2017 Annual Progress Report

Reporting Period

January-December 2017

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I. Executive Summary

This year we saw the culmination of a huge undertaking with the publication of the most complete book on cheetahs. *Cheetahs: Biology and Conservation* was published by Elsevier in November as part of the series *Biodiversity of the World*. The book that I co-edited with Lorraine Boast and Anne Schmidt-Küntzel brings together over 150 of the world's leading experts in all aspects relevant to cheetah, from its history, evolution and genetics, to threats, challenges, captivity, conservation strategies and solutions.

On the cheetah re-wildling front, we continue to learn from our research. In March, we released a 3-male coalition into the Erindi Private Game Reserve, and although one of them failed to succeed, the other two are doing very well. We were also excited to see a third generation of one of our re-wilded cheetahs, Jacomina, as one of her daughters, Savanna, gave birth to two cubs in November at Erindi.

Our work in the Eastern Communal Area of the Greater Waterberg Conservancy continues to provide important insights into human-wildlife conflict. We have collected important data that will allow us to design programmes to help farmers reduce losses to predators, and thus reduce their systematic killing.

A new scat detection dog, Levi, arrived at CCF in July. Levi came with his trainer, Quentin DeJager from Paramount K9 in South Africa. Our Livestock Guarding Dog staff was quite busy caring for 58 puppies throughout the year. Many of these puppies are already learning to protect livestock on Namibian farms, including CCF's Model Farm, where over 400 goats and sheep continue to play an important role in demonstrating the importance of an integrated approach to livestock farming. CCF's Dancing Goat Creamery products, made of milk from our dairy goat herd, yielded a robust 64% this year. Bushblok production continued at our factory in Otjiwarongo, and we expect to move it to CCF's Biomass Technology Demonstration Centre upon completion in 2018.

Eco-tourism is a growing industry in Namibia, and the number of day and overnight visitors to CCF continues to grow. In June, we proudly inaugurated CCF's new lodge, Cheetah View, which offers five bedrooms for the mid-priced tourist. In just six months, nearly 1,000 bed nights were booked at the Lodge. Similarly, the number of Namibian and international students and youth participating in education programmes at our Centre continues to grow, having exceeded 2,000 this year.

2017 was a difficult year for our Illegal Wildlife Trade team, as nine cheetah cubs confiscated in Somaliland sadly succumbed to a suspected virus, despite all efforts. Sadly, this is not unusual with cheetahs taken from the wild at a very young age. Three more cheetahs, one of which suffers of Metabolic Bone Disease as the result of poor nutrition, are under our care in the capital, Hargeisa. We continue to work with national and international partners to find solutions to the trafficking of cheetahs in the Horn of Africa region.

The ability to fund our programmes is always a priority, and my tours are an important element of our fundraising efforts. This year my Spring and Fall tours allowed me to reach more than 4,000 people in the US thanks to the efforts of our CCF USA staff and volunteer chapters. I also had the honour to join

CCF's International Royal Patron, HRH Princess Michael of Kent, for an event in the UK. The Princess had visited us in Namibia earlier in the year to learn more about our work.

As we close 2017, everyone at CCF is busy, especially with the organisation of the Pathways Africa conference and training, which we will be hosting in Namibia in partnership with Colorado State University, the Large Carnivore Management Association of Namibia (LCMAN) and the Namibian Nature Foundation (NNF). We look forward to welcoming over 200 scientists and practitioners at this major international conference on the Human Dimensions in Wildlife Management.

"I personally believe that the cheetah can be saved and conserved even in the face of its skirmishes with extinction in its past," wrote our Chairman Emeritus, Dr Stephen O'Brien on the foreword of our new book, *Cheetahs*. Like Steve, I believe that the amazing cheetah, having overcome so many challenges through its thousands of years of existence, must not be lost to future generations, or more importantly, to the habitats it occupies. This is why the work of CCF is so important. Seeing a cheetah in the wild is a breath-taking sight, but more importantly, the role it plays in its eco-system is one that cannot be replaced by any other animal. Thank you for joining us in this fight; a fight for the survival of Africa's most endangered big cat.

Laurie Marker, DPhil.

Founder and Executive Director

II. Organisational Structure

The Cheetah Conservation Fund (CCF) is an international organisation with registered not-for-profit organisations in Namibia, the United States, Canada, the United Kingdom, Australia and the newly formed CCF Italy. A new CCF foundation is being incorporated in China. In addition, CCF has Memoranda of Understanding with partner fundraising organisations in the Netherlands, France, and Germany.

CCF's International Research and Education Centre in Namibia is the primary base for all of CCF's global activities. In 1991 CCF became a Namibian Voluntary Trust and in 2002 was registered as a not-for-profit Namibian Section 21 Company. CCF's Namibian Board of Directors is comprised of leaders in the local community, businesses, and agricultural sectors. Additionally, there is an International Scientific Board of Advisors that assists in planning and advising on research projects. CCF's Executive Director, Dr Laurie Marker, is assisted in the management and operations of CCF by a core professional staff aided by short-term volunteers and students who assist with daily operations and data collection.

The CCF Centre includes the farms Elandsvreugde, Osonanga, Boskop (Khayam's Kopje), Cheetah View, Bellebenno, Janhelpman, and Bynadaar, totalling 46,000 hectares. CCF's Centre is located in prime cheetah habitat and a wildlife-friendly area, with many neighbouring farmers who believe in conservation ethics. This ensures a large prey population, which is important for the cheetah population and serves to provide a model for farmers to demonstrate that they can live harmoniously with cheetahs.

CCF is an active member of the Waterberg Conservancy, which encompasses over 175,000 hectares of private farmland surrounding the Waterberg Plateau Park: a national game park dedicated to rare and endangered species. The conservancy's farmers cooperatively manage the land's wildlife for long-term sustainability that in turn provides habitat and prey base for the cheetah. CCF also sits on the Steering Committee of the Greater Waterberg Landscape, an area comprising 16,000 km^2, or close to 2 million hectares, around the Plateau and in Hereroland.

III. Research

During 2017, the Cheetah Conservation Fund continued working towards achieving its research objectives and strengthening collaborative efforts. Research continued in overall health and genetics, ecological surveying, cheetah releases, and ecosystem research.

A. Population Dynamics

As of December 2017, the number of CCF's resident captive cheetahs has decreased to 37 (22M, 15F), compared to 39 (22M, 17F) at the end of 2016.

Throughout 2017, there was one release of three individuals, four deaths, no transfers, and three additions. The four deaths were:

- One male (AJU1518), age 11, died a natural death on 1 April 2017 due to renal failure.
- One female (AJU1206), age 17 years, euthanised on 22 June 2017 due to old age and renal failure.
- One female (AJU1493), age 12 years, euthanised on 4 August 2017 due to old age and renal failure.
- One female (AJU1237), age 17 years, euthanised on 28 August 2017 due to old age and renal failure.

Three cheetahs, one wild caught (1M – AJU1768) and two surrendered pets (1M – AJU1772, 1F – AJU1771), were added to CCF's captive population in 2017. On 9 November 2017 a young male estimated at 1.5 years was trapped on a farm in Omaruru by a farmer who was having livestock loss from predation. There was no option but to remove the male and bring him to CCF. He has now been introduced to a coalition of three releasable males and has bonded well. On the 12 December 2017 MET refused to issue a permit to a private hunting lodge outside of Windhoek with two captive cheetahs. Both cheetahs were habituated and therefore cannot be released into the wild so will remain captive residents at CCF.

B. Medical Examinations

Each cheetah that is evaluated under anaesthesia by CCF, both captive and wild, is assessed for general health and fitness. The examinations follow standard protocols. Male examinations include semen collection; the semen is analysed and sperm stored in the Genome Resource Bank (GRB).

Between 1 January and 31 December 2017 CCF performed a total of 44 exams on 26 individuals (17M, 9F). Of the 24 captive individuals, three were released back into the wild. Of the two cheetahs of wild origin, one has to remain in temporary captivity due to its young age; the other one was released.

1. Health-Related Medical Examinations: Captive Cheetahs

In 2017, CCF performed a total of 15 medical examinations or medical procedures on 11 individual cheetahs (7M, 4F). Details of on-site procedures are provided below in order of ascending AJU numbers. Off-site procedures are listed thereafter.

- Resident female AJU 1206 (Sandy) was declining in health since 25 April 2017. She had a decreased appetite and poor body condition. On 27 April blood was collected without anaesthesia and she was treated with fluids and vitamins. After no improvement over the few next days it was decided to do a full work up under anaesthesia on 3 May 2017. She was treated with antibiotics, Vitamin B Co, and steroids. The results from the blood chemistry test came in a few days later and confirmed end stage renal disease. After lengthy treatment, she was euthanised on 22 June 2017 due to old age and renal failure

- Resident female AJU 1233 (Solo) was noted to be lethargic, depressed and anorexic on 13 March 2017. Fly strike was noted around the base of the tail. She was anesthetised, maggots were removed from the perineal area and tail base. The area was shaved, cleaned and disinfected, and fly repellent was applied. She was further treated with steroid anti-inflammatories, long-acting antibiotic, Vitamin B Co, and anti-parasitics. Upon closer inspection of resident females AJU 1237 (Nina) and AJU 1206 (Sandy), fly strike was also detected and they received the same treatment as AJU 1233 (Solo), but did not require any anaesthesia.

- Resident female AJU 1237 (Nina) collapsed on 24 August 2017. A slow increase in renal values in her blood had been noticed and monitored since 3 July 2017. She had been on and off her food for a while, which improved after initiating treatments with antibiotics, and had green discharge from the nose. Her right front leg had been lame for a while and she was on pain medication for it. A full work up was done on 24 August to check for other issues besides renal failure. X-rays of her front leg showed that bony changes were minimal and it was concluded the lameness must have been due to muscle or nerve damage. Radiographs of her mouth were done as well to check for any dental issues. Her heart was arrhythmic on auscultation. Otherwise no abnormalities were detected. She was euthanised on 28 August 2017 due to old age and renal failure.

- Resident female AJU 1493 (Amani) suddenly stopped eating. A dental problem was suspected, possibly on top of another underlying problem. She was darted with long-acting antibiotic the day prior to the full work up on 22 June 2017. The dentist was called in and performed root canals on multiple pre-molars. Samples were taken and she was treated with fluids and anti-inflammatories. Her blood results indicated early stage renal disease, but she turned out to have cystitis as well.

Follow up treatments included a change in antibiotics and fluid therapy. Her health initially improved but deteriorated again and on 22 July 2017 another full work up and dental were done. Her kidney values (urea and creatinine) had worsened and confirmed end stage renal disease. She was euthanised on 4 August 2017 (see section 6).

- Resident males AJU 1513 (Livingston), AJU 1515 (Fossey), and AJU 1516 (Darwin) were castrated on 12 and 14 September, respectively, so they could join the older females in the same enclosure. Semen was collected beforehand and the testes were processed and stored in liquid nitrogen.

- Resident male AJU 1583 (Phil) had acutely started vomiting, was walking very stiffly with a hunched back and did not eat or drink. There was concern he might have ingested a foreign body and therefore it was decided to do a full work-up on 23 August 2017. Radiographs were taken of his abdomen and no foreign body was found, but blood smears indicated the presence of parasites, which he was treated for. Other treatments were supportive and included fluids, vitamin B, antibiotics, and anti-nausea medication. He recovered after 7 days of daily treatments.

- Resident male AJU 1654 (Merlin) was anesthetised for semen collection and x-rays of his previously fractured left carpus on 20 January 2017. It seemed to be healing well.

Two new cheetahs, AJU 1749 (Koya) and AJU 1750 (Nico), were handed over to CCF by a farmer. They were estimated to be about 7 months old and had resided with the farmer in a chicken coop for about 7 weeks. They both had deformed front legs (valgus). Their work-ups on 12 July 2017 confirmed metabolic bone disease (caused by an improper diet), with x-rays showing alteration of the distal growth plate of the ulna. On 3 August 2017, a follow up x-ray and health check were performed and showed that the bone lesions had significantly improved on a proper diet.

Two new cheetahs, AJU 1771 (Bella) and AJU 1772 (Katiti) arrived at CCF on 12 December 2017. They had been kept at a farm for most of their lives and are now approximately 18 and 8 months old. A work up was done on 21 December 2017 and besides being overweight they seem to be in good health; they were put on a proper diet with calcium supplementation. Their teeth had some tartar/plaque, which was cleaned. All usual samples were taken and they were vaccinated and microchipped.

The CCF team also visited the Kiripotib farm on 21 and 22 of August 2017 to do an annual health check on our cheetahs, AJU 1514 (Kayla), AJU 1517 (Kiana), AJU 1560 (Padme), and AJU 1578 (Bella), who are residing there on loan. They received their annual vaccinations as well.

2. Dental Procedures on CCF's Wild and Captive Cheetahs

In 2017, nine dental procedures were performed on six cheetahs (5M, 1F). For specialist treatments like root canal treatments the local dentist from town was called in.

- Resident male AJU 1473 (Ron) received a dental exam and treatment on 5 August 2017 since he was continuously chattering his teeth. Root canal treatments were done on his right top premolar (P4) and two right bottom premolars (P3, P4). His right top molar (M1) was extracted.

- Resident female AJU 1493 (Amani) was anesthetised on 22 June 2017 for a full medical and dental work up. She received root canal treatments on the right upper canine, the left upper large premolar (P4) and molar (M1). Dental follow-ups were done on 10 and 22 July 2017. On the last

occasion the premolar and molar were removed, since the root canal had proven to be insufficient to remove the infection.

- Resident male AJU 1515 (Fossey) of the 'Scientists' coalition seemed to be eating with some difficulty and it was decided that all 'Scientists' (AJU 1513 and AJU 1516) should be scheduled for a dental exam since their last check-up was in 2013, when they all needed quite extensive dental treatments because of their worn teeth after being housed off-site. On 15 July 2017 Fossey received a root canal treatment on all four canines. Since a semen collection was also done that day it was decided to continue the dental treatment the next week due to the anaesthesia becoming too long. On 22 July 2017 a root canal treatment on two right top premolars (P3, P4) was performed and the remaining lower incisors (4) were extracted.

- Resident male AJU 1513 (Livingstone) of the 'Scientists' coalition received a dental exam on 5 August 2017. Root canal treatments were performed on the right top canine and a top right incisor (I3), and the right bottom molar (M1) and left bottom premolar (M3) were extracted.

- A dental exam on resident male AJU 1516 (Darwin) of the 'Scientists' coalition was done on 22 July 2017. A repeat root canal was performed on the lower right canine, and two upper left premolars (P3, P4) also received a root canal treatment.

- Wild male AJU 1748 had two chipped canines (right top and right bottom), with exposed roots. Both teeth received a root canal treatment. The teeth were still long enough for him to be able to hunt and eat.

3. Released Cheetah Examinations

In 2017, no exams were conducted by CCF on any of their released cheetah.

4. Wild Cheetah Examinations

In 2017 CCF performed two exams on wild cheetahs:

- On 9 July 2017 a work up was done on a male wild cheetah, AJU 1748. He proved to be healthy but had chipped off pieces of two canines, presumably a capture cage injury. He was collared and released at the end of July.

- On 14 November 2017 an exam was done on a wild male cheetah, AJU 1768. He was very young but in good health and will be slowly introduced to other resident males that are slated for a future release.

5. Deaths, Euthanasia, and Necropsies

In 2017, CCF performed six necropsies. Three resident cheetahs (AJU 1206, 1237, 1493) were euthanised, one resident cheetah (AJU 1518) died, one male cheetah on loan at Okutala died (AJU 1461) and one released cheetah (AJU 1616). The remains of another cheetah were brought to CCF from another location (AJU 1771) but a necropsy was not possible. At each necropsy, samples are

taken for histopathology assessment and genetic research, and skin and bones are preserved unless this is not possible due to missing parts or extremely advanced state of decomposition.

- Resident female AJU 1206 (Sandy) was euthanised on 22 June 2017 due to pre-existing renal failure and deteriorated quality of life. She had allowed the CCF veterinary team to give her extensive supportive treatment including daily fluids, Vitamin B Co, anti-nausea medication, and stomach acid suppressants. Blood had been drawn regularly and the kidney values did not improve. The necropsy showed very small kidneys, with severe discoloration of cortex and pelvis and white fibrotic deposits in the pelvis. The renal failure is most likely caused by amyloidosis, which can only be confirmed by histopathology. The bladder wall was also very swollen, so she may have had a recurring cystitis.

- Resident female AJU 1237 (Nina) was euthanised on 28 August 2017. She had been monitored for a while by drawing blood from her in a crush cage and her renal values were slowly going up. After the work-up she never recovered and her health suddenly deteriorated quickly. She could barely walk and was very ataxic. Her renal values had increased considerably. The kidneys were very pale on the necropsy and the bladder wall was thickened. Her heart seemed abnormally flaccid and enlarged, suggestive of dilative cardio myopathy (DCM), which needs to be confirmed on histopathology. This would explain the pulmonary and systemic hypertension and could have possibly caused thrombosis.

- One male cheetah on loan to Okutala, AJU 1461 (D'Artagnan), died on 23 September 2017. He had been showing neurological signs for a couple of days. His body is currently kept in the freezer at Okutala private lodge, but will be transferred to CCF for a necropsy.

- Resident female AJU 1493 (Amani) was euthanised on 4 August 2017 due to renal failure. When she stopped eating for 36 hours despite treatment it was decided to euthanise her. The necropsy showed small and lumpy kidneys. She had only one ovary, which was stored in liquid nitrogen. She had large maggots in her sinuses, which must have been there over 24 hours.

- Resident male AJU 1518 (Mendel) died on 01 April 2017. He had been diagnosed with renal failure and his condition had been deteriorating. He had been receiving supportive treatment as often as he would allow it. The necropsy showed that his body fat stores were depleted. The lungs were collapsed indicating possible pneumonia. The kidneys were small, with a thin hardened cortex, fitting with chronic kidney disease.

