

- Black-footed Cat Working Group -
Report on surveying, catching and monitoring Black-footed cats (*Felis nigripes*)
on Benfontein Nature Reserve, Nuwejaarsfontein and Taaiboschpoort Farms in 2014

Alexander Sliwa, Beryl Wilson, Martina Küsters, Arne Lawrenz, Birgit Eggers, Jason Herrick,
Adrian Tordiffe, Piet Marais and Sterrie Marais

Introduction:



The Black-footed Cat Working Group (BFCWG) aims to conserve this rare cat species by furthering awareness and conducting multidisciplinary research on the species' biology. The BFCWG owns a research vehicle (Toyota Hilux) for which the insurance, running and maintenance costs are administered by the McGregor Museum, Kimberley, South Africa. The specialized equipment required for our research is also stored at the McGregor Museum. This year we made one joint trip to the two previous study areas: Nuwejaarsfontein (NJF) and Taaiboschpoort (TBP) Farms,

south of De Aar, from 12-22 November 2014 then to Benfontein Nature Reserve (BFN), near Kimberley, from 22-25 November 2014.

Study Areas and Project Aims

1 - Nuwejaarsfontein (NJF) and Taaiboschpoort (TBP) Farms:

Situated 24 km south of De Aar in the Northern Cape Province, these sheep and game farms are owned by Sterrie Marais and managed by his son Piet Marais. They are about 5 km apart, separated by the farm Eselsfontein. The BFCWG visited them for the first time in February 2009. The 9 000 ha of NJF and 4 500 ha TBP farms receive an average of 300 mm rain annually and the Karoo plant communities are fenced into 300–400 ha camps both sides of the secondary road parallel to and between the R348 and N10.

2 - Benfontein Nature Reserve (BFN):

A private nature reserve owned by De Beers Consolidated Mines, located 10 km southeast of Kimberley on the border of the Northern Cape and Free State Provinces in central South Africa. The majority of the 11 400 ha which consists of arid plant communities has been the subject of the first, and so far only, in-depth field study on the black-footed cat by Sliwa in the 1990s (1992-1998) (Sliwa 2004, 2006, Sliwa *et al.* 2010). BFN receives average annual rainfalls of 450 mm.

Project Aims: This project is part of a multidisciplinary effort to study the distribution, ecology, health, and reproduction of *F. nigripes* over an extended period. With the aim of repeatedly capturing black-footed cats (hereafter termed “bfc”) for biological sampling and radio-collaring for subsequent observation, several methods were employed to survey areas, previously known to hold bfc. From November 2005 annual capture operations were conducted on BFN and from February 2009 also on NJF and TBP until the present visit. 10 reports are available on these periods by the authors and are downloadable as PDFs on the website www.black-footed-cat.wild-cat.org.

Methods:

(A) Spot-lamp searching: For a total of 10 nights (7 nights on NJF & TBP, 3 nights on BFN) a 4x4 vehicle (2.4 litre Diesel Toyota Hilux Double cab or Toyota Landcruiser) drove a route of 20–80 km in length along dirt roads at a speed of 20–30 km/h whilst looking for the characteristic bright eye-shine of cats. A minimum of 2 people (4-6 this trip) stood on the open back of the vehicle operating 2 spotlights (1 million candle power / Lightforce® SL240 mm). This trip we could not

work for the first 3 nights on NJF & TBP, since the veld was too wet and soft for off-road driving following significant rains in the region. We did drive on the night of 14.11.14 along the public dirt roads between De Aar and NJF and Richmond and saw two bfcs.

- (B) Catching via searching and pursuit:** Once bfcs were located by their eye-shine in the spotlights, their species identity was swiftly confirmed using 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. 1 or 2 people with fish landing nets then netted the cats. On other occasions the cats would find a den system (dug by aardvarks, ground squirrels or springhares) and were either captured by exposing them after digging, or were lost when escaping deeper into the den system. All accessible cats were subsequently anaesthetized with an intramuscular injection of medetomidine, midazolam, and butorphanol and covered with a blanket to shield them from lights and sounds. This November we processed all 9 captured cats in the field. All animals were given complete physical examinations, had biological samples collected for disease and genetic studies, morphometric measurements obtained, and radio-collars fitted. During this year's captures even more vital body parameters were collected while the cats were under anaesthesia, such as blood pressure, and a blood sample was drawn from a catheter in the jugular vein every 20 minutes for blood gas analysis. The anaesthetic drugs were antagonized with intramuscular injection of atipamezole, flumazenil and naltrexone, and the cats then placed in a small plastic crate for recovery. All bfcs 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. A digital camera trap was set close to the den entrance to record the cat leaving the den. There were no complications associated with these procedures and all cats (n=6) were confirmed alive and well on subsequent nights using telemetry and visual verification.
- (C) "Digging" of previously radio-collared cats:** This method was employed twice this year, where the den with the radio-collared bfc was either carefully opened with a spade or via hand-digging. Or the cat was extracted directly out of the burrow by probing, to prompt it to run into a draped-over net, or grabbing the cat directly behind the neck on the radio-collar. The still functioning radio-collars of the males (Stan) and (Zuma) were exchanged with no or very little digging being necessary.
- (D) Live-trapping:** no trapping was performed on this field trip.

The captures via vehicles were variously staffed in November 2014 by:

Ms. Beryl Wilson, zoologist, McGregor Museum, Kimberley, South Africa (berylwa@museumsnc.co.za)
 Dr. Alex Sliwa, behavioural ecologist and zoo curator, Cologne (Kölner) Zoo, Germany (sliwa@koelnerzoo.de)
 Dr. Arne Lawrenz, zoo veterinarian, Wuppertal Zoo, Germany (a.lawrenz@zoo-wuppertal.de)
 Dr. Birgit Eggers, wildlife veterinarian, Durban, Kwazulu Natal, South Africa (blackegg@mweb.co.za)
 Dr. Jason Herrick, reproductive biologist, National Foundation for Fertility Research, U.S.A. (jherrick@fertilityresearch.org)
 Dr. Adrian Tordiffe, research veterinarian, National Zoo of South Africa, Pretoria, South Africa (adrian@nzc.ac.za)
 Ms. Martina Küsters, field technician, researcher bfc-study Namibia, Swakopmund, Namibia (kusters.m@hotmail.com)
 Mr. Sterrie Marais, farm owner of Nuwejaarsfontein and Taaiboschpoort, De Aar, SA (info@karooexperience.co.za)
 Mr. Pieter Marais, farm manager of Nuwejaarsfontein and Taaiboschpoort, De Aar, SA (maraispiet@gmail.com)
 Mr. Julian Kusak, zoo animal keeper, Wuppertal Zoo (visiting).
 Mr. Takalani Musekwa, junior research assistant, National Zoo of South Africa, Pretoria, SA (visiting).

