa)



Fig. 14. Capture vehicle at Nuwejaarsfontein (B. Wilson)



Fig. 15. Sterrie Marais with female cat "Ilse" (A.Sliwa)



Fig. 16. 4 AM – time for a short rest while tracking "Ilse" (A.Sliwa)



Fig. 17. Ilse's daytime den (A.Sliwa)



Fig. 18. Female kitten ~ 1.5 months old (B. Wilson)

Table. 1: Body measurements, range size and remarks on 6 black-footed cats on Benfontein and Nuwejaarsfontein, February 2009.

Date	2.02.09	04.02.09	08.02.09	12.2.09	14.02.09	not captured
Name (also on Map)	Jason	Okko	Ilse	Kit-Nuwe	Edwin	Pole
No. captured	Cat 1 09	Cat 2 09	Cat 3 09	Cat 4 09	Cat 5 09	Cat
Sex	M	M	F	F	M	M
Age	adult	adult	adult	kitten	adult	adult
Microchip #.	TRV 00-0689-712E	TRV 00-0689-5205	TVN 00-0689-5136	TVN 00-06CB-8BAA	TVN 00-06C6-899C	TRV 00-0676-D916
Mass (kg)	1,70	2,00	1,16	0,52	1,72	
Ear (cm)	5,50	5,00	4,60	/	5,20	
Shoulder (cm)	26,00	25,00	19,00	/	26	
Total Length (cm)	62,00	62,00	53,00	/	60,5	
Hind foot (cm)	10,3	9,3	8,5	/	9,5	
Front foot (cm)	2,00	2,00	/	/	2,00	
Tail (cm)	17,00	18,00	16,80	/	18,00	
Neck (cm)	14,00	14,00	11,00	/	13,00	
Canine UR (cm)	0,95	1,01	0,70	/	0,93	
Canine LR (cm)	0,80	0,81	0,62	/	0,82	
Canine UL (cm)	0,91	1,03	0,73	/	0,90	
Canine LL (cm)	0,80	0,88	0,62	/	0,83	
Testes RL (cm)	/	/	/	/	1,10	
Testes RW (cm)	/	/	/	/	1,00	
Testes LL (cm)	1.5	/	/	/	1,25	
Testes LW (cm)	/	/	/	/	0,90	
				/		
Number of fixes	16	14	33	/	8	11
Range size (100%)	5,1 (2,5) km <sup>2</sup>	9,1 km <sup>2</sup>	9,0 km <sup>2</sup>	/	0,7 km <sup>2</sup>	5,1 km <sup>2</sup>

**REMARKS**

**Jason Cat 1 09** Adult male, not captured before

**Okko Cat 2 09** Adult male, recapture from Nov06, May07, Apr08 (Cat 3 06/ Cat 2 07/ Cat 4 08), good condition, some tartar on M<sup>1</sup>, all canines un-chipped, **radio-collared**

**Ilse Cat 3 09** Adult female, captured on Nuwejaarsfontein, De Aar, good condition with fat present, used nipples, some plaque, many ticks and fleas, **radio-collared**

**Kitten Cat 4 09** Female kitten of about 1.5 months, captured on Nuwejaarsfontein, de Aar, definitively dependent on mother, only took samples and microchipped before released

**Edwin Cat 5 09** Adult male, not captured before, lean but fit, right ear with teeth puncture marks, injury disfigured nose, slight tartar on teeth, many fleas, **radio-collared**

**Pole Cat 1-08** Adult male, collar still working from collaring in May 2008 but could not recapture him due to heavy rains and failure to find him the last 2 nights, radio tracked