- Released cheetah AJU 1616 (Donner) was found dead on 9 June 2017. He was kept in the freezer and brought to CCF later and the necropsy was done on the 25 July 2017. The abdomen and abdominal and thoracal organs were missing, so was all soft tissue in the groin and perineal area. His body condition score was good. An atlanto-axial dislocation was found, which supports the suspicion that a leopard had killed him.

- On 12 December 2017 a wild cheetah, AJU 1771, was found dead on a farm in Damaraland. The farmer brought the remains to CCF. It was assumed that the cheetah died of natural causes from starvation, as the cheetah had been seen often around the Twyfelfontein lodge and was not seen with its mother, but another sibling, which was reported to have died a week later, but no samples were retrieved. Unfortunately, a lot of body parts were missing on AJU 1771, as the cheetah had already been put into a fire, so the remains received at CCF were scorched. The only parts

received were a partial right front leg (right front scapula, humerus, and parts of the radius and ulna), part of the skull and mandible, part of the spine and ribs with some muscle and connective tissue. Only samples for genetics were taken, however the state of the tissue did not allow us to obtain any results.

6. Non-cheetah Carnivore Examinations and Necropsies

In 2017, three exams and three necropsies were performed on non-cheetah carnivores.

CCF received two groups of African wild dogs from the MET: two (2M) on 19 June 2017 and seven (4M,3F) on 10 August 2017. A necropsy and two work ups were performed on three of these wild dogs in 2017:

- On 10 September 2017 one of the pups from the 10 August group (Orange) was euthanised due to deterioration of his health despite supportive medical treatment; the pup showed a development of neurological symptoms fitting with canine distemper. The head was sent to the state vet to exclude rabies, and the results came back negative. A necropsy was performed on the remains. The lungs were congested and partially collapsed. The animal had small bleedings in the small intestine and oedema in the kidneys. Swabs and blood were taken and the tests were positive confirming canine distemper virus.

- On 27 October 2017 a work up was done on the two African wild dogs (Zebralegs and White collar) that arrived on 19 June. All samples usually taken during a work up were taken including blood samples, weights and measurements and samples for genetics. They were moved to a new, bigger enclosure with underground concrete to prevent them digging out.

CCF performed an annual examination as well as a necropsy on the lions of a neighbouring farm, Aloegrove:

- On 1 August 2017 the over 20-year-old captive lioness was euthanised as she had not been eating for several days and was urinating blood. Genetic samples were collected on site and a full necropsy was performed at CCF. The kidneys were small with an irregular surface and shape with some nodules on it. The bladder was full of bloody urine and had a thickened wall indicating a bladder infection. The lungs were full of nodules and pus indicating pneumonia, possibly combined with cancer. Blood was sent and confirmed the diagnosis of chronic renal failure.

- On 19 August 2017 an annual examination was done on a lioness. She was anaesthetised, vaccinated, and tested negative for FIV and FELV.

On 30 September 2017, a necropsy was performed at CCF on a leopard (PPA 079) that was captured and shot by farmer two days earlier. The animal had been caught in a gin-trap and was reported to have been shot and to be suffering. It was advised to put the animal out of its misery and the leopard was shot dead with MET's approval. The CCF veterinary team found three minor shot wounds and two lethal shots to the face that had shattered the palate. The stomach of the leopard was empty and his teeth were worn, which indicated this was probably an older animal that was not able to hunt efficiently anymore and was therefore around the farmstead and livestock. The farmer was educated on the danger of the use of gin-traps to both animals and people.

C. Health and Reproduction

1. Genome Resource Bank

Since 2002 CCF has been collecting, evaluating, and freezing cheetah sperm. The CCF GRB contains a total of 632 cryo-preserved sperm samples from captive and wild cheetahs in Namibia, representing 111 individual cheetahs. Between January and December 2017, 18 samples were added to the CCF GRB, as CCF conducted work ups on 14 resident cheetahs and collected sperm, serum, plasma, white and red blood cells on each.

To date 171 Namibian cheetah blood/tissue samples have been processed, of which 8 were processed in 2017. Twenty-six international cheetah blood/tissue samples have been processed. Of these, 16 were processed in 2017.

A total of 555 scat samples from Namibia have been processed, and approximately 100 of these samples were processed in 2017. International scat samples processed total 336 with 106 having been processed in 2017.

CCF continues to bank sperm, serum, plasma, white and red blood cells, hair, and skin samples on all cheetahs worked up. Additionally, an increasingly extensive scat sample collection from wild cheetahs in Namibia and neighbouring countries is kept at CCF. All samples are part of CCF's Genome Resource Bank (GRB). Since 1991, blood and tissue samples have been obtained from over 900 individual cheetahs. These samples are used for over-all health and genetic purposes, with backups stored at both CCF Namibia and some at the Smithsonian Institution in the USA. With the creation of CCF's genetics laboratory, most samples are now held at CCF. Currently CCF holds the world's largest wild cheetah database of biological material, which also creates the need to curate all the samples and the development of database management systems.

D. Conservation Genetics

1. Life Technologies Conservation Genetics Laboratory

The Life Technologies Conservation Genetics Laboratory (formerly known as the Applied Biosystems Genetic Conservation Laboratory) was set up in 2008/2009 by Dr Anne Schmidt-Küntzel for CCF, thanks to the generous support of Life Technologies Inc. (formerly Applied Biosystems, today Thermo Fisher Scientific) and the Ohrstrom Foundation. Since then, the most important addition to the CCF genetics laboratory was the donation and installation of a refurbished 4-capillary genetic analyser in July 2014 by Thermo Fisher Scientific. The new instrument has greatly increased the capacity of the laboratory. In 2015 the genetics laboratory moved to the new Visitor Centre. This laboratory was designed with forensic laboratory standards and is larger in order to be able to host visiting scientists and university interns.

The laboratory's main aim is to contribute to the on-going research and conservation of cheetahs by working together with the ecology and biomedical departments in CCF's cross-disciplinary mode of operation. The CCF Scat Detection Dog programme is part of this approach and was put into place to provide the necessary samples to the various genetics projects. The main genetics projects are related

to cheetah population structure, census, relatedness, and assignment of individual ID to non-invasive samples such as scat. Projects related to other species are performed with outside funding and are currently limited to collaborative projects.

William Versfeld joined the laboratory as Laboratory Technician in January 2017. CCF is fortunate to have one of the few Namibians holding an MSc in genetics (which he obtained abroad). Natalie Giesen, who was Laboratory Manager in 2013/2014, returned to CCF in November 2017 to assist with ongoing projects.

Throughout 2017, the laboratory hosted seven interns, who were provided hands-on experience with conservation genetics and taught best laboratory practices.

Four interns joined CCF as part of their university rotation and received credit for their internship, as CCF's genetics laboratory is an official placement for 4th year students of the University of Namibia (UNAM) since 2017 and of Namibia University of Science and Technology (NUST) since 2018. Margareta Nangula and Mukelabai Muyoba from UNAM joined the laboratory in December of 2016 and stayed until January and February 2017 respectively. Tobias Erastus from NUST joined the laboratory from 1 September until 20 October 2017 as part of his Work Integrated Learning (WIL) (https://cheetah.org/blog/nambia-university-science-technology-students-take-work-integrated-learning-ccf/) and returned from 17 November 2017 until January 2018. Lorraine Boois from UNAM came for three weeks (22 November to 13 December 2017).

The laboratory also takes in 6-month interns who have finished their undergraduate degree and are aiming to specialise in genetics. Harmonie Tshimwanga, a Congolese graduate from UNAM did an internship from January to April 2017. Hafeni Hamalwa and Monika Nanghama joined the laboratory in March and April 2017 respectively. At the end of their internship, both accepted an offer to stay at the CCF's genetics laboratory. Hafeni was accepted in a research-based MSc programme and will do his work based at CCF. Monika accepted a position as Laboratory Assistant, which she will start on 1 January 2018.

The Genetics Department in collaboration with the Ecology Department, hosted a three-day workshop for UNAM students from the Katima Mulilo campus for the second year around. The workshop included hands on experience of camera trapping, kill identification (human wildlife conflict), and the preparations of genotyping individuals. The students further were provided with lectures on how to apply the knowledge gained.

Genetics Projects

- Cheetah genotypes of known individuals (blood/tissue samples): As part of CCF's on-going research at the genetics laboratory, DNA is extracted from all individuals of which blood and tissue samples are available and their genotypes are obtained. All extracted DNA samples were assessed for quality via gel electrophoresis and extraction information was entered into File Maker Pro. The samples were genotyped for 15 short tandem repeat (STR) markers and a sex marker. For 2017, eight new cheetah samples were added to the sample collection and extracted.

- Population study of cheetahs on CCF property using non-invasive techniques: Individual cheetahs are assigned a genetic ID. The data from 2008-2014 is part of Lucia Mhuulu's MSc research thesis,

which she defended in June 2015. For this study the genetic ID was combined with a visual ID obtained from CCF's camera trap study. Many of these scat samples were collected with the help of the scat dogs Finn, Isha, and Tiger. The scat sample collection from a coalition of two wild cheetah males ('The Wild Boys': Hifi (AJU 1543), and Sam (AJU 1542)), which had been collected daily around the CCF Centre between July 2008 and October 2013, comprises over 950 samples and is an invaluable resource for long-term monitoring of physiological parameters in two wild cheetahs. While the two wild males have died since (AJU 1542 in August 2010, AJU 1543 in October 2013), the work on the samples continues. The parasite levels were assessed and recorded on a regular basis at the time of collection and DNA has been extracted on over 200 samples, of which 135 were identified genetically. The aim of the study is to identify samples for every 3-5 days throughout the entire five-year period and conduct hair analysis to determine the wild males' diet over time. Hormone work to determine stress and testosterone levels will be performed when funding is secured.

- Namibia-wide population genetic study: Non-invasive samples are processed once they are collected by the CCF ecology and scat detection dog teams. Some samples are also obtained from collaborators from other conservation organisations and taxidermists.

- Verification of the accuracy of the scat detection dogs: The species of the scat samples found by the dogs is routinely verified using molecular markers.

- Illegal trade: The species content of samples from illegal trade was assessed using molecular markers specifically designed to identify carnivore species in samples of poor quality. PCR products were taken to the United States by Dr Schmidt-Küntzel to do next generation sequencing in a collaborator's laboratory. The obtained results will be made public when possible.

- Babesia: A trial study was conducted to determine the percentage of affected cheetahs that are currently at CCF and compare those to the results obtained from microscopic evaluation of blood smears from other captive cheetahs. We also developed a diagnostic test to be used for further screening of the samples. The initial testing was assigned to Shalette Dingle, a visiting Cornell veterinary student in 2013; since then, a more sensitive test was also tested with promising results. Cornell veterinary student intern Natasja Lavin read the blood slides corresponding to the genetic samples. Babesia presence in ticks collected on cheetahs will be analysed in mid-2018.

- Release study: Sixty-six release and pre-release scat samples were extracted and assigned to an individual cheetah. These samples were sent to the Smithsonian Institution in the US to be analysed for faecal hormone levels. Results of the hormone work are pending.

- Carnivore species ID and diet: In 2014, visiting student intern Alicia Walsh from University of New Hampshire (USA) extracted DNA from 50 carnivore scat samples and verified the species they belong to using a mitochondrial marker. She also identified what the animals ate by using a variety of approaches including hair, bone, exoskeleton, and vegetation analysis. She published the project in the university's Inquiry journal. A preliminary analysis of the diet composition was performed by ecology research assistant Samara Moreira.

Current Collaborative Genetics Projects

- Oxalate nephrosis: A collaboration was started in March 2012 with Dr Karen Terio from the University of Illinois (USA) and Dr Emily Lane from the National Zoological Gardens of South Africa for a study on oxalate nephrosis. Primers for one candidate gene were designed by Dr Schmidt-Küntzel and optimised at the CCF genetics laboratory in 2014. Diseased individuals were tested in the laboratory of the South African collaborators. In the first half of 2015 a second gene was investigated. The South African team came to visit CCF as part of the collaboration, and two students from each institution visited the other one as part of the grant. To date no candidate mutation was found. Results will be published in 2018.

- Illegal trade: The collaboration with cheetah holding facilities and veterinary clinics in the UAE was initiated during a trip in June of 2013 and renewed in February of 2014. The aim is to begin developing a genetic database of cheetahs held in that area. Sperm and genetic samples were collected on males in 2014. The genetic samples are currently being analysed.

- Carnivore ID: Carnivore hair samples obtained from rubbing stations and hair snares in southern Namibia were analysed at the genetics laboratory to identify the species. This work was done in collaboration with the Brown Hyena Project in Lüderitz and will be part of Sarah Edward's PhD. The genetic analysis was finalised in 2014, and the PhD successfully defended in October 2015. A publication is expected in 2018.

- Caracal ID: DNA from Caracal hair and tissue samples, collected from killer traps in South Africa, were extracted and genotyped at the genetics laboratory to assess relatedness. This study is a collaboration with Kristine Teichman, a student from British Columbia University (Canada) and will be part of her PhD. Most samples were processed and should be finalised in 2018.

- Rhinoceros: A pedigree for white rhinoceros (*Ceratotherium simum*), performed by visiting researcher and Master's student Abigail Guerier, from Ongava Wildlife Reserve's Research Centre, was finalised and published in 2012 as part of Abigail's MSc. In the beginning of 2013 she started a genetics project on Ongava's resident population of black rhinoceros (*Diceros bicornis*) at the CCF genetics laboratory. The project is on-going and more samples are added as they are collected by the Ongava research team. In April 2017, Abigail visited the laboratory to process new rhinoceros samples as part of an ongoing collaboration.

- Kenyan cheetahs: Brian Soloman, an MSc student from Kenyatta University in Nairobi, visited the laboratory as part of collaboration between CCF, Action for Cheetahs in Kenya, and the Kenyan Wildlife Services. He spent ten weeks (28 August to 6 November 2017) processing scat and tissue DNA samples to genotype individuals. For his MSc he will examine cheetah relatedness in the Maasai Mara.

- Termites: In May 2015 and February 2016, a research team from the University of Florida worked with CCF to do a pilot study on termites. The initial tests were successful. More research is planned for upcoming years.

- Brown Hyena Project: As part of collaboration with Dr Ingrid Wiesel from the Brown Hyena Project in Lüderitz, we received a set of paste marks of brown hyenas (*Hyaena brunnea*) in August 2016, which allowed us to optimise protocols to successfully extract DNA. Additional samples were sent

since and 59 samples were genotyped with published markers. However, additional markers are needed, and will be developed in 2018. These results will be part of Inga Jänecke's PhD.

- **Herpetology Project:** As part of collaboration with Paul Kornacker from the Museum König in Germany on lizard species identification on samples from the NamibRand region of Namibia, 81 samples were extracted and species identity was determined for half of the species. A new primer was ordered, which did amplify some of the remaining species and will be used in 2018. This collaborative project was assigned to Hafeni Hamalwa and will allow him to obtain a MSc. Funding applications are in process to support the project.

- **Mushara Elephant Project:** The genetics laboratory received 94 elephant scat samples in 2017 from Dr Caitlyn O'Conner.

2. Scat Detection Dogs

CCF's scat dog programme is moving forward with our new scat dog trainer, Quentin de Jager, who joined CCF on 1 March 2017. Since Tiger's leg injury last year, Finn has temporarily been CCF's main scat dog. He was mostly used to look for scat around play trees at CCF's Big Field area between March and July 2017. Out of the 86 samples placed during this time, Finn was able to find 72. No wild cheetah scat was found during that period. Tiger was retired from the programme and was placed as a pet. He received a donated brace from Ortho Pets (Dr Ilana Strubel) to assist him with movement in his retirement.

In July 2017, CCF acquired a new scat dog, 'Levi', a Belgian Malinois/German Shephard cross breed which was trained by Quentin at the Paramount K9 Unit in South Africa. Levi's purchase and travel expenses were generously sponsored by our German partner "Aktionsgemeinschaft Artenschutz (AGA) e.V.", and we are very thankful for their ongoing support in moving our scat dog programme forward. Since Levi's arrival in June 2017 he has been trained to detect scat in random transects, on roads, and at play trees. Levi currently works on transects of 1.5 km with the aim to further improve his endurance and expand the transect length in the future. Levi was initially trained to detect cheetah scat but has since been trained on leopard and African wild dog scat towards the end of 2017. Levi is in training to give a different indication on cheetah scat samples.

During June and August 2017, Tim Hofmann, a Biodiversity, Ecology and Evolution MSc student from the George-August University in Gottingen, Germany, conducted his field research with the scat dog programme at CCF. Tim was looking at the different influences (e.g. wind, humidity, heat, and age of scat) that influence the detection probability of a scat detection dog. Finn was used on a total of eight transects that consisted of 250 meters, and five scat samples in total on each transect. Four of the transects were in dense area, and four of the transects were in open areas. The final results of the study will be published in the beginning of 2018.

The genetics lab, ecology department and scat dog programme work together closely, as the scat samples found by the dogs of the scat detection programme are used for genetic purposes.

E. Large Carnivore Research and Ecology

1. Go Green Project – Carnivore Landscape Distribution and Abundance

A project to determine the density and human-carnivore conflict areas for cheetah (*Acinonyx jubatus*) and other key large carnivores across the Great Waterberg Landscape (GWL) was initiated on 1 September 2015 and is planned to last through 2018.

The project focuses on CCF's farm, commercial, re-settled farms, and communal conservancies across the GWL, which consists of five conservancies; Waterberg, Okamatapati, Ozonahi, Otjituuo and African Wild Dog (Figure 1).