Results:

Trapping: no trapping performed on this field trip.

Spot-lamp searching and catching/exchanging radio-collars:

NJF and TBP: we saw bfcs on 4 occasions during 7 nights of searching (no search efforts on 12 & 13 Nov) and caught 3 of 3 attempts (100% capture success), we didn't attempt to catch the 4th sighting, due to not being able to drive through a gateless fence. We sighted an additional 2 bfcs across the fences, when we drove on the night of 14.11.14 along the public dirt roads between De Aar and NJF and Richmond, but could not attempt capture due to the wet conditions in the veld. We caught 2 uncollared females "Nele" on NJF and "Sani" on TBP as well the likewise uncollared young adult male "Epoc" on TBP. Thus we saw a bfc every ~1.75 nights (57% chance of sightings /night) when being able to capture and one per ~1.17 nights (87.5% chance of sightings /night) when including the one night where we could not capture. During these night drives we observed other carnivore species such as aardwolves (*Proteles cristatus*), groups of bat-eared foxes (*Otocyon megalotis*), Cape foxes (*Vulpes cana*) and small-spotted genets (*Genetta genetta*). Also aardvark (*Orycteropus afer*) almost every night, porcupines (*Hystrix africaeaustralis*) and spotted eagle owls (*Bubo africanus*). As potential predators of bfcs we saw 2 caracals (*Carcacal caracal*) in one night and a single subadult black-backed jackals (*Canis mesomelas*). We caught 3 new cats on NJF and TBP via the pursuit method. Thus our success rate was 100% out of 3 pursuit attempts. We also exchanged the functioning radiocollars of the males "Stan" and "Zuma", when we extracted them from their den or hollow termite mound, they took refuge in during daylight. So we had 5 radio-marked bfcs on these two farms, when we left on 22 November 2014.

BFN: we saw 1 bfc individual during 2.5 nights of searching and caught it. Thus we saw bfcs unaided by telemetry every 2.5 nights (40% chance of sightings/night). The entire area was part of the previous ecological study of Sliwa from 1992–1998, and the same as what we have covered during previous capture trips (2005-2013). During these night drives we observed other carnivores including aardwolves, one black-backed jackal, small groups of bat-eared foxes and many aardvark (up to 3 per night, on one occasion 2 together in the rain) and springhares (*Pedetes capensis*). The first night we had to stop after only 1.5 hours of searching due to strong rain setting in. On the second night we only started at 2200, two hours later than normally, after the rain had stopped.

We caught one new cat on BFN, the adult male "Bolt" via the pursuit method. Thus our success rate was 100% out of 1 pursuit attempt.

Fate of black-footed cats in 2014 (collared in 2013)

Female "Faf": we collared her in November 2013 on BFN as an adult female. She maintained a relatively small territory (3.8 km²; n=36, Jan-April 2014) in the central part of BFN and was last heard on 10.4.14 by Beryl Wilson. We don't know exactly what happened to her, but her chewed collar and some hair, no carcass, was found by Martina Küsters on 22.4.14 (skull sign, Map 1), so she either died of disease and was then eaten or she was killed by jackals in the area. She died around 15 April 2014.

Female "Hasi": caught in November 2013 as an adult on TBP. She had an average-sized home range (9.7 km², n=64) between 26.1.14 - 12.5.14. Then she disappeared and was picked up again on 25.5.14, a remarkable 19 km straight north, where again she roamed an average sized home range of 8.1 km² (n=74). The home ranges are marked as two red polygons on Map 2. She was last seen alive on 6.6.14 and the collar and some hair, but only a likely impression of her former carcass near some bushes, were found on 11.8.14 (skull sign, Map 2). She may have been killed as jackals with pups were found in the area prior to finding the collar. She died around 1 August 2014.

Female "Ilse": we caught her last in November 2013 on NJF. She was subsequently monitored by Martina Küsters until she was last located alive on 23.4.14 towards the edge of her range (home range Jan-April 2014 of 6.8 km², n=28). Martina found her dead on 4.5.14, probably due to old age or kidney problems, as she was found close to water at Eselsfontein homestead. There were no bite marks on the collar. She probably died 1 May 2014. We collected her carcass and let it weather in a trap and later collected her skeleton for storage in the reference collection at the McGregor Museum, Kimberley. She has been the longest monitored female bfc ever in all the years of studying the species. She was monitored continuously for over 5 years, after we caught her as an adult on 8.2.09, only 3 km northwest

from her final resting place (skull sign, Map 2). We estimate her to have been at least 7 years old, maybe older and she likely died of old age. We recorded 3 litters of kittens from her, she very likely had more, and we hope that she has contributed strongly to the bloodlines of the currently living bfcs in our study area and further away!

Male “Bama”: caught in November 2012 and again November 2013 on BFN. He was monitored by M. Küsters and was last seen on 6.2.14 on the neighbouring farm Susanna, where he spent all his time since November 2013. Maybe he was displaced from BFN by male “Kubu”? Contact was lost entirely, despite repeated searching and checking his signal frequently from a high adjacent hill. He presumably dispersed even further away or the collar malfunctioned. It is possible he is dead.