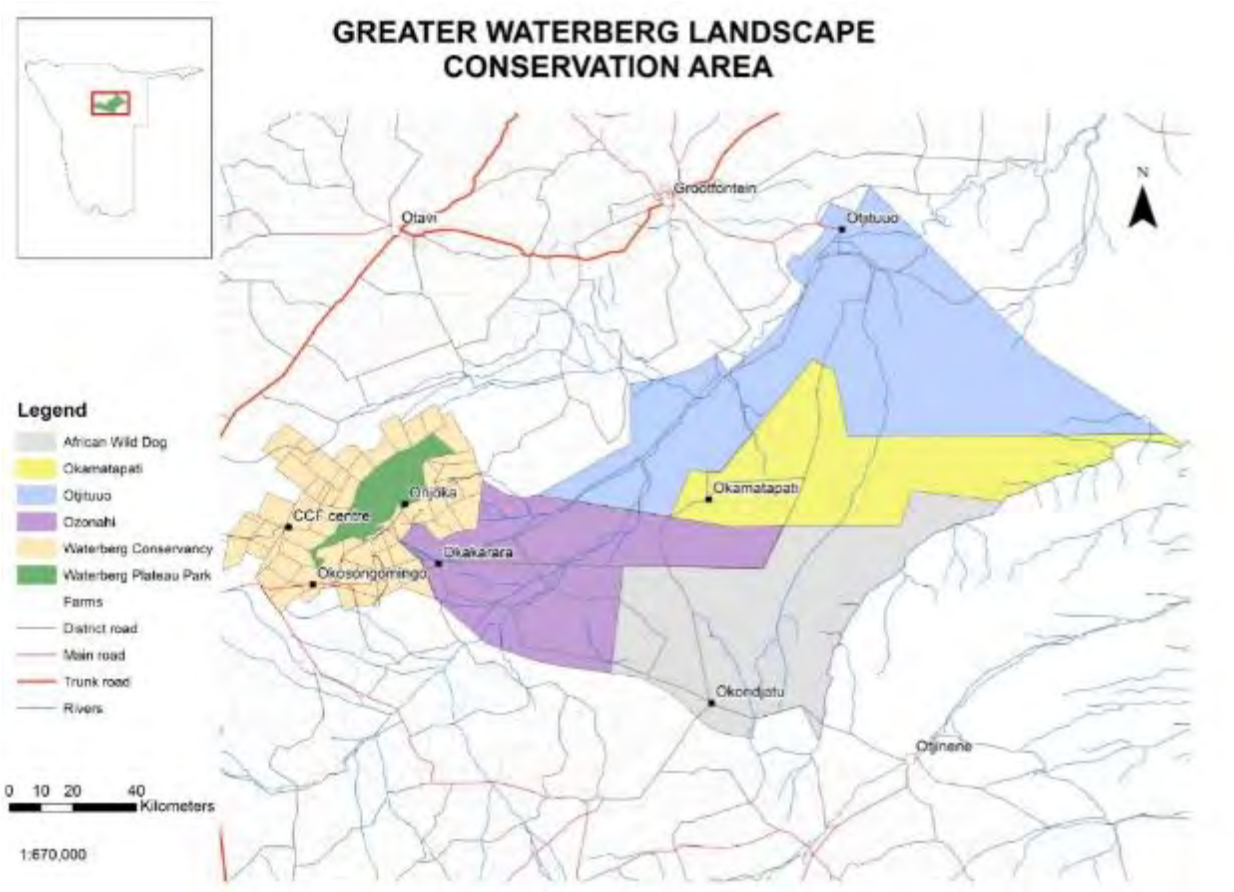
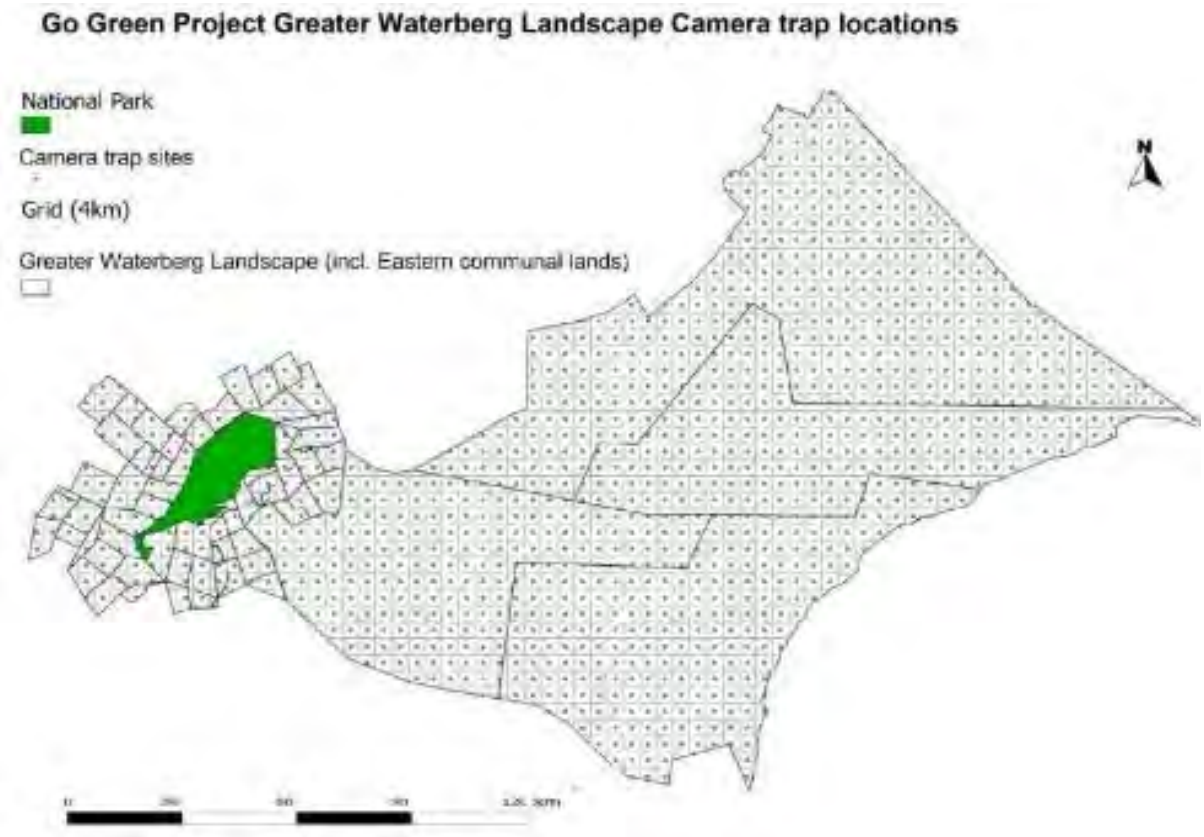


Figure 1: Location of the GWL and the five individual conservancies; the Waterberg (commercial), Otjituuo, African Wild Dog, Okamatapati, and Ozonahi (communal) conservancies.

The current distribution and densities of key carnivore species including the African wild dog and cheetah across the GWL is unknown. However, previous studies have shown that high level of retaliatory killing of carnivores due to livestock loss is occurring across the GWL. This project therefore aims to use remote camera traps to determine large carnivore presence and densities across the GWL. The main goal is to determine if land use affect large carnivore densities and occupancy.

Camera trapping

The commercial farms within the GWL were divided into four survey areas (Figure 2), and camera traps were deployed for 30 nights on a 4x4km grid, with each survey being sampled for the dry and wet season. All surveys from the commercial farms are now completed (Table 1) and all pictures (1,330,874, see examples Figure 3) have been sorted to the species level for wild species (carnivores and game). Table 2 shows the number of pictures of carnivore species taken in each survey area, while Table 3 shows the number of pictures for each carnivore during each sampling period.



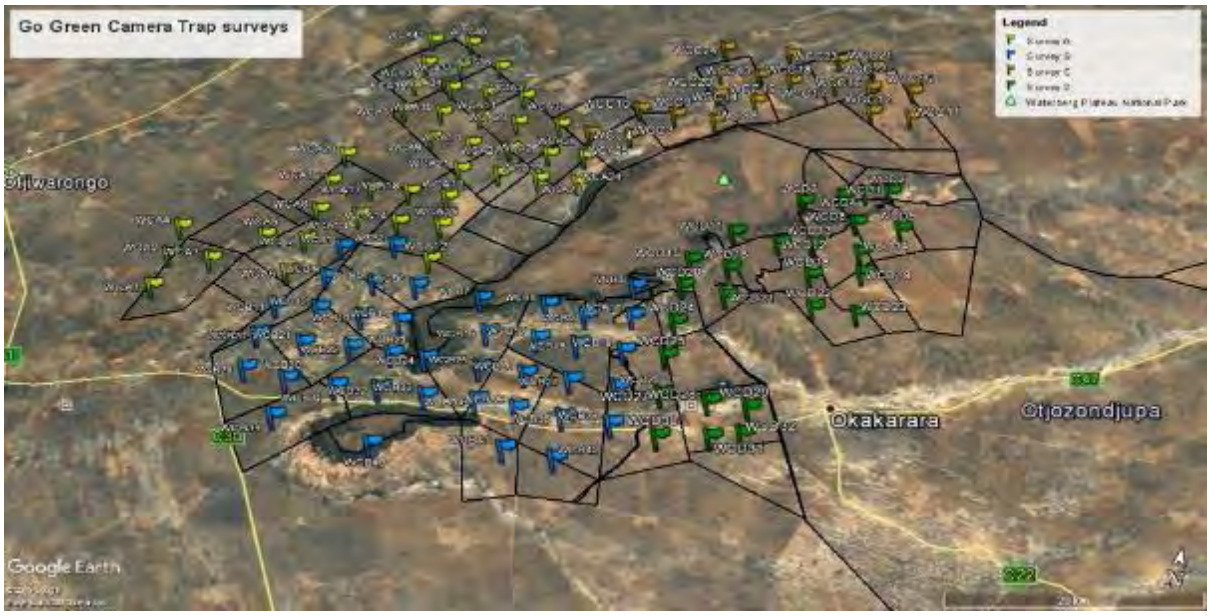


Figure 2: Outline of the Waterberg Conservancy with 4km x 4km grids showing camera traps locations around the Waterberg Plateau National Park.

Table 1: Camera trapping deployment dates and total number of pictures taken in the GWL.

Survey area	Dry season	Wet Season
A	September-October 2016 265,865 pictures	February-March 2016 271,014 pictures
B	August-September 2017 141,197 pictures	March-April 2016 274,318 pictures
C	June-July 2016 215,213 pictures	February-March 2017 27,024 pictures
D	July-August 2017 72,667 pictures	February-March 2017 63,576 pictures
Total	1,330,874	

Table 2: Number of carnivore pictures taken and number of species detected during camera trap surveys. These figures include African wild cat, cheetah, leopard, caracal, black backed jackal, Cape and bat-eared fox, small spotted genet, aardwolf, brown hyaena, serval, banded and slender mongoose and striped polecat.

Survey area	Dry season	Wet season	Total
A 634 km^2	2 309 (13 species)	2 860 (13 species)	13 species
B 730 km^2	2 592 (12 species)	1389 (11 species)	12 species
C 308 km^2	1179 (12 species)	371 (10 species)	12 species

D 439 km^2	1 532 (13 species)	861 (11 species)	13 species

Table 3: Total number of pictures taken for each carnivore species.

Species	Dry season	Wet season
Aardwolf	169	45
Banded Mongoose	240	100
Bat-eared Fox	337	407
Black-backed Jackal	3408	1995
Brown Hyaena	1547	784
Cape Fox	61	9
Caracal	333	133
Cheetah	11	9
Genet	565	299
Leopard	249	475
Polecat	104	84
Serval	14	3
Slender Mongoose	94	168
African Wild Cat	339	369

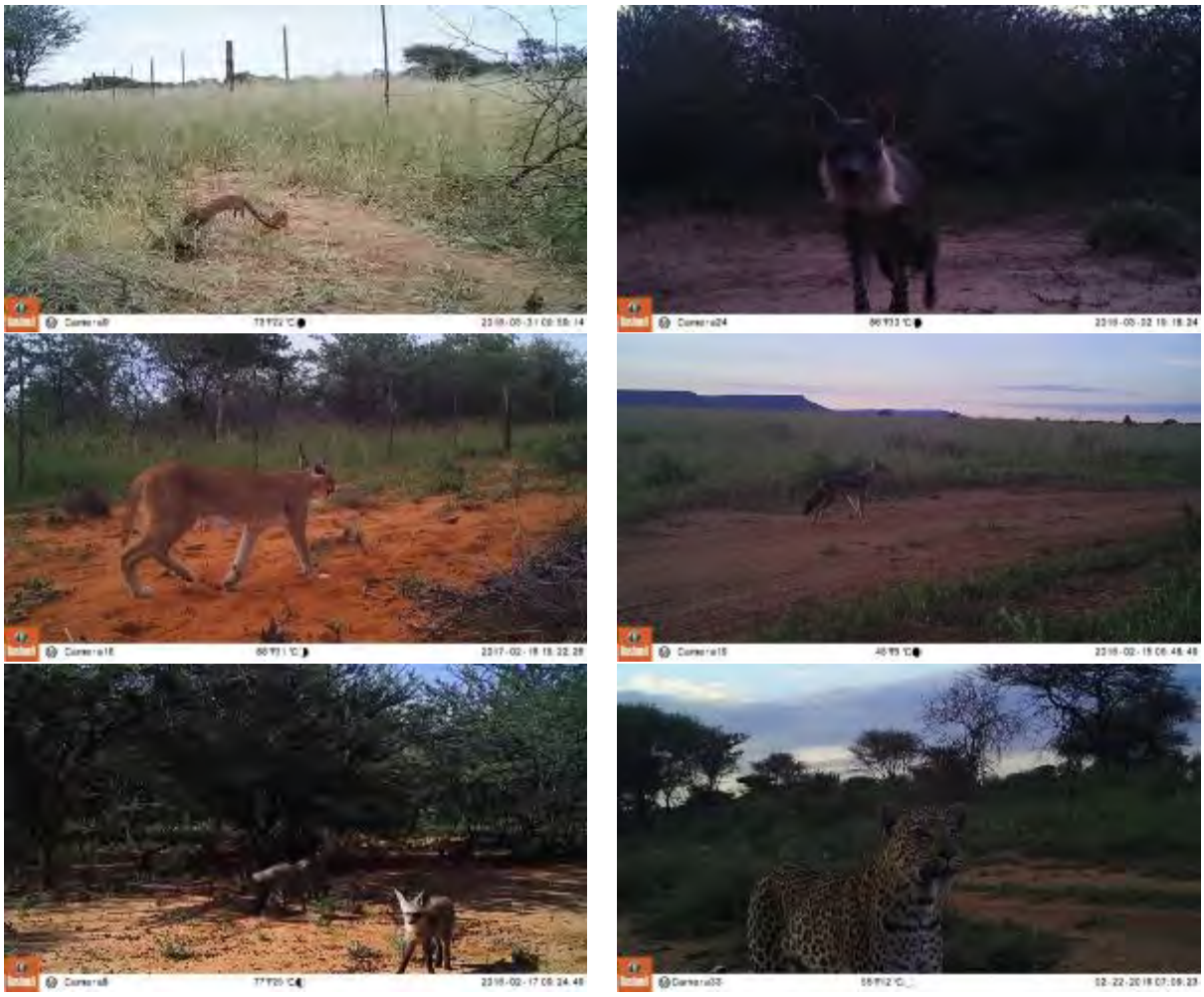


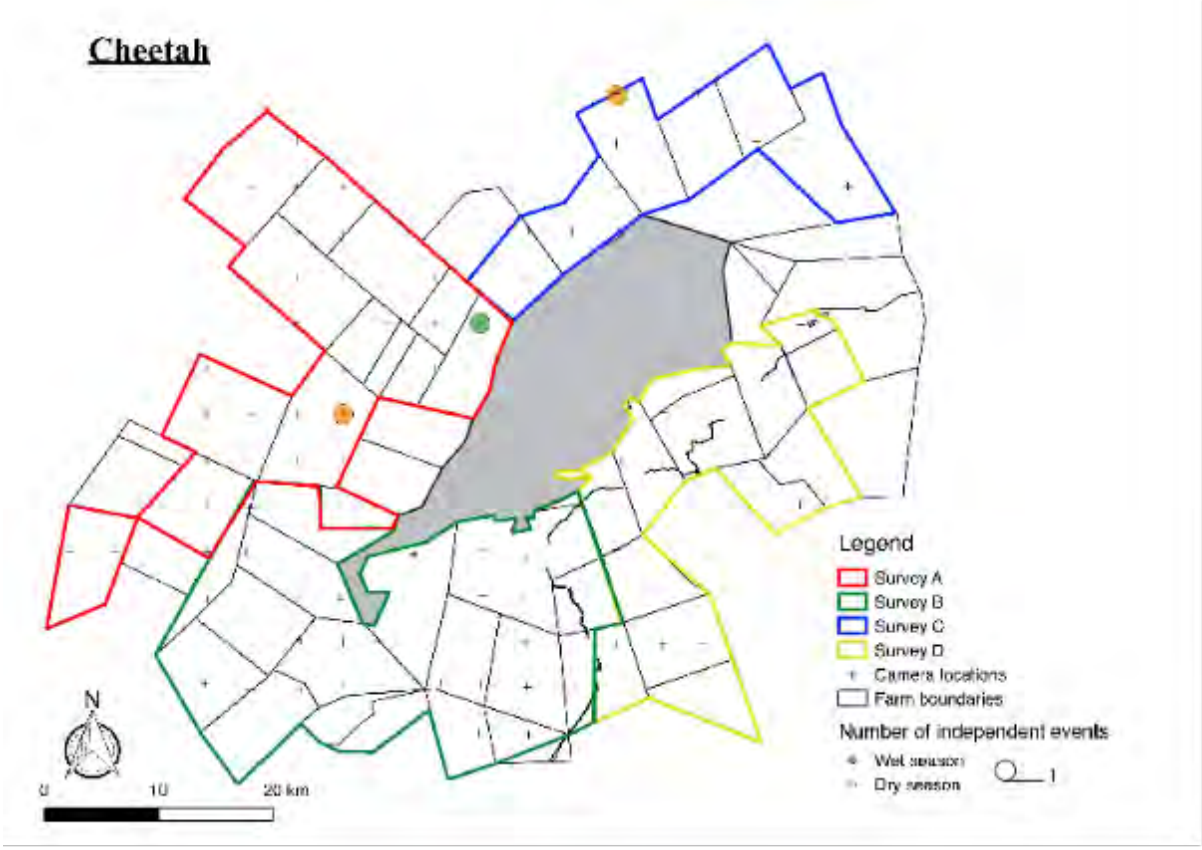
Figure 3: Example of carnivore pictures taken during the Go Green Project. Left: slender mongoose (*Herpestes sanguineus*), caracal (*Felis caracal*) and bat-eared fox (*Otocyon megalotis*). Right: brown hyaena (*Hyaena brunnea*), black-backed jackal (*Canis mesomelas*) and leopard (*Panthera pardus*).