Male “Kubu”: caught as a magnificent, fully mature male in November 2013 on BFN. He was intensively monitored until 12.9.14, when last seen alive. He roamed a very large area of BFN (47.0 km², n=135), was trailed on an excursion when crossing the N8 towards the neighbouring farm Susanna. Over several months he had a wound on the side of his nose, which could have stemmed from fighting or even an animal bite or sting. Alarmingly he was seen drinking from several windmill troughs with increasing frequency from May 2014 onwards, which may have been a sign of kidney failure, as healthy black-footed cats don’t need to drink. His carcass was found on 1.11.14 some 1.3 km southwest from the next closest previous waypoint location, in an area with tall grass and camelthorn trees. He may have carried himself there or was dragged to that spot. His skull and carcass had been chewed and scavenged by jackals, so he may have been predated in an advanced state weakness or died and later scavenged by jackals.

Male Ego: caught as a young adult on TBP in November 2013. He became quite accustomed to the tracking vehicle and roamed a large home range (20.1 km², n=92). Was moving slowly off TBP into farms to the southwest and was last seen 25.5.14. Presumed to have dispersed, but he may also have died or his radiocollar has malfunctioned as he disappeared suddenly (Map 2).

Other: Only the males “Stan” and “Zuma”, radio-collared on NJF were still alive in November 2014 and their collars were replaced with new ones. “Stan” had lost another 0.1 kg (8%) from his already very light and lean body mass of 1.35 kg for an adult male in November 2013. He seemed emaciated and the fur matted and dull. Still in February 2015 he seems to have recovered slightly and nonetheless roams a large area in the north of NJF. He was seen together with a female on 30 August 2014. Male “Zuma” started spray marking in 2014 and had picked up even more weight and grown more muscular since 2013. He completely overlaps the range of several females (former “Ilse”, currently “Nele” and “Sani”).

Locating the radio-collared cats

NJF, TBP and BFN: before and subsequent to their respective capture Martina, Alex, Arne and Julian attempted to acquire location fixes (waypoints) of all newly radio-marked cats in their dens during daylight each day, and then additional fixes during the course of the nights. Altogether 83 (Tab 1) such fixes were obtained for the 5 cats on NJF & TBP (Map 3) and the 1 cat on BFN (Map 1). The short duration of the field trip allowed only for the collection of a limited number of fixes, and thus to arrive at incompletely estimated ranges (Tab 1) for these new cats, even when incorporating all the fixes collected in 2014 (November – December). The BFCWG was able to finance the tracking of all the cats (Table 1) by enumerating Martina Küsters, who was tracking them on all three farms (BFN, NJF, TBP) and had collected 164 waypoints until 19th December 2014. Sterrie Marais and his son Piet checked the pulse rate of the radio signals when going out on predator patrols, so they could tell in what general area the radio-collared cats are staying on NJF and if they are alive (no mortality-signal). However, this doesn’t provide data accurate enough for home range analysis. All the location fixes (waypoints stored) provide a clearer picture of the home ranges of individual bfcs, especially on NJF & TBP. The home ranges used by the cats on NJF and TBP in November/December 2014 are shown as 100% MCP polygons (Map 3) including single waypoints. Actual home range sizes for all the individuals are provided in Table 1.

Behavioural Observations of black-footed cats

A total of 12 cats were monitored in 2014 with varying intensity. “Ilse” on NJF was well habituated since February 2009 and was thus the longest continuously radio-collared bfc until she was last seen alive on 23.4.14. “Bama” has hardly been tracked on BFN since his capture in November 2012 and again 2013, since he moved across the N-8 to the farm “Susanna”. The females “Faf” remained quite shy until her death. The female “Hasi” allowed closer approach, both on foot and by vehicle, often coming close to the observer at the start of the tracking session, then running off again. Both “Stan” and “Zuma” have habituated well over the past 14 months of tracking, particularly when tracked via the vehicle. Even better habituated were the two males “Ego” on TBP and male “Kubu” on BFN. Particularly “Kubu” was an exceptionally confident male and allowed close approach, seemingly unaffected by the vehicle and lights. Many excellent pictures could be taken of him walking, hunting, spray-marking and even when feeding, drinking and walking and crossing dirt roads and the N8. Among the new cats the female “Nele” has habituated the best so far. All the other cats were still rather shy, but with continued tracking will allow better behavioural observations will become better approachable via vehicle.

Unfortunately the young adult male “Epo” was found dead after Martina’s return to TBP on 31.1.15. He likely died around 20 January 2015. His carcass was dismembered and chewed and his destroyed skeleton was only 50 m from a water trough on Eselsfontein. His carcass was moved by a scavenger or predator, but the collar had not been chewed.

Over the past 2 months Martina has tracked the 4 remaining cats (3 on NJF & TBP and 1 on BFN) and the cats have habituated more to the tracking vehicle. She has been able to record several prey captures, including the capture of a blue korhaan (*Eupodotis caerulea*) by “Nele”. She has also witnessed an aggressive meeting between “Bama” and “Faf” on BFN in 2014. Unfortunately almost all the cats leave the study farms at some point and thus permission must be sought with the adjacent land owners in advance to get periodical visual observations of them and to check on their condition. We hope that we can establish good relations with these neighbouring land owners, to explain that it is highly desired to record the full size of the used home ranges of these trespassing cats.

Reproduction: We recorded a ~3 week old kitten in a hollow termite mound on 20 November 2014, one day after capturing its mother “Nele”. The other adult females (“Hasi”, “Ilse” and “Faf”) didn’t seem to care for kittens during the monitoring period according to Martina Küsters. “Ilse” was probably too old for a viable pregnancy. It is hoped that Martina will record kittens by the females “Nele” and “Sani”, once veld conditions have improved after the summer rainfall in 2015. So far there has been very little rain on NWJ and TBP (status Feb 2015)

Camera Trapping: Alex Sliwa and Martina Küsters deployed 2 digital camera traps (Bushnell Trophy Cam HD, Reconyx Hyperfire HC600) after every release of the captured cats in their subterranean dens. The cameras recorded the exact time of their leaving their release dens. Some videos and pictures of the various cats, leaving their dens after waking from anaesthesia are available on www.black-footed-cat.wild-cat.org.

Outreach and social media coverage of BFCs and the BFCWG: throughout 2014 most members of the BFCWG have spread the information on the species, have given interviews and presentations about our joint research. Scientific tourists and interested laypersons were provided the opportunity to join on tracking sessions of the radio-collared bfcs at both sites. Most notable, and for the first time ever, our annual field trip in November 2014 was followed on social media by ISEC Canada (International Society for Endangered Cats) as part of a crowd sourcing project! This campaign was meticulously planned and nurtured by Pat Bumstead, officially started on 31 October 2014 and ran for 5 weeks. Despite being hampered by poor cellalur reception (particularly in De Aar) we tried to keep the many generous and interested supporters updated with live blogs from the field that helped raise US\$4 375 for the project. These could be followed on Twitter and Facebook as well as on the following links:

<https://www.indiegogo.com/projects/help-save-africa-s-smallest-wild-cat;>

<https://felids.wordpress.com/black-footed-cat-project/>

The campaign ended on 10 December 2014 and the funds generated from this effort together with additional funding raised by ISEC came to an incredible total of \$20,500 CAD!

Discussion and Conclusions:

Valuable data on censusing and catching black-footed cats have been collected again on this trip of the BFCWG on BFN, where the species was intensively studied between 1992–1998. We captured 1 new cat (during 2.5 nights of spotting there). We attained a slightly higher success rate on NJF and TBP with 3 new cats captured and the daytime exchange of the collars of the males “Stan” and “Zuma” through extracting them from accessible dens.

The sighting frequencies between the 2 established study areas during this trip were similar (see progress reports 2005 to November 2013 – downloadable as PDF files at www.black-footed-cat.wild-cat.org), with NJF and TBP having a slightly higher sighting frequency. Over the years, the detection chance of bfcs was similar between the 2 sites as both have open habitats with good visibility, especially with this year’s still short grass, despite our delayed start due to recent rainfall. During this trip, we couldn’t drive on farm tracks for 3 nights on NJW and TBP and half a night on BFN we had to stop and another night had to start only later, due to rain or thunder storms, which seriously hampered our work.

The jackal density on BFN was the same (low) as during the November 2013 trip, seeing only 2. We saw just one subadult jackal on NJF and TBP, while two caracals in one night there. We saw no African wildcats, feral/domestic cats this trip.

Due to the short time periods the group spent on both study areas, we were not able to make a reasonable judgement of the population sizes, however there seem to be average population in both sites, as during the past years.

We only caught two of the cats from 2013 again (“Stan” and “Zuma”) and there was anticipated dispersal (“Ego”) and mortality (“Epo”) of young adult males. In contrast there was alarmingly high mortality or disappearance (>50%) of adults (“Hasi”, “Faf”, “Ilse”, “Kubu”, “Bama”) in the year 2014. The deaths and disappearance of all these individuals were frustrating for us, as often no clear cause of death could be determined, as all remains were not found within an easily determinable time period. Some cats were infrequently monitored, while others died when the field worker Martina Küsters was away on a break or at the other study area. The small bodies are quickly desiccated or decomposed by the climate and in two cases only the collars, chewed or unmarked, with a few hairs were found. Not a single carcass was found fresh enough for a necropsy to be performed. The mortalities can thus be due to disease, old age, but also direct predation on healthy adults by black-backed jackals.

For 2014 we have only a record of a single kitten bred on NJF (“Nele’s” on 20th November), which probably disappeared in late November already (M. Küsters, pers. comm.).

The waypoints collected during the latest capture field trip don’t allow for a meaningful comparison of estimated home range sizes with those of past field trips. Home range size development, especially for new animals collared, is highly dependent on the number of locations collected over a minimum of several months for each individual cat and on its reproductive cycle in this period (Molteno *et al.* 1998; Sliwa 2004; Sliwa *et al.* 2010). Fortunately, Martina Küsters was able to collect over 1 000 waypoints for all the cats combined and, particularly, the two surviving males “Stan” and “Zuma” were intensively tracked for an entire year (Maps 2 & 3; Table 1). Also, the deceased male “Kubu” was intensively

tracked (Map 1, Table 1). His frequent drinking of water from troughs may have indicated AA-Amyloidosis (“kidney-disease”) as a precursor to his death which has been recorded previously from bfcs on BFN (Terio et al 2008, Zimmerman et al, 2011). Kubu’s careful crossing of the national road N8 at 2300 on 1 May was photographed by Alex Sliwa and Martina Küsters and it was evident that he picked a period of ~20 minutes when there was no traffic on this busy road. All three males were resident; were observed urine spraying and used exceptionally large home ranges in 2014 (47-55 km², MCP100) compared to previously recorded resident male home ranges on BFN (average 20.7 km², range 15.7-24.3 km², n=5, Sliwa 2004), while “Bama” seems to have moved across to “Susanna” Farm and was thus lost to our monitoring. The movement pattern of adult female “Hasi” was the most surprising. It is the first time that an adult female has shifted her home range so substantially, a remarkable 19 km straight line. It is up to speculation what precipitated this marked shifting of home range location, while she was killed at this new location a few weeks later. Sliwa (2004) only recorded minimal shifts in home range centres from one year to the other on BFN.

Altogether the trip was successful, with the capture rate averaging similar to previous field trips. We continued with our decision to radio-collar any captured bfcs heavy 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). Martina Küsters, Sterrie Marais and Piet Marais will be able to listen to radio signal frequencies and collect more location fixes and on a regular basis for each of the 4 radio-collared cats on NJF, TBP and BFN in 2015.