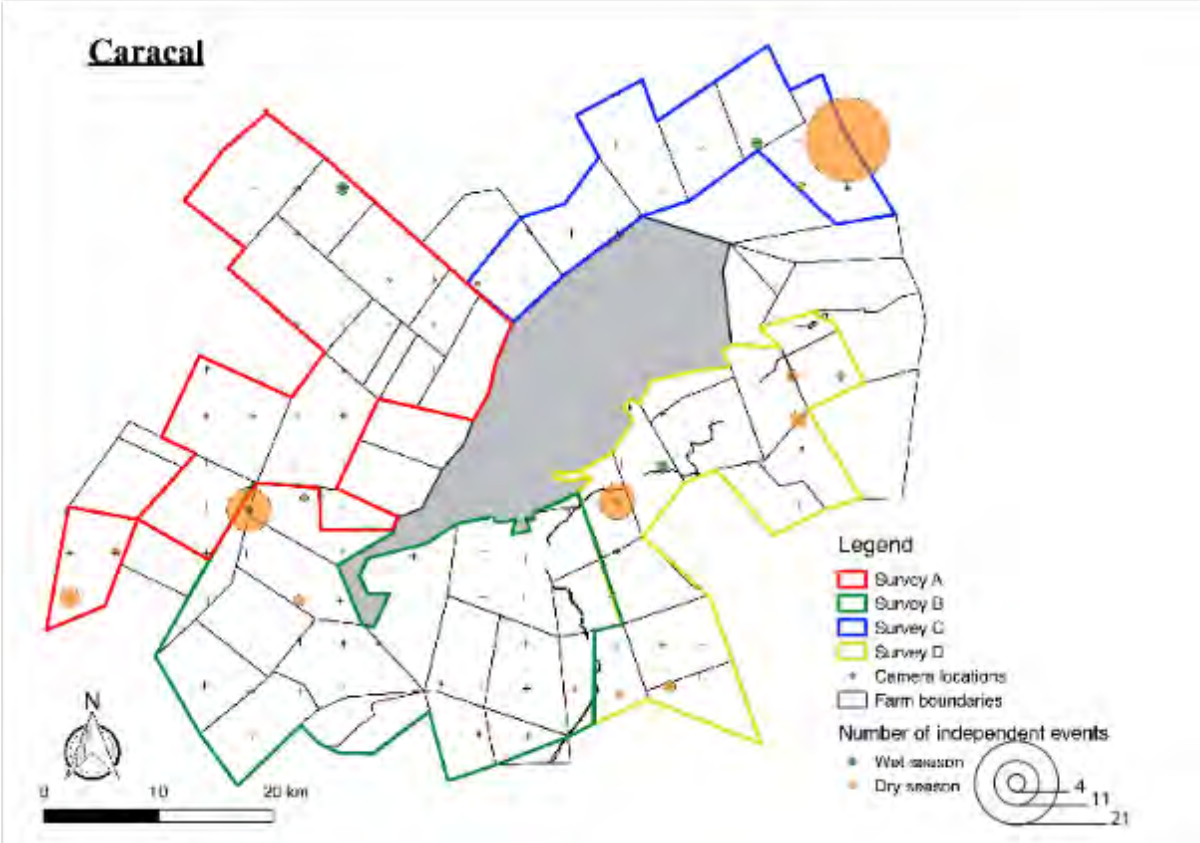
Independent capture events were defined when pictures of the same species at a given site were taken at least 30 minutes apart from each other (Figure 4). Using these independent events, CCF staff mapped carnivore frequency of occurrence across the survey area (Figure 5). At least one carnivore species was captured at almost every site (overall only three sites had no carnivore captured) but not necessarily during both seasons. The maximum number of species recorded at a given site during a given season was eight.

Of the species potentially involved in human-wildlife conflicts, black-backed jackals were the most often seen on camera, followed by brown hyaenas and leopards. Caracals appear to be captured far less often than these three species. Cheetahs occurred at extremely low densities in the area as they were only observed three times.

In terms of spatial distribution, while jackals and brown hyaenas were spread rather evenly through the whole survey area, leopards were less common in the Survey D area, and cheetah was only observed north of the Waterberg Plateau National Park. Brown hyaenas and caracals showed a strong nocturnal

activity pattern as did jackals but to a lesser extent with some activity remaining during daylight hours. Leopard activity also peaked during the night, but they were still captured on camera relatively often during the day. Cheetahs were not captured often enough for the activity patterns to be discussed.


Cheetah
Legend
Survey A
Survey B
Survey C
Survey D
Camera locations
Farm boundaries
Number of independent events
Wet season
Dry season
1
N
0
10
20 km


Caracal
Legend
Survey A
Survey B
Survey C
Survey D
Camera locations
Farm boundaries
Number of independent events
Wet season
Dry season
4
11
21
N
0
10
20 km

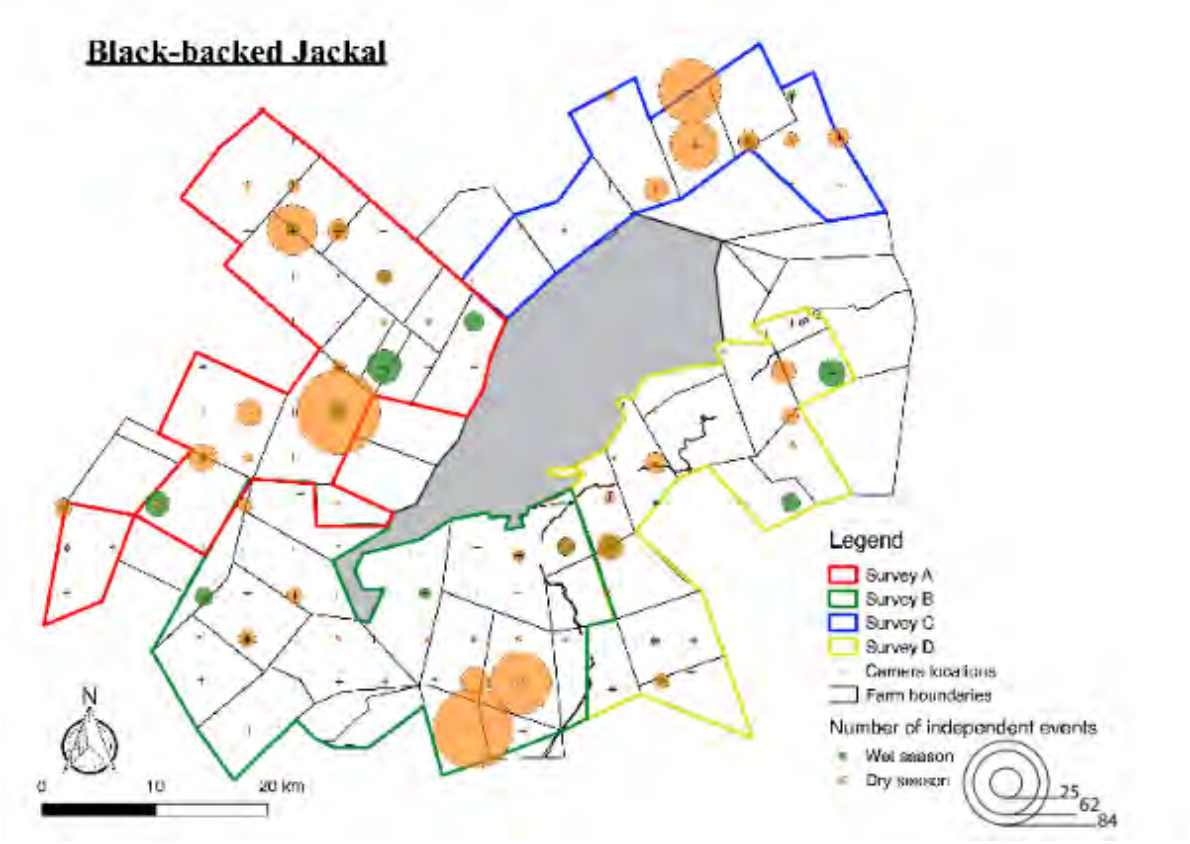


Figure 4: Number of independent event captured per species durng the wet(green) and the dry (orange) season.

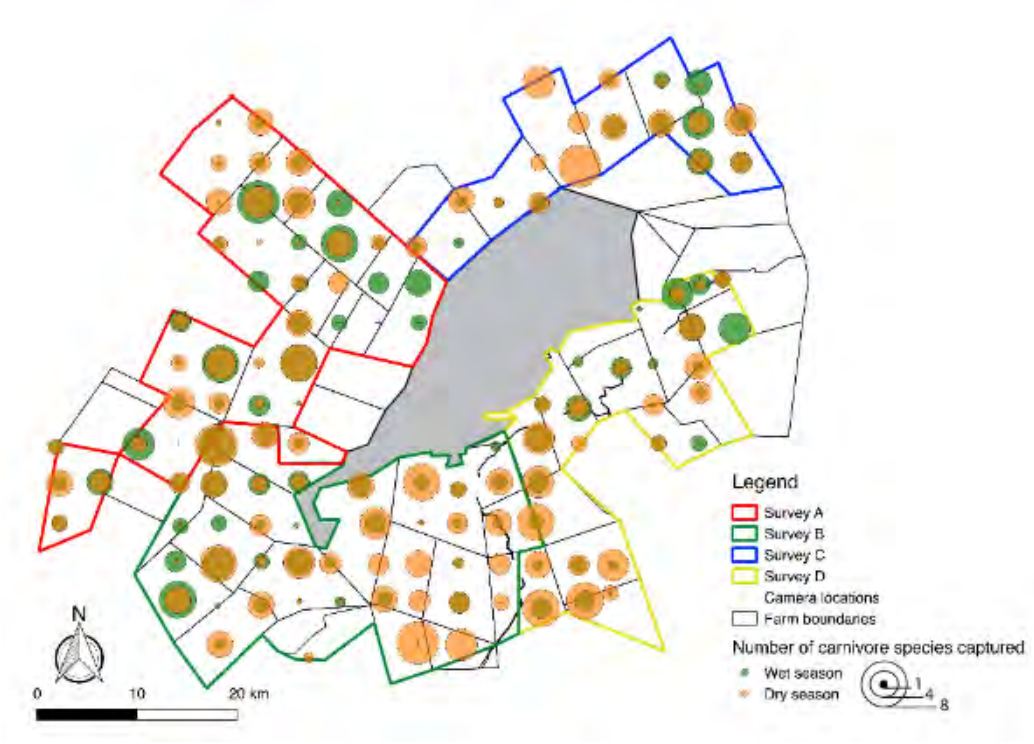


Figure 5: Distribution map of all carnivore presence.

Leopard Abundance and Density

As it is possible to identify each individual leopard by their unique rosette patterns (Figure 6), a preliminary study of leopard density and population size was conducted for the dry season sampling of surveys A (encompassing a 180-km^2 area comprised of CCF land and immediate surrounding farms). Individuals were also identified for surveys B dry and C wet. This study was conducted by CCF post graduate intern, Samara Thays Moreira Müller, using a capture-recapture approach. Density was estimated using the software CAPTURE and occupancy with PRESENCE for the animals identified. Twenty-three individual leopards were identified leading to a population estimate of 26 (95% confidence interval 25-47). Occupancy estimate was 0.4884 and density estimate was 13.8 – 26.1 leopards / 100 km^2 (Table 4 & Table 5).

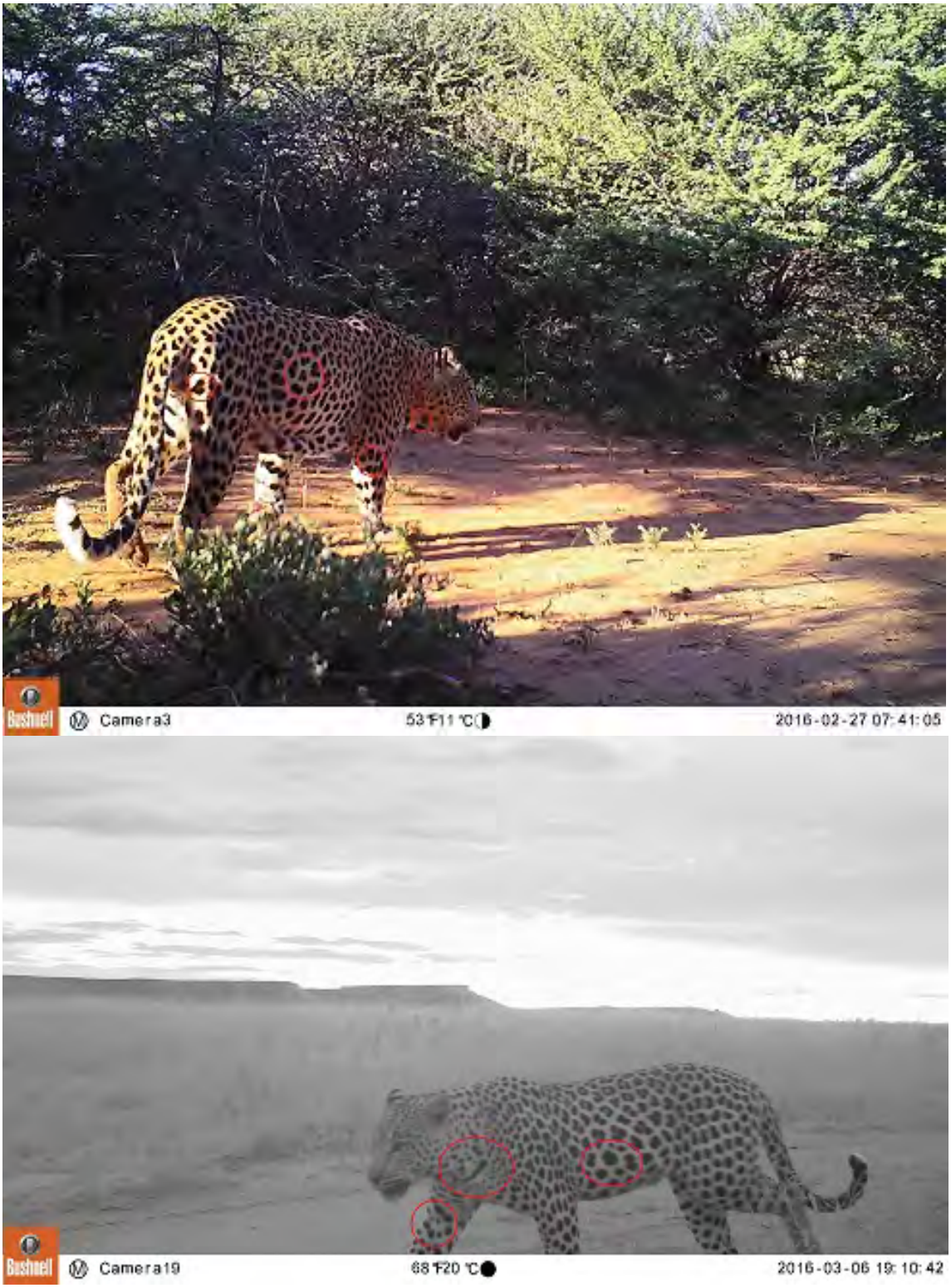


Figure 6: Example of photos allowing for individual identification of leopards, red circles show distinctive unique patterns.

Table 4: Data collected on leopards from surveys A, B, and C.

Survey	CameraTrap Nights	Total Pictures	Leopard Pictures	Pictures used for ID	Leopard Captures	Stations with leopard presence	Indentified Individuals
A	1343	363731	322	207	61	22	23
B	1209	341443	93	54	26	13	12
C	608	215389	77	35	20	8	7

Table 5: Sexual identification of leopards in surveys A, B, and C.

Survey	Males	Females	Unknown	**Total**
A	8	10	5	23
B	4	4	4	12
C	4	2	1	7
			Total:	42

Questionnaires in Eastern Communal Area

For the past decade, CCF has conducted integrated livestock, wildlife, and predator management training programmes for communal farming communities throughout Namibia, called Future Farmers of Africa (FFA), to mitigate predator conflict. Since 2015, FFA trainings, have taken place in the GWL in the Eastern communal areas.

In addition, face-to-face questionnaire surveys have been conducted in this area to better understand aspects of livestock management and health as it relates to livestock losses pre-and post-training programmes. This survey yielded 231 farmer respondents from Go Green and European Union (EU) 2015-2016 workshops, as well as 87 opportunistic questionnaires during July-September 2017, with the majority of respondents (89%, n=284) having lost livestock in the past year. Small stock (goats and sheep) made up the highest number of livestock lost. Within the 2015-2016 Go Green and EU surveys, concerning a single cause, most losses (n=3,592) were to predators followed by drought (n=2,346). However, it is notable that the majority (60%) of losses were due to causes other than livestock depredation (predation) (Table 6).

Table 6: Total number of livestock lost (n=8957) by cause reported by 2015-2016 Greater Waterberg Landscape eastern communal conservancies Go Green and EU respondents.

Cause of Total Livestock Losses						
Disease	Theft	Poisonous Plants	Drought	Snakebite	Birthing Problems	Predation
1,260	410	947	2,346	80	322	3,592

The majority of respondents from the 2015-2016 Go Green and EU surveys reported kraaling their animals (98%), using livestock guarding dogs (75%), and herders (56%). CCF believes that it is key to determine the extent of the efficacy of kraals, livestock guarding dogs, and herders and to continue to innovate methods to protect livestock both inside and outside the kraal to limit losses of farmers'

livelihoods and chances of potential retaliation against predators such as the African wild dog (*Lycaon pictus*) and the cheetah.