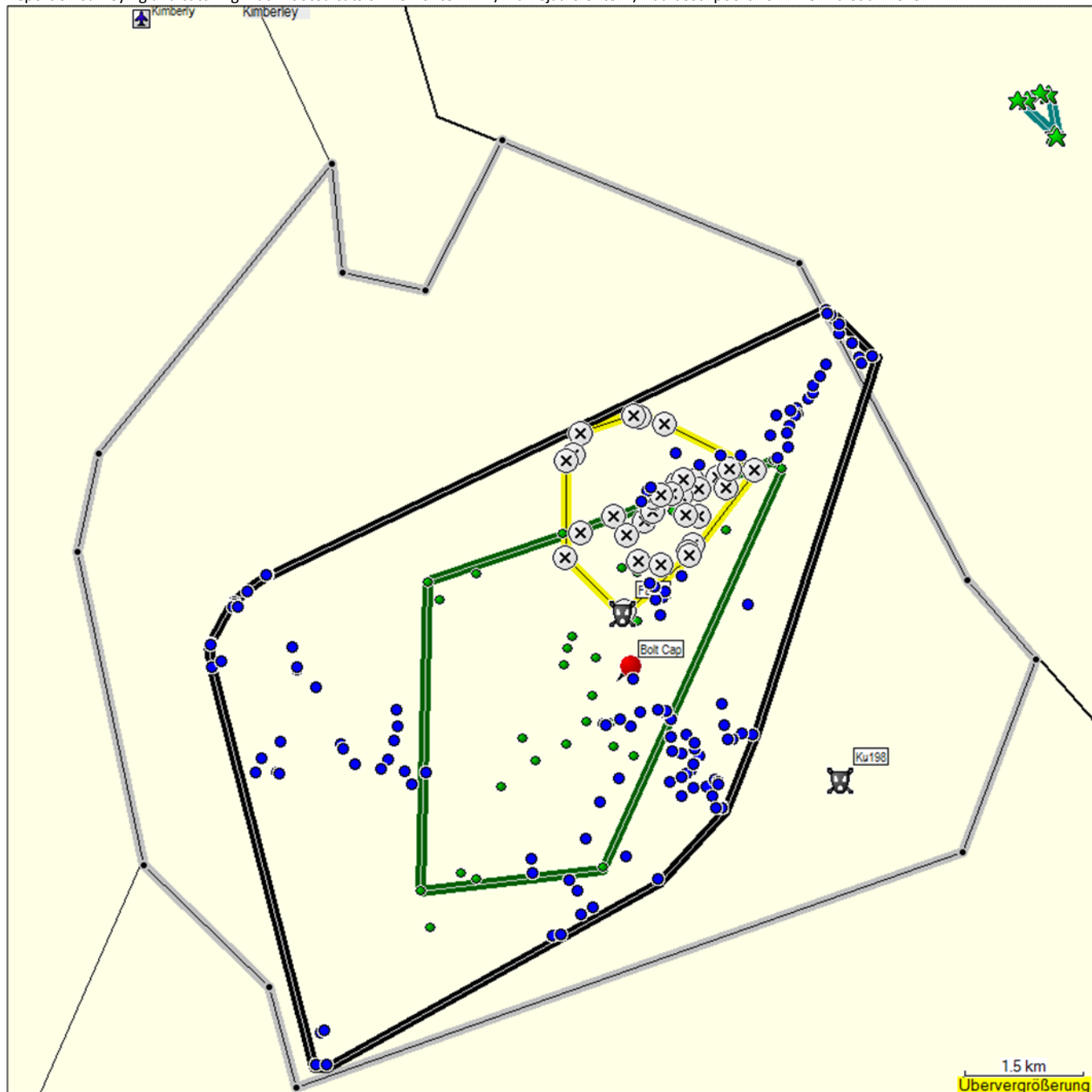
We will return to BFN, NJF and TBP for further capturing and sampling of wild black-footed cats in late 2015.

Acknowledgements: We thank Sterrie Marais, his wife Ilse and son Pieter for their continued support of this capture trip to Nuwejaarsfontein and Taaiboschpoort. Not only did Sterrie and Pieter drive and man spotlamps on the Toyota Landcruiser every night, but they also helped with the capture of 3 cats. In addition they covered all the running costs of this vehicle and provided the use of their equipment. We are especially indebted for their provision of our beautiful, tranquil and comfortable lodging at Taaiboschpoort entirely for free, again. Likewise, we thank De Beers Consolidated Mines and the Diamond Route for permission to work on Benfontein NR and the use of the research house and the hanging lodge for accommodation. Ecology Division of De Beers gave us permission for the sampling, and supported us in employing the pursuit method. Funds for fieldwork came from Cologne (Kölner) Zoo; Zoo-Verein Wuppertal e. V. (friends of Wuppertal Zoo, R. Stock & B. Stock); Tierarztpraxis Dr. Lore Marholdt; Christine Ritzen and K. Stellmacher (all Germany); SOS Félines & Co. Nesles (Paris, France); Zoological Association of America (ZAA), Punta Gorda FL, USA; EFBC Feline Conservation Center AAZK, Rosamond CA, USA; Fresno Chaffee Zoo, Fresno, CA, USA; Omaha’s Henry Doorly Zoo & Aquarium, Omaha, NE, USA; San Antonio Zoo and Aquarium, San Antonio, TX, USA; Cincinnati Zoo and Botanical Garden, Cincinnati, OH, USA. The International Society of Endangered Cats (ISEC) - Canada Branch, gave generous funds for radio-collars and vehicle running costs and ran the incredibly successful crowdsourcing campaign with our goal for a new field vehicle should our old one stop working! Martina Küsters’ upkeep and lodging in De Aar was supported by funds donated to Alex Sliwa by Le Parc des Félines / SOS Félines & Co., France; ISEC - Canada Branch and Zoological Association of America (ZAA). Further generous funding was also received from a private donor, Mr Ralph Christie, which supported the running costs and field work in the Kimberley area. We sincerely thank our respective employers for supporting us and granting us leave from our busy work schedules to carry out this field work.

References:

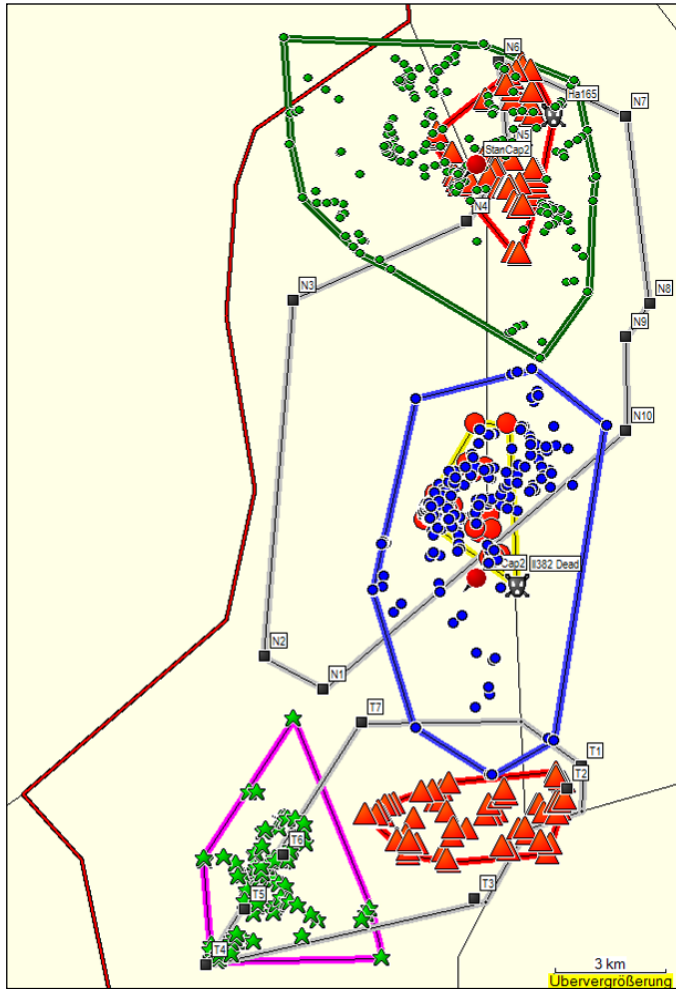
Molteno, A.J., Sliwa, A., & Richardson, P.R.K. 1998. The role of scent marking in a free-ranging, female black-footed cat (*Felis nigripes*). *Journal of Zoology* (London) 245: 35-41.

- Sliwa, A. 2004. Home range size and social organisation of black-footed cats (*Felis nigripes*). *Mammalian Biology* 69: 96-107.
- Sliwa, A. 2006. Seasonal and sex-specific prey composition of black-footed cats (*Felis nigripes*). *Acta Theriologica* 51: 195-204.
- Sliwa, A., Herbst, M., Mills M. 2010. Black-footed cats (*Felis nigripes*) and African wild cats (*Felis silvestris*): a comparison of two small felids from South African arid lands. Case study 26, p.537-558 in *The Biology and Conservation of Wild Felids* Oxford University Press, Editors. Macdonald, D. & Loveridge, A. pp. 736.
- Terio, K.A., O'Brien, T., Lamberski, N., Famula, T.R., & MUNSON, L. 2008. Amyloidosis in black-footed cats (*Felis nigripes*). *Vet Pathol* 45(3):393-400.
- Zimmermann, P.A., Lawrenz, A. & Sliwa, A. (2011) Untersuchungen zu Amyloidose und Akute-Phase-Proteinen bei Schwarzfußkatzen (*Felis nigripes*). *Tierärztl. Umschau* 66, 364 – 368 (2011). In German with English abstract.



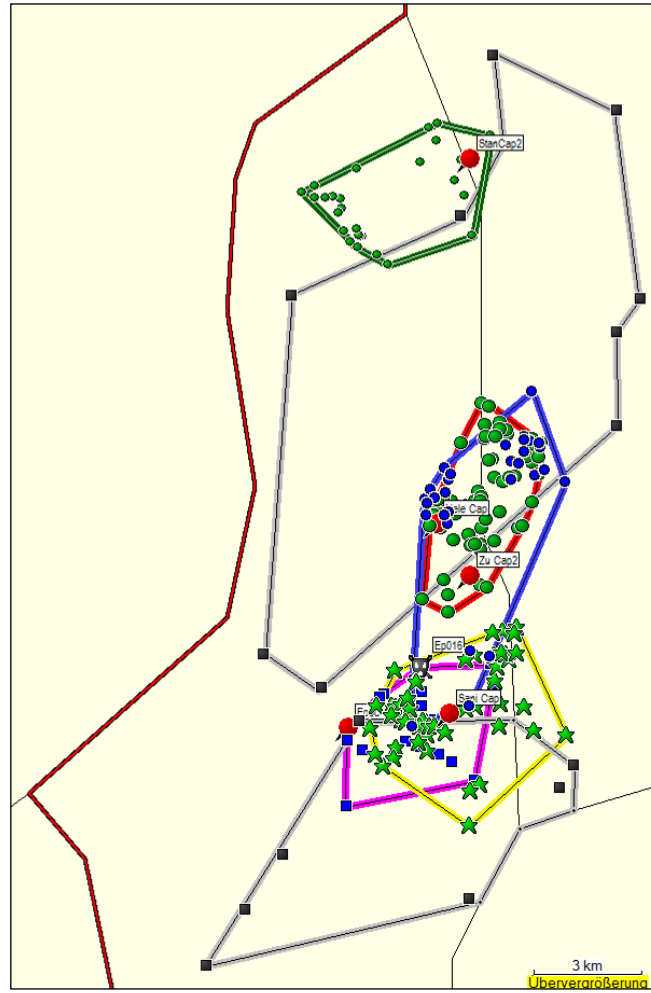
Map 1: GPS map of Benfontein NR (boundary = grey polygon), with minimum convex polygons (100% MCP) encompassing the locations of the 4 radio-collared cats collected during the year 2014. N = number of waypoint recorded.

- Female “Faf” = 3,8 km² (n=36) in yellow polygon, crosses in circles; last seen 10.4.14, carcass found (skull sign in central part) on 22.4.14 – **predated** by jackals.
- Male “Bama” = 0,1 km² (n=7) in turquoise polygon, green stars; last seen on neighbouring farm Susana on 6.2.14. Has moved off and thus **missing**.
- Male “Kubu” = 47,0 km² (n=135) in black polygon, blue dots. Moved over most of Benfontein, body found 1.11.14 (skull sign) in SE part, 1.3 km from closest other location; was drinking from water points frequently, thus suspected kidney disease, carcass chewed by jackals – suspected **predation/disease**.
- One new cat collared in November 2014: Male “Bolt” = 15.1 km² (n=32) in green polygon, green dots. Good condition, fast runner = nicknamed after Usain Bolt. Is roaming range of deceased male “Kubu”. Red beacon shows his capture location.