Data from the 2015-2017 Go Green and EU surveys and the 2017 questionnaires have been compiled. Data analysed did not include losses implicated to more than one carnivore (e.g. jackal, caracal) nor did it include losses reported from an unknown conservancy or to a conservancy outside the Eastern Communal Conservancies. From the entirety of data from 2015-2017, Okamatapati Conservancy had the highest number of overall losses (692), followed by Ozonahi, Otjituuo, and African Wild Dog (Figure 7).

The family *Canidae* was responsible for the most livestock losses across the Eastern Communal Conservancies (Figure 8). Jackals were implicated in the highest number of livestock losses, particularly for small stock. African wild dogs were implicated in the second highest number of depredation events, particularly for adult cattle, followed by calves (Figure 9).

It has become evident that cheetahs are implicated in relatively few conflict incidences across the Eastern Communal Conservancies in comparison to other predator species.

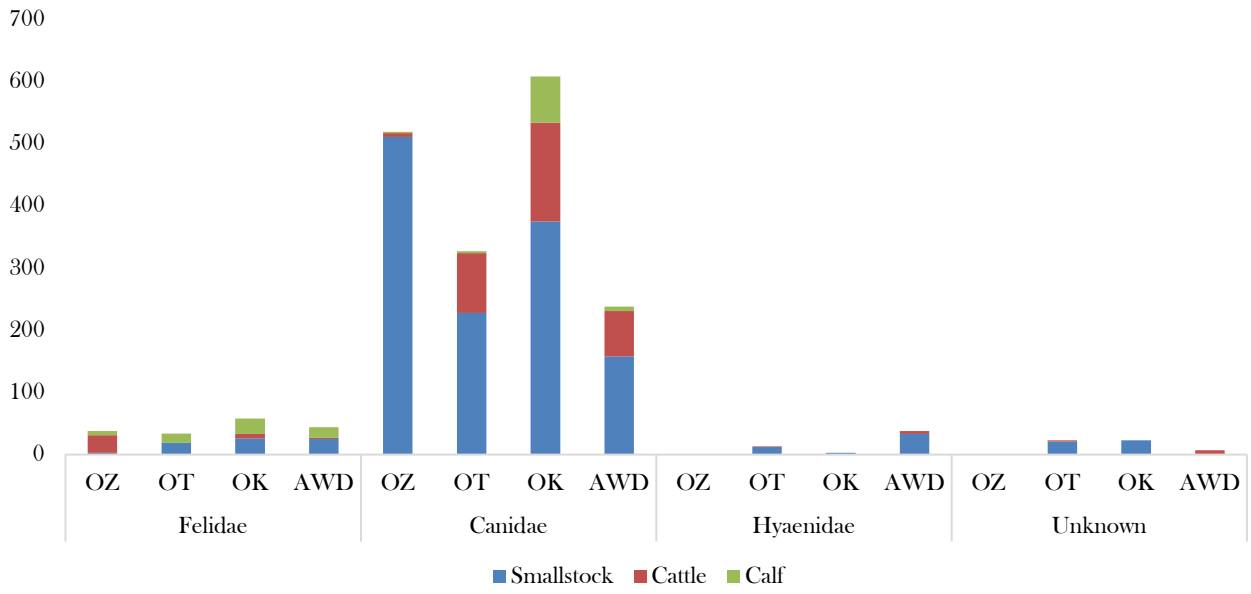


Figure 7: Total numbers of losses and percentages of livestock predation by carnivore families in the Eastern Communal Conservancies as per the 2015 EU survey conflict records (n=81), and 2016 Go Green May-June (n=97, GG1), November-December (n=32, GG2) and opportunistic 2017 surveys (n=62) records.

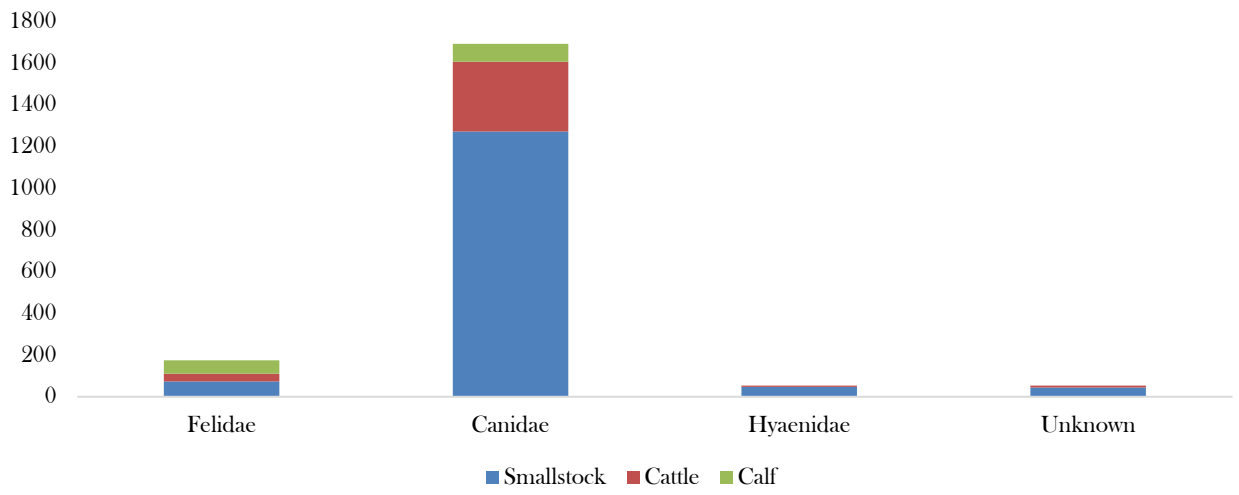


Figure 8: Total numbers of losses and percentages of livestock predation by carnivore families in Eastern Communal Conservancies as per the 2015 EU survey conflict records (n=81), and 2016 Go Green May-June (n=97, GG1), November-December (n=32, GG2) and opportunistic 2017 surveys (n=62) records.

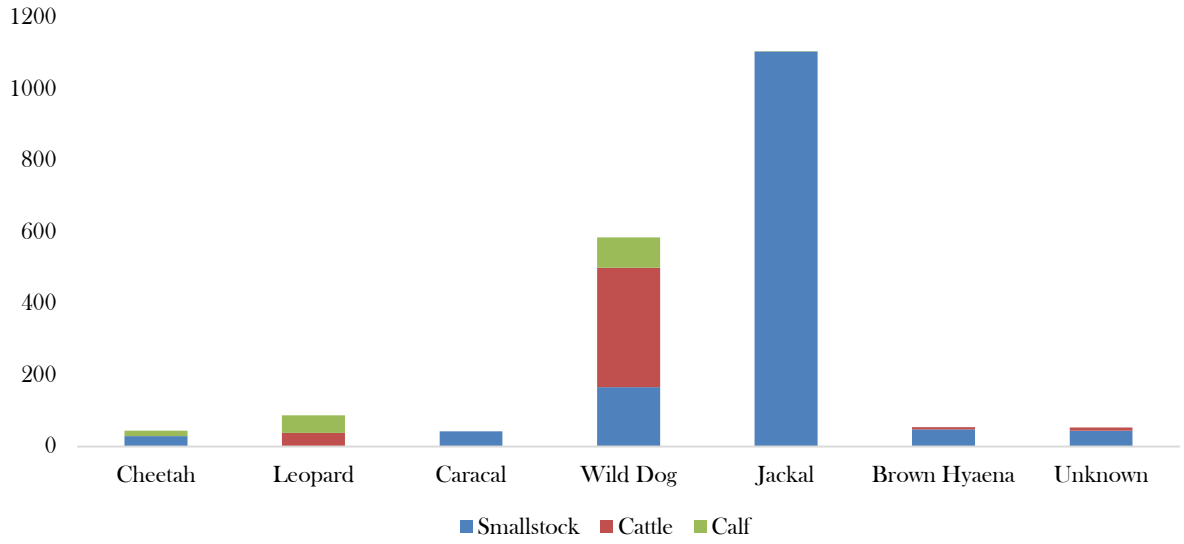


Figure 9: Total numbers of losses and percentages of livestock predation by carnivore species in the Eastern Communal Conservancies as per the 2015 EU survey conflict records (n=81), and 2016 Go Green May-June (n=97, GG1), November-December (n=32, GG2) and opportunistic 2017 surveys (n=62) records.

2. Cheetah Releases and Monitoring

The 'Inmates' Release

CCF released a coalition of three male cheetahs, known as the 'Inmates' on 5 March 2017 at Erindi Private Game Reserve. They were held in a *boma* from the 12 January 2017 until release.

The 3 cheetahs, named Alcatraz, Dexter and Donner, were in captivity for just over 5 years. Dexter and Donner, which were brothers, arrived at CCF at 6 months of age. Alcatraz was one year old when he arrived at CCF. Because they were of a similar age, they were introduced, bonded and formed a

coalition. In captivity, Donner was most dominant and spent most of his time with Dexter. After release there were concerns that Alcatraz would split from Donner and Dexter. However, the group dynamic changed after release and it appeared that Dexter assumed the dominant role.

Since their release, the Inmates made multiple kills. Most of these were of steenbok lamb, however they have also killed kudu calves and springbok. For most of 2017, the Inmates were not hunting successfully often enough, so the Erindi monitoring team was providing supplemental food. Although they still have a lot to learn to be independent, their hunting skills and their knowledge on dangerous animals they could encounter in the wild has improved. They were chased a few times by lions, leopard and another coalition of two male cheetahs. They also encountered elephant and black rhino and responded well to the situation.

After following them every day for more than 5 weeks (from the 5 March to the 9 April 2017), CCF staff decided they were going to do well and let Erindi staff continue to check on them regularly. CCF staff is still following their movements remotely thanks to their GPS collars, while Erindi keeps CCF updated regularly as to their movements and activities.

Unfortunately, Erindi staff found Donner dead on the 6 June 2017. It looked like he had been killed by a leopard and eaten by hyaenas. Dexter and Alcatraz were split up the first few days after this incident, but have since joined back together.

Since Donner's death, Dexter and Alcatraz have established a solid home range in the southern part of Erindi. Their movements seem very normal, and Erindi staff reports that they are doing much better and hunting successfully more regularly but are still supplementing them on occasion (Figure 10).

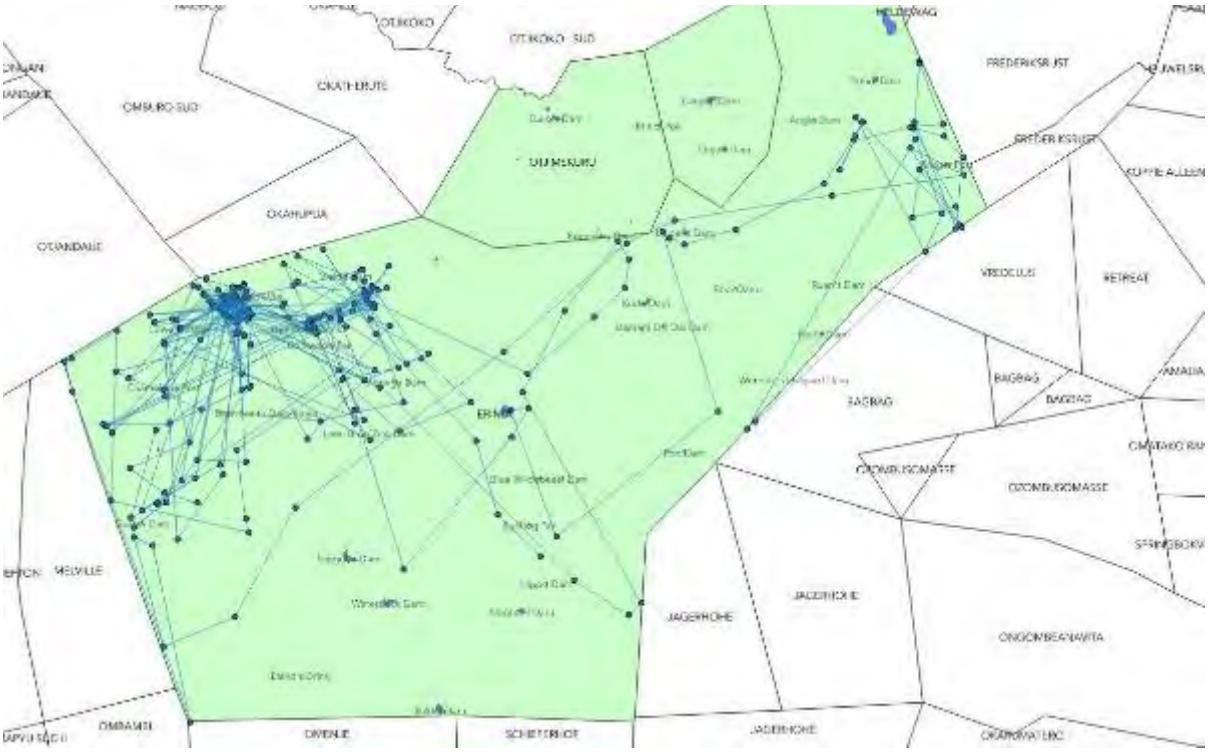


Figure 10: GPS collar data from Dexter and Alcatraz for 2017, truncated to 1 point per day.

Savanna and Shandy (AJU1648 & AJU1649)

Savanna gave birth to her first litter of cubs in July, but sadly lost them before they were old enough to leave the nest. Erindi staff last saw Savanna with this litter on 28 July 2017. Savanna's collar died (battery depleted) on 15 June 2017, however CCF and Erindi staff found her on 9 July 2017 and managed to re-collar her the same day. She is in good condition and everything checked out during her work up.

As of December 2017, Savanna is still spending most of her time in the northern area of Erindi. Her movements are entirely regular with clear evidence of normal kills and water visits. Erindi staff has reported that she is doing fine and never requires any sort of supplementation. On 29 November, Savanna gave birth to yet another litter, her second for 2017. Her nesting behaviour looks good, but she has spent longer than normal at the first nest site (see Figure 11, the first nest site is the northernmost blue star). Erindi staff saw her on Christmas day at the nest site with two cubs. Savanna has yet to move from her original nest site with the cubs, but will most likely move with them to a new site soon.

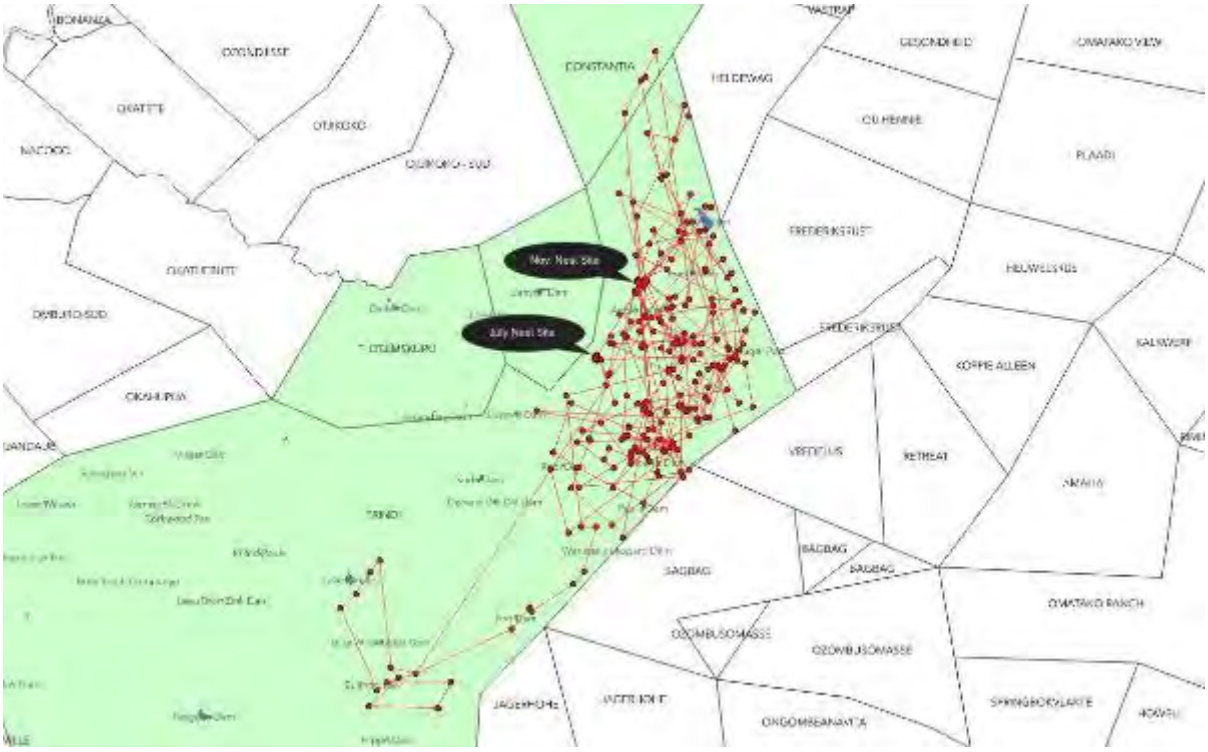


Figure 11: GPS collar data from Savanna for 2017, truncated to 1 point per day. The two nest site locations are indicated.

Unfortunately, Shandy's collar failed on 16 October 2016 and has yet to be replaced as of December 2017. While Shandy's precise movements are currently unknown, Erindi staff still sees her on occasion and report she's doing very well. CCF will attempt to re-collar her should an opportunity present itself.

Obi-Wan (AJU1561)

Obi Wan has been doing very well since his coalition mate Chester died in November 2016. He is killing every two to three days (essentially Springbok) and is in good condition considering his age

(nearly 8 years of age). In May of 2017, Obi-Wan had an altercation with Dexter and Alcatraz, who managed to win from him a part of his core home range. Despite this, Erindi staff report Obi-Wan is doing very well.

Simone (AJU1733)

Unfortunately, CCF lost track of Simone and her cub following a collar failure. The last time they were seen was on the 7 of December 2016. However, Simone's collar was collected from her dead body in May 2017 by a famer who found her and the collar. The farmer returned the failed collar to CCF. The cause of her death is unknown.