Map 2: GPS map of Nuwejaarsfontein (NJF) and Taaiboschpoort (TBP) farms (boundaries = grey polygons), with minimum convex polygons (100% MCP) encompassing the locations of 5 radio-collared cats intensively monitored between **January – October 2014**.

- Female “Ilse” in yellow polygon, red circles (6.8 km²; n=28), died of old age, carcass found (skull sign) on 4.5.14.
- Female “Hasi” with two red polygons, red triangles (southern TBP 9.7 km², n= 64, between January and 12.5.14 and then she moved 19 km north to NJF 8.1 km², n=74, between 25.5. - 6.6.14), was found dead (Skull sign) on 11.8.14.
- Male “Ego” in magenta polygon, green stars (20.1 km², n= 92). Contact was lost when moved SW after 25.5.14.
- Male “Zuma” in blue polygon, blue dots (51.8 km², n=234).
- Male “Stan” in green polygon, green dots (54.8 km², n=232).



Map 3: GPS maps of NJF and TBP farms (boundaries = grey polygons), with minimum convex polygons (100%MCP) encompassing the locations of 5 radio-collared cats collected during the field period **November-December 2014**. Red beacons show capture locations of all 5 black-footed cats.

- Female “Sani” in yellow polygon, green stars (18,7 km², n=52)
- Female “Nele” in red, green dots (11.6 km²; n=79)
- Male, young, “Epic” magenta , blue squares (11.9 km², n=18) – skull sign shows location where he was found dead on 31.1.2015 (**disease?**)
- Male “Stan” green polygon, small green dots (12.6 km², n=29)
- Male “Zuma” blue, blue dots (21.9 km², n=32).

November 2014 Nuwejaarsfontein & Taaiboschpoort Farms



Fig. 1: Capture vehicle with team @ night".
(B. Wilson)



Fig. 2: Team with "Stan".
(B. Wilson, self-release picture)

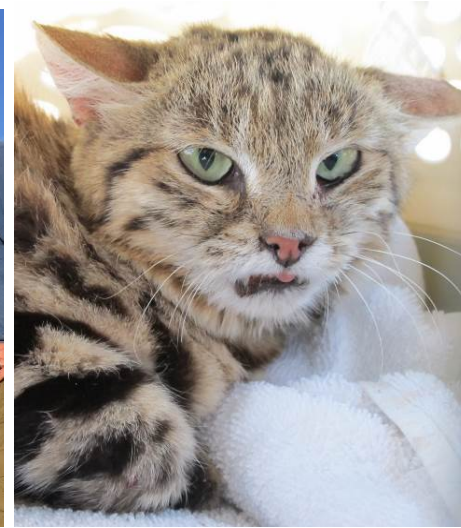


Fig. 3: Waking up in a bad mood, "Stan".
(A. Sliwa)



Fig. 4 Martina & Julian cover "Nele".
(A. Sliwa)



Fig. 5: Team with "Sani" (B. Wilson, self-release picture).



Fig. 6: Jason working on "Epic" (A. Sliwa).



Fig. 7: Working by the side of the road
(A. Sliwa)



Fig. 8: "Zuma" eating a gerbil.
(A. Lawrenz)

November 2014 Benfontein Nature Reserve



Fig. 9. Thunderstorm – dramatic, but made us wait (A. Sliwa).



Fig. 10: Old men (Arne & Alex) shouldn't climb fences – time for healing wounds. (A. Sliwa).



Fig. 11. Adrian and Takalani documenting "Bolt". (A. Sliwa).



Fig. 12. Alex finding "Bolt" in his den (A. Lawrenz).



Fig. 13: Arne and Alex releasing "Bolt". (J.Kusak).



Fig. 14: "Bolt" leaving his den. (A.Sliwa).



Fig. 15: "Kubu" about to cross N8 on 1st May 2014. (A.Sliwa).



Fig. 16: "Kubu" drinking at Nine Tanks in August 2014. (M.Küsters).

Black-footed Cats tracked in 2014

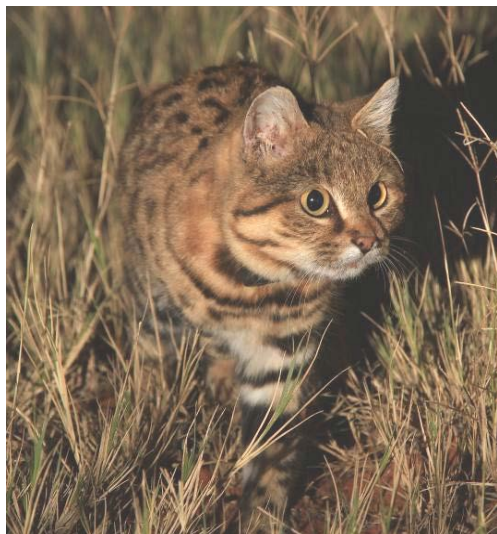


Fig. 17: "Kubu" stalking on Benfontein (A.Sliwa)

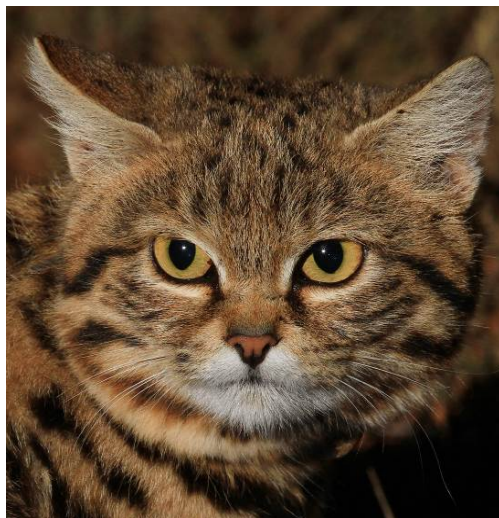


Fig. 18: "Ego" left TBP in June 2014 (A.Sliwa)



Fig. 19: "Hasi" shifted her home range and died in June 2014 (A.Sliwa)



Fig. 20: "Stan" in May 2014 with wound on left side of nose – it later healed (A.Sliwa)



Fig. 21: "Nele" leaving her den (M. Küsters)



Fig. 22: "Nele's kitten, ~ 3 weeks old in hollow termite mound (A.Sliwa)



Fig. 23: "Nele" moving her kitten (camera trap picture: A. Sliwa & M.Küsters)



Fig. 24: "Sani" leaving her den in t.-mound (camera trap picture: A. Sliwa & M.Küsters)

Table. 1: Body measurements (cm), range size and remarks on 12 black-footed cats with 6 captures on Benfontein, Nuwejaarsfontein and Taaiboschpoort in 2014.