Bart (AJU1748)

On the 8 June 2017, we went to pick up a caged cheetah on the farm Lindehof (#745) near Otavi. The cheetah had been caught the previous day and it was brought to CCF. He was fitted with a GPS/VHF collar and released on CCF property directly at the holding pen site on 26 July 2017. Unfortunately, his collar stopped working on 2 August 2017 and his whereabouts and status are unknown.

Eli (AJU1732)

Eli was first collared in September of 2016 when he was spending most of his time around CCF property. As of the middle of 2017, Eli shifted his core home range roughly 45km north of CCF centre. His greater home range surrounds a mountain and is the cause for the 'gap' in the middle of his range as shown in Figure 12. Since the end of July 2017 and through December 2017, he had not been back on CCF land. Though CCF does not often have the chance to see Eli, his GPS data shows that he's making very regular kills and expeditions around his greater home range, most likely looking for mates.

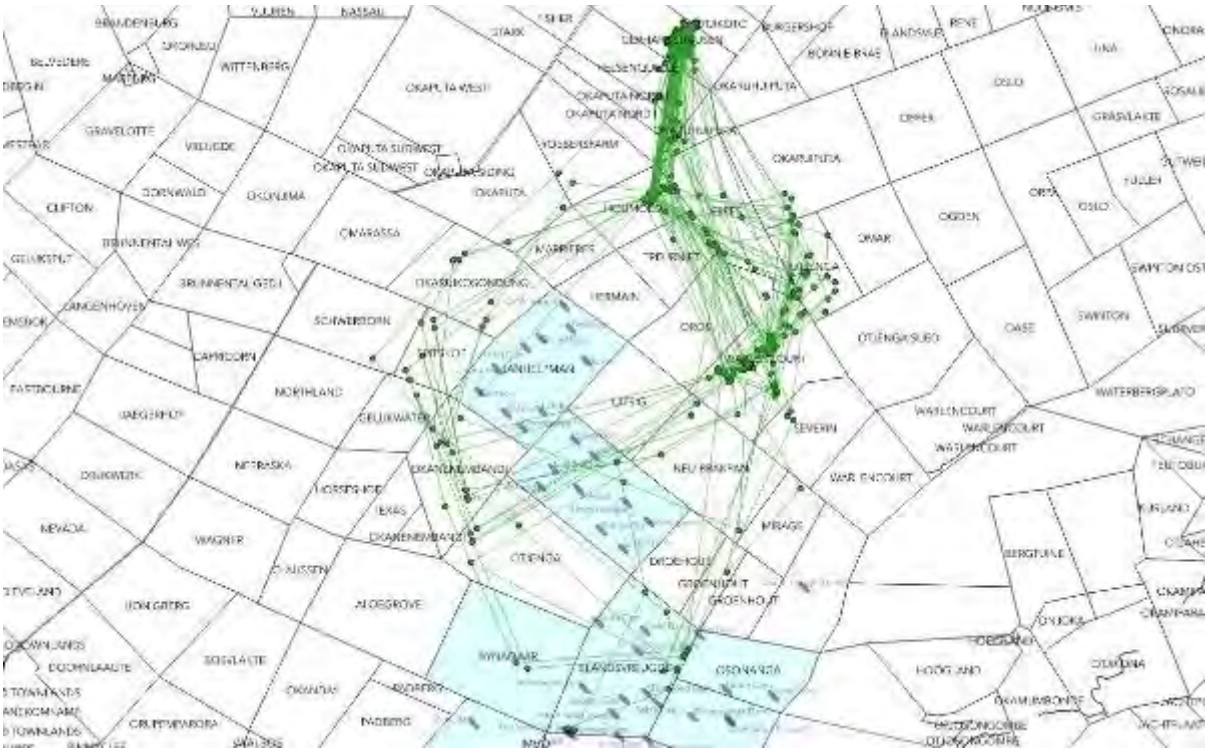


Figure 12: GPS collar data from Eli for 2017, truncated to 1 point per day.

F. Ecosystem Research

As over 80% of Namibia's game inhabits farmland, assessment of the Namibian ecosystem for long-term habitat viability for the cheetah and its prey is a part of CCF's primary on-going research.

1. Weather Monitoring

CCF staff continued collecting rainfall data on CCF farms and daily high and low temperature readings at the CCF Centre through 2017 (Figure 13 & Figure 14). Between January and December 2017, CCF received a total of 490.5 mm at the centre. The first drops in the summer came on 25 September 2017 (<2mm) and the first significant rain event was on 25 October (35mm). During the wet season 2016-2017 (Sept – April), CCF received 499 mm of rain, which is higher than the median (384mm) rainfall for the last 10 years.

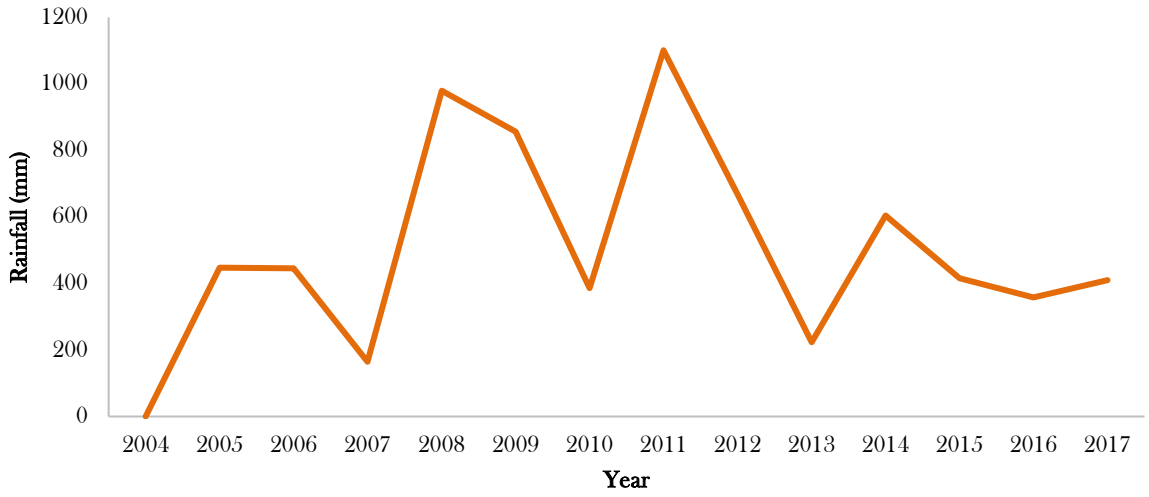


Figure 13: Annual rainfall from 2004 to 2017. Each rainy season comprises the precipitations occurring between October of one year and July of the following year.

The lowest temperature in 2017 was recorded on 4 and 25 June (4°C), and the highest temperature was recorded on 12 September (38°C). In comparison to 2016, the monthly minimum temperatures are similar but the monthly maximums are substantially lower than last year (Figure 14).

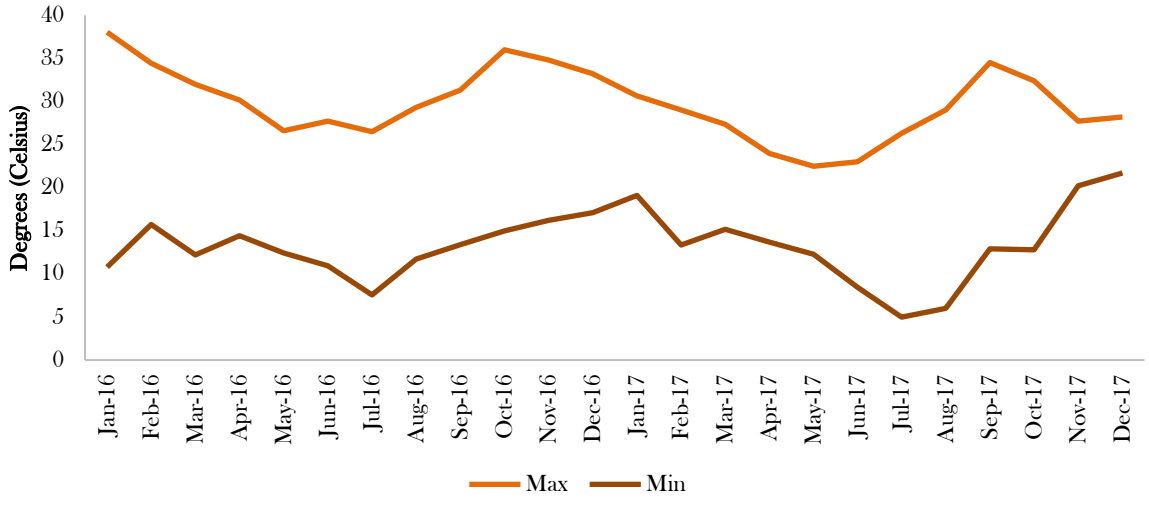


Figure 14: Monthly average minimum and maximum temperatures (°C) from January to December 2016 and 2017.

2. Game Monitoring

CCF's long-term wildlife monitoring programme continues with the assistance of volunteers and student interns. The research conducted on CCF farms is designed to understand patterns and trends of game density, movements, demographics, and habitat utilisation. The monthly monitoring involves

visual road counts, categorising vegetation types, densities, and distributions. This information is correlated with data collected on rainfall and temperature.

Big Field Game Counts

CCF's Big Field, also known as 'The Little Serengeti', is an old uncultivated field of 14.9 km^2. The field, one of the largest open, uncultivated areas in the north central farmlands, attracts a high number of free-ranging game. This area provides an ideal case study to monitor ecological successional trends. Apart from containing high prey densities for cheetahs and leopards, this area contains the most game, so monitoring trends and understanding the dynamics of how the game utilises the field provides important information for future management strategies and is very helpful for tourism in the long term. For this reason, CCF has been conducting monthly counts since 2004. The field habitat has changed over the years and continues to show a high density of Bitter bush (*Pechuel-loeschea leubuitziae*), which has triggered a change in species density on the field.

During this reporting period, a total of 36 replicate counts (3 routes sampled daily for 3 days) were conducted on the Big Field, resulting in a sampling effort covering 296.64 km. There are three routes on the field: Chewbaaka Road (6.34 km), Midfield Road (5.38 km), and Osonanga Road (4.76 km, Figure 15). The total distance travelled per day by three teams is 16.48km and per month is 49.44km.

All data from these surveys were entered into the main database and preliminary results on trends were produced. Density estimates for the most common species (representing more than 10% of sightings) are reported in Table 7. Densities were estimated using the R software with automated model selection and truncation level of 5%.

The current period was compared to the same period in 2016, showing an overall increase in the four most common species (Figure 16). A comparison of least common species observations between 2016 and 2017 is included in Figure 17.

Figure 15: Map of CCF land and location of the Big Field showing the three transects driven monthly for game counts.

Table 7: Density estimates (individual/km^{2}with 95% confidence interval) of the most common species seen on Big Field in 2016 and 2017.

	2016			2017		
Species	**Mean**	**Lower CI**	**Upper CI**	**Mean**	**Lower CI**	**Upper CI**
Warthog (*Phacochoerus africanus*)	4.00	3.24	4.94	6.22	5.07	7.62
Springbok (*Antidorcas marsupialis*)	0.09	0.06	0.14	0.16	0.11	0.22
Red hartebeest (*Alcelaphus buselaphus caama*)	0.08	0.06	0.12	0.1	0.07	0.14
Oryx (*Oryx gazella*)	0.21	0.7	0.27	0.37	0.30	0.45

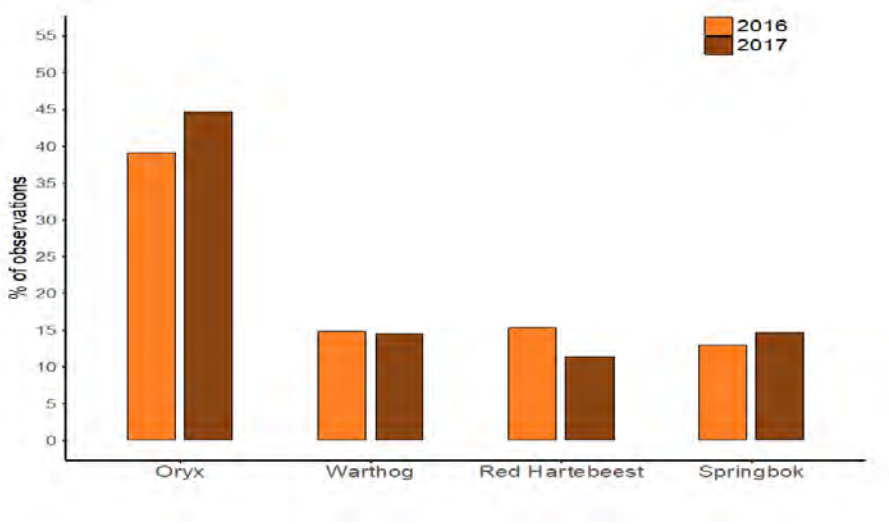


Figure 16: Number of sightings of the most common species during Big Field counts.

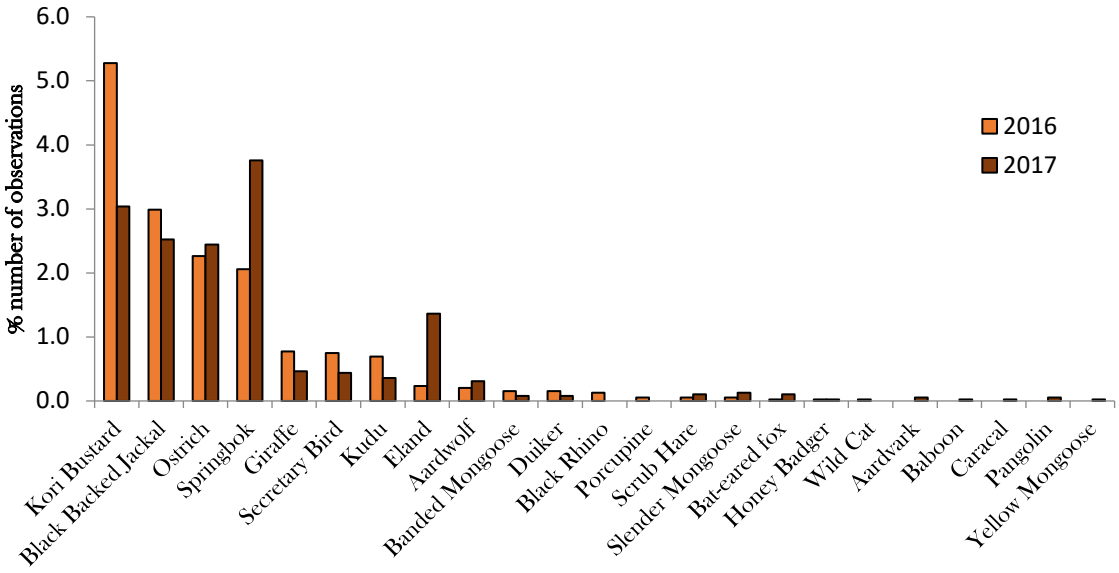


Figure 17: Distribution of least common species seen during the Big Field game counts in 2016 and 2017.

Circuit B Counts

Circuit B (27.4 km) is driven once a month and samples a larger diversity of habitats in the CCF reserve than the Big Field counts (Figure 18). During the reporting period, Circuit B counts have been conducted only twice and are now discontinued.

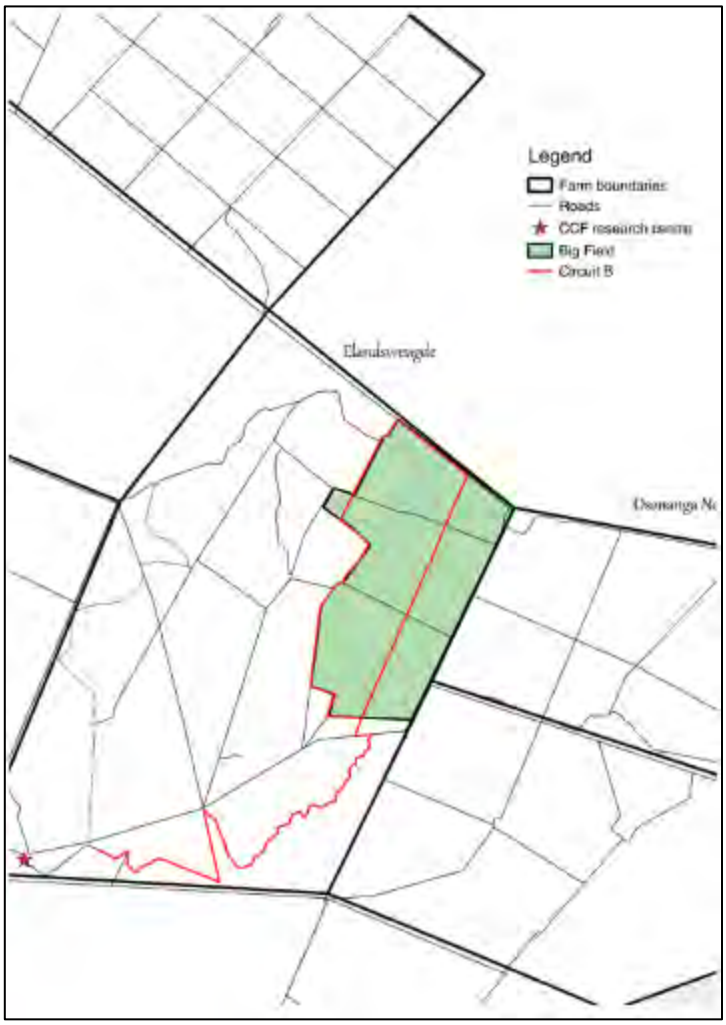


Figure 18: Location of Circuit B in farm Elandsvreugde.

Circuit B Night Drive

Circuit B was also driven once a month at night (7 to 10pm in winter, 8pm to 11pm in summer) using spotlights on both sides of the car. While all species seen were recorded, we report here only the nocturnal ones. The species most often seen was the Black-backed jackals for both 2016 and 2017, while duiker and scrub hares came second in 2016. Scrub hare and black-backed jackal made up most of the sightings in 2017 (Figure 19).

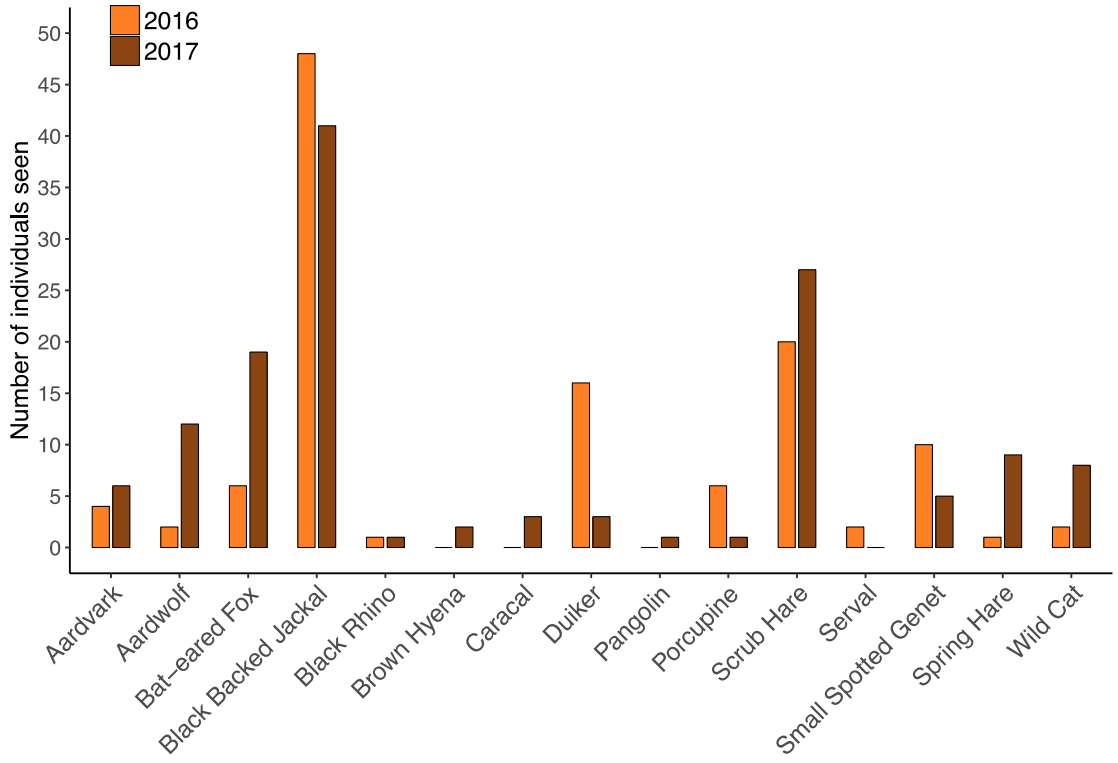


Figure 19: Sightings of nocturnal species during night counts in 2016 and 2017.

Bellebenno 12-hour Waterhole Counts

To assist in developing a management plan for the 4,000-ha game-fenced Bellebenno camp, CCF started 12-hour waterhole counts in 2008. These counts are conducted at 4 waterholes every second month from 6 am to 6pm by CCF volunteers and staff members. Species, group size, sex, and age classes are recorded. For each animal/group visiting the waterhole, we also record if they drink and/or make use of salt blocks.

In 2017, waterhole counts were conducted 6 times. A total of 1,652 animals were counted involving seven different species (Figure 20 through Figure 23).

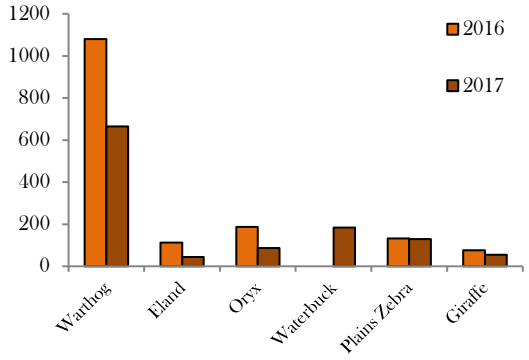


Figure 20: Frequently sighted herbivore species during the Bellebenno waterhole count.

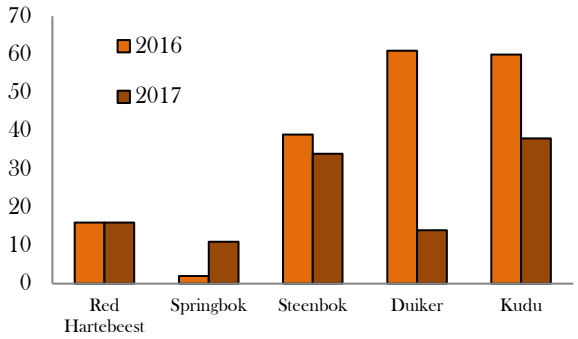


Figure 21: Infrequently sighted herbivore species during the Bellebenno waterhole count.

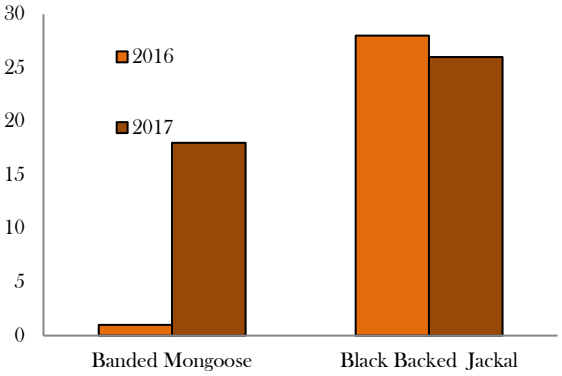


Figure 22: Frequently sighted carnivore species during the Bellebenno waterhole count.

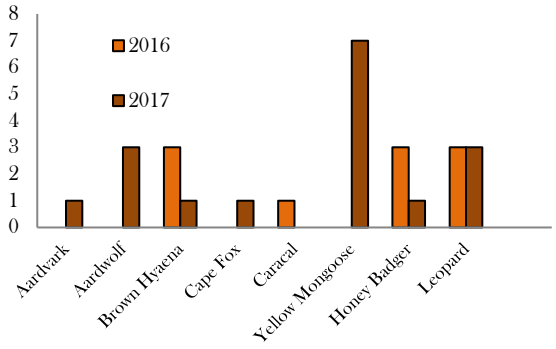


Figure 23: Infrequently sighted carnivore species during the Bellebenno waterhole count.

Annual waterhole counts

The annual 12h waterhole counts took place on the 24 July 2017. A total of 17 waterholes (Figure 24) were surveyed this year by teams of 2 observers comprised of CCF volunteers/interns/staff and Earth Expedition members.

Figure 25, Figure 26 and Figure 27 show the number of individuals seen of each species. Compared to 2016, fewer duiker, eland, and oryx were observed. Warthog were observed more frequently in 2016 than in 2017 and while waterbuck were not recorded for 2016, they were seen in 2017.

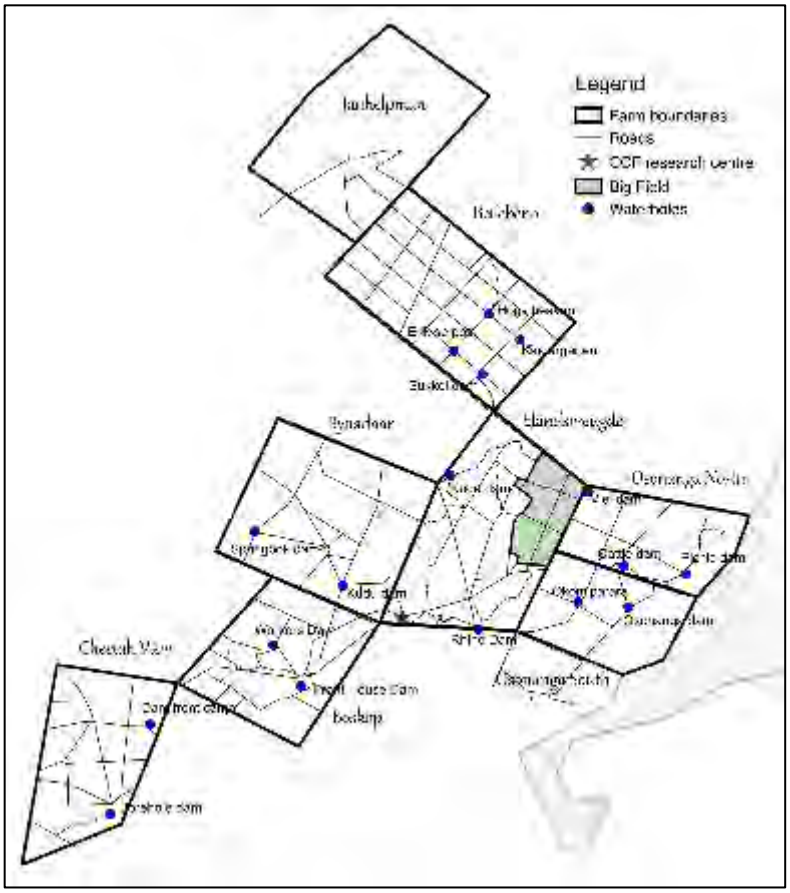


Figure 24: Location of waterholes surveyed during the annual 12-hour waterhole count.

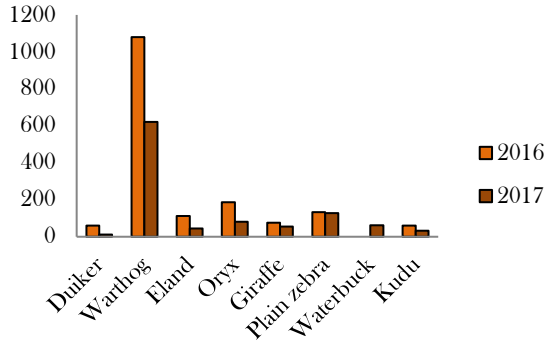


Figure 25: Most frequently observed species during the annual waterhole count.

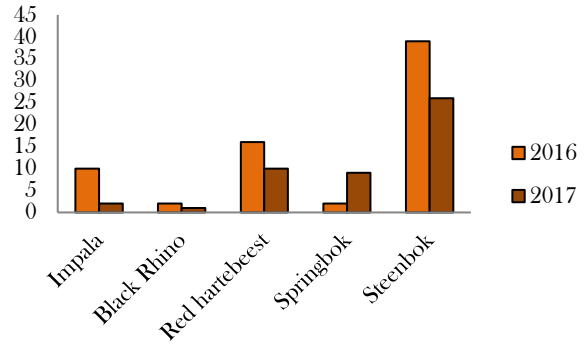


Figure 26: Infrequently observed species during the annual waterhole count.

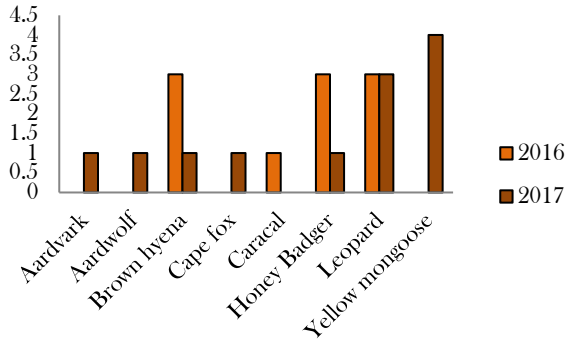


Figure 27: Least frequently observed species during the annual waterhole count.

Seasonal Count across CCF farms

Starting in July 2017, CCF began conducting seasonal, rather than only annual strip counts across all CCF farms. These seasonal counts follow transects used in the past for annual counts (Figure 28) with an added route to cover Osonanga farms. They are repeated twice (one morning and one afternoon count) for each season (wet, early and late dry). The seven transects cover a total of ~140 km (280 km including the repetitions).

At the time of writing, the cold and hot dry seasons sampling has been conducted and we estimated densities for the most commonly seen species following the same methods as for Big Field counts. Table 8 shows the density estimates for the most common species. Densities seem to be higher during the hot compared to the dry season, which could be the result of increased visibility due to reduced foliage during this season.

Table 8: Density estimates of main species counted during seasonal strip counts, by season.

	Density estimate (individual/km^2)		
Species	**Cold dry**	**Hot dry**	**Total**
Oryx (*Oryx gazella*)	6.3 (2.2-18.2)	13.2 (5.1-34.4)	9.7 (4.3-22.3)
Warthog (*Phacochoerus africanus*)	40.6 (15.0-109.7)	65.5 (24.5-174.9)	53.1 (24.4-115.1)
Red hartebeest (*Alcelaphus buselaphus caama*)	0.1 (0-0.3)	0.1 (0-0.3)	0.1 (0-0.2)
Springbok (*Antidorcas marsupialis*)	0 (0-0.2)	0.2 (0-0.7)	0.1 (0-0.4)
Steenbok (*Raphicerus campsetris*)	3.4 (2.0-5.8)	5.3 (3.2-8.8)	4.4 (2.8-6.9)
Eland (*Taurotragus oryx*)	2.0 (0.4-10.7)	4.2 (0.9-20.8)	3.1 (0.7-14.2)
Zebra	1.9 (0.4-9.4)	3.0 (0.6-16.2)	2.5 (0.6-10.7)

(*Equus burchelli*)

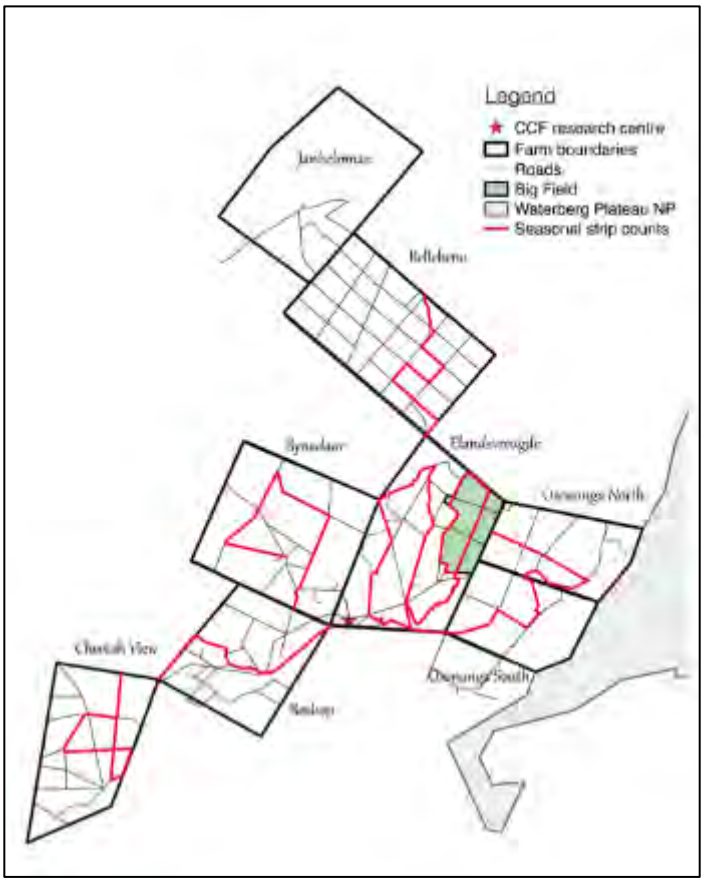


Figure 28: Location of the 7 seasonal strip counts transects on CCF land.

3. Bush Encroachment and Biodiversity

Bush encroachment is an environmental problem threatening Namibia's rangeland productivity, food security, and biodiversity conservation nationwide. However, it also has potential as a renewable source of alternative energy, especially in rural areas, and may alleviate electricity shortages projected to affect Namibia in the near future.

Research continued around CCF's Bushblok project in 2017. During this reporting period, CCF hosted two interns from NUST, Tangeni Aaron and David Shipingana, for a period of six months. The students undertook bioassay surveys using Moringa and Barley to determine seedling growth using soil samples from three different habitats (previously thinned sites) in order to determine the impacts of harvesting.

CCF, the University of Hamburg in Germany, and UNAM entered into an agreement to study the impacts of bush encroachment and bush clearing on soil and vegetation characteristics, and on the savannah water budget. This project is part of the Southern African Science Service Centre for Climate Change and Adaptive Land Management (SASSCAL). The project has three sites in Namibia and

includes CCF's farms. In November 2014, data collection equipment consisting of rain gauges and soil moisture meters, as well as remote digital data transmitters were installed in previously harvested sites and current bush-encroached sites on CCF farms Cheetah View and Boskop. Both UNAM and Hamburg partners continued with field research during this reporting period, with the involvement of their graduate students and faculty members.

In 2016, CCF's Ecologist and Forest Steward, Matti Nghikembua, conducted a soil survey to study the nutrient and mineral compositions (chemical and physical properties) between harvested and non-harvested bush encroached habitat in order to understand long-term natural regeneration and recovery of the soils and restored vegetation. A total of 15 harvested and non-harvested sites each were identified with different harvest ages for chronological sequence analysis. Researchers collected 648 samples at various depths of the top soils to characterise the physical and chemical properties of soils from harvested and non-harvested sites by chemical analysis: Nitrogen (N), Phosphorus (P) and Potassium (K); percent organic matter, organic Carbon; Exchangeable cations (Calcium, Magnesium, Potassium, Sodium), cation exchange capacity (CEC); Soil PH; and Physical properties (sand, silt and clay fractions). Samples were submitted to a laboratory for data extraction. The results will be utilised as a baseline for further ecological research and monitoring of harvested sites. The findings have applications to bush harvesting operations in both commercial and communal farmlands. The research will also provide necessary reference information to the public and for farmland management.

In 2017, as part of Matti Nghikembua's PhD research, a camera trap survey was conducted between harvested and non-harvested sites, spanning over three commercial farms owned by CCF. Twenty-six camera trap stations were operated and replicated once per study area, yielding a total of 1,092 trap nights and 10,483 correctly identified images. The aim of the survey is to examine impacts associated with reversing bush encroachment and identify whether bush thinning enhances wildlife diversity, richness and habitat use.