Capture Date	13.11.14	15.11.14	18.11.14	20.11.14	20.11.14	24.11.14	<i>not captured</i>	<i>not captured</i>	<i>not captured</i>	<i>not captured</i>	<i>not captured</i>	<i>not captured</i>
Name (also on Map)	Stan	Zuma	Nele	Sani	Epoc	Bolt	Faf	Kubu	Bama	Ilse	Hasi	Ego
No. captured	Cat 1 13	Cat 2 14	Cat 3 14	Cat 4 14	Cat 5 14	Cat 6 14	Cat 8 13	Cat 9 13	Cat 1 13	Cat 6 13	Cat 4 13	Cat 5 13
Sex	M	M	F	F	M	M	F	M	M	F	F	M
Age (judged by teeth)	Adult	Adult	Adult	Adult	Y Ad	Adult	Adult	Adult	Adult	Adult	Adult	Y Adult
Microchip #.	6CBBEBA	6CB9581	0006CB8BE6	0006C67601	0006B3770D	0006FB1FOC	6CBB8B1	6FB9662	6CAC2B8	6895136	6CBAE75	6B374ED
Mass (kg)	1,25	1,99	1,30	1,28	1,43	2,05						
Ear (cm)	4,9	5,2	4,2	5,0	5,4	5,1						
Shoulder (cm)	24	25	24	24	26	26						
Total Length (cm)	59	61	57	56	60	63						
Hind foot (cm)	9,0	9,1	8,8	8,6	9,0	9,6						
Front foot (cm)	2,06 x 2,08	2,5 x 2,0	1,8 x 1,7	1,8 x 1,7	1,9 x 2,1	2,4 x 2,2						
Tail (cm)	17	17	17	16	17	19						
Neck (cm)	11,5	14	11	11	12	14						
Canine UR (cm)	1,10	1,00	-	0,93	0,98	0,95						
Canine LR (cm)	0,80	-	-	0,74	0,84	0,83						
Canine UL (cm)	1,00	1,05	0,86	0,88	1,00	0,94						
Canine LL (cm)	0,85	-	0,76	0,70	0,84	0,80						
Testes (cm)/nipples	small	average	in use	Used before	small	2,0 x 1,2 large						
No. fixes collected in 2014	232	234	79	52	18	32	36	135	7	28	64 +74 = 138	92
Range (100%MCP) in 2014	54,8 km ²	51,8 km ²	11,6 km ²	18,7 km ²	11,9 km ²	15,1 km ²	3,8 km ²	47,0 km ²	0,1 km ²	6,8 km ²	9,7 + 8,1 km ²	20,1 km ²

All fixes collected in 2014, N=1083: Alex Sliwa / Arne Lawrenz / Julian Kusak / Martina Küsters in November 2014 (N=73) and by Martina Küsters alone (N=1010).

Remarks:

- 1) Stan (Cat 1 14): NJF adult male, very thin and scruffy looking, little fat. Caught and re-collared in Northernmost NJF. Has frequented an area on lease to Marais family north and west of NJF
- 2) Zuma (Cat 2 14): NJF, adult male, ~ 3 yrs old, even better condition than in 2013. Boldly marked. Grown more muscular and is spray marking. Moves also on TBP and Eselsfontein in between.
- 3) Nele (Cat 3 14): NJF, newly capture adult female, good condition, lactating. Found her ~ 3 week old kitten in hollow termitarium; frequents an area which was formerly occupied by old female "Ilse".
- 4) Sani (Cat 4 14): TBP, newly captured adult female, good condition, also frequents part of Eselsfontein. Still skittish.
- 5) Epoc (Cat 5 14): TBP, young adult male, only tracked for a few weeks. Found dead on 31.1.15; chewed carcass ~ 10 days old, only 50m from a water point, suspected disease or predation? **DEAD**
- 6) Bolt (Cat 6 14): BFN, adult male, very good condition, very fit – ran fast and far. Roams a large part of BFN, probably moved in after death of male "Kubu".
- 7) Faf (Cat 8 13): BFN, ~3 years old, adult female, tracked only a few months, collar found chewed close to jackal activity on 22.4.14, predation? **DEAD**
- 8) Kubu (Cat 9 13): BFN, adult male, excellent body condition, roamed large part of BFN, visited neighbouring Farm Susana, chewed carcass found on 1.11.14, jackal predation or weakened by disease? **DEAD**
- 9) Bama (Cat 1 13): BFN, adult male, fair condition. Last found 6.2.15 on neighbouring Farm Susana, Not found since. Moved off or dead. **MISSING or DEAD**
- 10) Ilse (Cat 6 13): NJF > 7 years old adult female, collared since Feb 2009, tracked for over 5 years. Carcass found with collar untouched on 4.5.14! Died of old age. **DEAD**
- 11) Hasi (Cat 4 13): TBP (later NJF), adult female, tracked until 12.5.14 on TBP, found 2 weeks later 19 km north on NJF, tracked until 6.6.14; collar and hair without carcass found on 11.8.14. **DEAD**
- 12) Ego (Cat 5 13): TBP, young adult male, tracked in south-western part of TBP, until 25.5.14, moved increasingly south west, across to next door farm until contact was lost. **MISSING or DEAD**