4. CCF Rhino Reserve

CCF continues to monitor its 14.6 km^2 rhino reserve, where a small population of south-western black rhinos (*Diceros bicornis occidentalis*) resides. The rhinos are part of the Namibian Ministry of Environment and Tourism's (MET) Black Rhino Custodian Programme. CCF utilises various methods to monitor the rhinos, including camera traps permanently running.

On the 25 May 2017, a neighbour reported a badly limping rhino and an MET team was called in to immobilise and assess the situation. They immobilised the rhino on the same day, treated a foot wound and dehorned the individual. From 12 to 15 June 2017, an MET team visited CCF to monitor the rhinos as well. They spent a night at key waterholes and tracked in the mornings.

5. Play Tree Research

Namibian cheetahs are known to frequent what have been termed 'play trees', which are normally large and visually conspicuous trees used for territorial marking and social interactions.

Olfactory communication, such as scent-marking, plays a vital role in the conspecific interactions of numerous mammalian species because it allows for communication in the absence of the sender.

Furthermore, every mark can possess detailed information about the sender. Namibian cheetahs are highly selective when choosing sites for scent-marking.

Since the first initial survey in 2005, CCF has been monitoring play trees on its land on a permanent basis. In June 2017, camera traps were deployed at 5 play trees and 39 pictures of cheetahs collected (Figure 31). Of these, 23 were of Eli (AJU1732 - collared individual) and the individual(s) on the remaining 16 pictures could not be identified.

Figure 29: A few camera trap photos of cheetahs at play trees.

6. Giraffe Identification

Cheetah Conservation Fund started to document and identify giraffes in 2003. This year, these identifications were double-checked and put into an ID master list. Thus far, 120 individuals have been identified, and there are potentially an additional six individuals that have not been verified due to poor quality photos. Approximately 65 to 70 individuals are found in Bellebenno, and 35 to 40 in the Reserve. There is a total of 35,947 giraffe photos with 534 photos left to be sorted as of December 2017. All the sorted photos have been double-checked to ensure that they have been sorted into the correct individual's folder. Analysis of the giraffe data is due to start in 2018.

Figure 32 shows the number of newly identified individuals in each location per sex and age class. Overall, the largest numbers of each age class have been identified in Bellebenno: 14 adults, 15 sub-adults, and 20 calves. It is possible that due to the mostly-closed nature of Bellebenno (game-fenced), it is much easier to capture and identify new individuals, whereas the Reserve is an open system that does not restrict giraffe movements in and out.

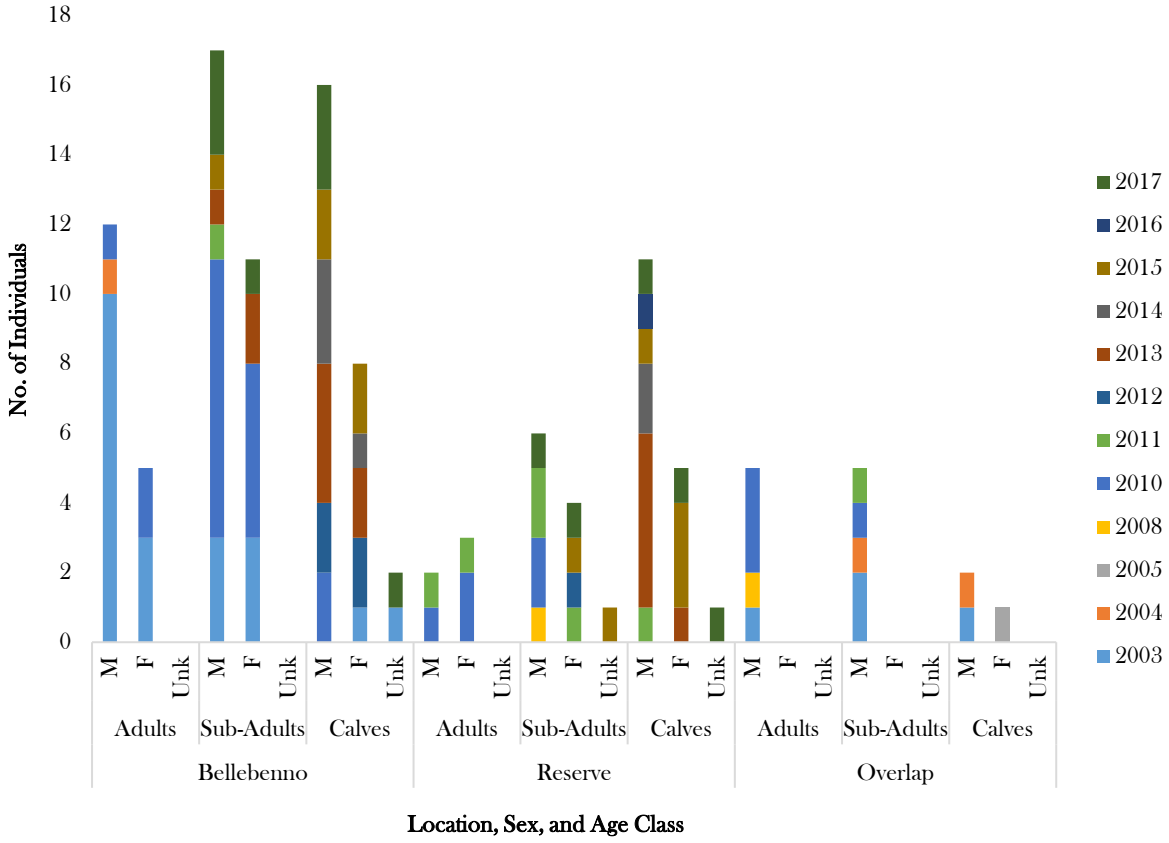


Figure 30: The location, age, and sex of newly identified giraffes from 2003 to 2017. All ages are based upon the year the individual was first observed. Calves are individuals estimated to have been born the year they were first observed, sub-adults are individuals between the estimated ages of two and four, and adults are individuals estimated to be five years old or older. The individuals that have been observed in both Bellebenno and the Reserve are categorized under "Overlap."

7. Visiting Researchers

Dr Mark Stanback: Bird Research

Dr Stanback is an avian behavioural ecologist from Davidson College, North Carolina, USA. Mark first travelled to Namibia over 30 years ago to study hornbills. Over the past few years, he has returned and has established a study site at CCF to research the breeding biology of Monteiro's hornbills, Southern yellow-billed hornbills, and Damara red-billed hornbills. Mark plans to address multiple questions during the 2018 breeding season:

- What is responsible for the unusual variation in rates of egg production among females?
- Will supplementing females with additional food cause them to lay more or larger eggs, faster?

- What is the rate at which stored sperm is depleted from the sperm storage tubules within the female oviduct?
- Do females incorporate testosterone into their later-laid eggs to help those chicks compensate for hatching so much later than their earlier-laid siblings?
- Do females use tactile or visual cues to signal the termination of egg production?
- Does the darkness of the nest cavity help stimulate the simultaneous molt of flight feathers?
- Do nutritionally-limited chicks allocate energy differently to development than do well-fed chicks?
- Do hornbills (*Bucerotidae*) have a preen gland microbiome similar to that of their relatives, the hoopoes (*Upupidae*)?

In addition to these hornbill questions, Mark is also investigating the importance of lesser honeyguides in maintaining the availability of tree cavities for other cavity-nesting species. Because African honeybees abandon their hives frequently, one might expect that over time, most local tree cavities would become filled with old wax comb. However, honeyguides are unusual in that their primary source of nutrition is beeswax. If honeyguides, rather than invertebrates, are responsible for the disappearance of most wax, they would be acting as a keystone species.

Andrea Surovek and Hannah Mohen: Termite Research

Andrea Surovek and Hannah Mohen from the South Dakota School of Mines and Technology visited CCF in May, and then December 2017. Their main objective is to understand the relationship between internal mounds structures and their external forms, how they ventilate, and how the structures can be correlated to external climate. During their visits, they have installed a weather station at Cheetah View and established a WIFI connection to upload the data to cloud storage for future analysis. They have also done the following;

- performed basic soils tests to determine moisture content of fresh built termite soils;
- developed a small library of 3D termite mound models using 360 photo capture techniques; and
- performed a "slice and scan" of 2 mounds to develop models that consider both internal tunnels and external form.

G. Scientific Publications and Papers

1. Books

Marker, L., Boast, L. and Schmidt-Küntzel (Eds.). (2018). *Biodiversity of the World: Cheetahs: Conservation from Genes to Landscape*. Elsevier. San Diego, CA.

2. Book Chapters

Marker, L., Grisham, J. and Brewer, B. (2018). A brief history of cheetah conservation. In. L. Marker, L.K. Boast & A. Schmidt-Küntzel (Eds.*), Biodiversity of the World: Cheetahs: Biology and Conservation* (pp. 3 – 14). San Diego: Elsevier.

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Jeo, R.M., Schmidt-Küntzel, A., Ballou, J.D. Sanjayan, M. (2018). Drivers of habitat loss and fragmentation: implications for the design of landscape linkages for cheetahs. In. L. Marker, L.K. Boast & A. Schmidt-Küntzel (Eds.), *Biodiversity of the World: Cheetahs: Biology and Conservation* (pp. 137 – 147). San Diego: Elsevier.

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4. Submitted Papers

Stanback, M., Millican, D., Visser, P. and Marker, L. The simultaneous moult of female hornbills is not triggered by the darkness of their nest cavity**.** Submitted to Ostrich.

Schmidt-Küntzel, A., Stoneburg, D., Mujaj, S.A., Barley, S.J. and Marker, L. The common causes of cheetah (*Acinonyx jubatus*) death in captivity – A 30-year retrospective study from 1980 to 2009. Submitted to Zoo Biology.

5. Papers in Preparation

Khwaja, H., Schmidt-Küntzel, A., Crosier, A. and Marker, L. Analysis of ovarian activity in group-housed captive female cheetahs (*Acinonyx jubatus*) using vaginal cytology (in prep)**.**

Marker, L., Walker, E. H., Richmond-Coggan, L. Nghikembua, M. and Schmidt-Küntzel, A. The release of captive-raised cheetahs in Namibia: management implications and lessons learned (in prep)**.**

Fabiano, E. C., Sutherland, C., Fuller, A., Nghikembua, M., Eizirik, E. and Marker, L. Trends in cheetah *Acinonyx jubatus* abundance and density in the Waterberg Conservancy, north-central Namibia (in prep)**.**

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IV. Conservation

Whether perceived or real, livestock loss to cheetahs is an economic and emotional issue as farmers' livelihoods depend on the economic success of their livestock and wild game industries. While many Namibian farmers are very respectful of nature and tolerate a certain level of loss, some resort to lethal predator control rather than alleviating their problems in a non-lethal manner through appropriate livestock and predator management. By addressing livestock-predator conflict through a conservation management strategy that benefits both humans and cheetahs, CCF is ensuring the long-term species' survival on Namibian farms and has raised greater awareness of better farm practices.

A. Livestock Guarding Dog Programme

1. Programme Overview

CCF's Livestock Guarding Dog Programme (LGD) continues to be one of the most successful conservation projects to assist farmers with predator conflict in Namibia. To date, CCF has placed 589 (301M, 288F) Livestock Guarding Dogs with farmers throughout Namibia and other parts of Africa. As of December 2017, there were 200 (92M, 108F) dogs alive in the programme (Table 9), of which 174 (80M, 94F) are working dogs, five (2M, 3F) are puppies in training at CCF, and 21 (10M, 11F) are retired or housed as pets.

Table 9: Dogs alive as of 31 December 2017.

Location	M	F	Total
Commercial	26	27	53
Commercial (CCF Working)	5	14	19
Commercial (CCF Puppies)	2	3	5
Communal	24	31	55
Emerging Commercial	13	10	23
Resettled	9	9	18
South Africa	1	1	2
Kenya	1	0	1
Tanzania	1	2	3
Total Working	**82**	**97**	**179**
Retired/Pet (breeding)	10	11	21
Total dogs alive:	**92**	**108**	**200**

CCF began a collaboration with the Ruaha Carnivore Project (RCP) in Tanzania in 2013, which is working to mitigate human-carnivore conflict in the Ruaha area. A large part of this conflict is driven by attacks on livestock, so CCF has provided RCP with a total of 10 (5M, 5F) puppies throughout the years to protect livestock of Maasai and Barabaig farmers. The programme has been quite successful and due to this success RCP will begin their own breeding programme in the future with one intact female provided by CCF. Unfortunately, one of the male dogs placed in 2013, Shujaa (SB# 521), died on 2

December 2016 from what the local vet believes to be Trypanosomiasis, a parasite in the blood caused by biting insects. CCF was only informed in February 2017. One of the females placed in 2013, Jasiri (SB# 522), was killed by a lion on 3 January 2017. RCP has always been worried about the risk of a dog being killed by a lion, but it has been found that other dogs have successfully chased off lions so this was just an unfortunate event. In December 2017, Busara (SB# 579), RCP's intact female, was killed by a cobra. CCF hopes to send a new breeding dog in 2018 to help continue the programme.

CCF has also donated numerous puppies over the years to Cheetah Outreach, another facility who works to save the wild cheetah in South Africa, to help form their own livestock guarding dog programme. Since the trial programme was so successful in 2005, they also began breeding and providing Anatolian shepherds to South African farmers after the CCF model. The programme is key in helping farmers protect their livestock and thus save more cheetahs. In December 2017, CCF donated a male puppy from Aleya, SB# 707, to their programme as they needed a new breeding male.

Currently, there are 17 (5M, 12F) intact dogs in CCF's programme (Table 10), of which 11 (2M, 9F) reside at CCF as working dogs, four (2M, 2F) work on commercial farms, and two (1M, 1F) are in South Africa. Susie (SB# 628) was returned to CCF on 1 August 2017 as the farmer had sold most of his livestock and no longer needed both dogs since his numbers had greatly decreased; he also had a sterilised Anatolian via an agreement. Susie will stay permanently at CCF for breeding purposes. Five dogs were removed from the programme in 2017 for the following reasons:

- Ray (SB# 664) was hit and killed by a car on CCF's property,
- SB# 658 (no name), was stolen from her pet home in December 2016 and despite numerous efforts to search for her, she was not found,
- Max (SB# 423) died from a snake bite or scorpion sting in November 2016, but CCF was only informed in November 2017,
- Tiny (SB# 392) is retired from breeding,
- Busara (SB# 579) was killed by a cobra.

Table 10: Intact livestock guarding dogs as of 31 December 2017.

SB#	Dog Name	Born	Sex	Working/Pet	Farm Type	Country
277	Uhtaya	9/30/2004	M	Pet	N/A	South Africa
324	Wagter	9/18/2007	M	Working	Commercial	Namibia
451	Kiri	2/10/2010	F	Working (CCF)	Commercial	Namibia
424	Aleya	7/5/2010	F	Working (CCF)	Commercial	Namibia
405	Pandora	8/5/2010	F	Pet	N/A	South Africa
431	Firat	8/31/2010	M	Working (CCF)	Commercial	Namibia
456	Kaspaas	2/1/2012	M	Working	Commercial	Namibia
487	Lady	2/17/2013	F	Working	Commercial	Namibia
490	Taya	2/17/2013	F	Working (CCF)	Commercial	Namibia
498	!Us	4/2/2013	F	Working	Commercial	Namibia
507	Repet	4/11/2013	F	Working (CCF)	Communal	Namibia
524	Karibib	2/10/2010	F	Working (CCF)	Commercial	Namibia
535	Lady	9/10/2012	F	Working (CCF)	Commercial	Namibia

628	Susie	11/11/2015	F	Working (CCF)	Commercial	Namibia
660	Bolt	5/20/2016	M	Working (CCF)	Commercial	Namibia
709	April	8/1/2017	F	Working (CCF)	Commercial	Namibia
718	Tika	8/8/2017	F	Working (CCF)	Commercial	Namibia

The LGD programme is a crucial part in CCF's mission to conserve the wild cheetah and its continuing success is due to the efforts of dedicated CCF staff. Gebhardt Nikanor has worked on placing dogs with farmers for over 10 years. Paige Seitz arrived in December 2013 to manage the programme.

2. Breeding and Puppy Placements

Since the programme's inception, 75 litters have been born at CCF for a total of 633 (306M, 312F, 15U) puppies. From January to December 2017, a total of 48 (23M, 25F) puppies were born to six of CCF's breeding females (Table 11). From the 2017 litters, three (2M, 1F) puppies were stillborn and there was one female puppy death. A total of 47 puppies (22M, 25F) were placed during this period, including eight puppies born in December 2016. Five puppies (2M, 3F) born in November 2017 will be placed in January 2018.

Table 11: Puppies born and type of placement as of 31 December 2017 (K = Commercial Farm; C = Communal Farm; EC = Emerging Commercial Farm; R = Re-settled Farm; P/B = Pet/Breeder; D = Dead; NP = Not Placed; IP = Intact Puppies).

Sire/Dam	431/524		431/490		431/451		660/535		660/424		660/507		660/628		**Totals**	
DOB:	19Dec'16		5Apr'17		5Jun'17		2Jul'17		1Aug'17		8Aug'17		15Nov'17			
Sex:	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
K	1	2	0	0	2	0	0	2	0	1	1	2	0	0	**4**	**7**
C	1	3	1	3	4	2	4	1	0	1	2	4	0	0	**12**	**14**
EC	0	0	0	1	0	1	0	0	0	0	0	0	0	0	**0**	**2**
R	1	0	0	1	1	1	1	0	0	0	2	0	0	0	**5**	**2**
P/B	0	0	0	0	0	0	0	0	1	0	0	0	0	0	**1**	**0**
D	1	3	0	2	0	0	1	0	0	0	1	0	0	0	**3**	**5**
NP	0	0	0	0	0	0	0	0	0	0	0	0	2	3	**2**	**3**
Total	**4**	**8**	**1**	**7**	**7**	**4**	**6**	**3**	**1**	**2**	**6**	**6**	**2**	**3**	**27**	**33**
IP	0	0	0	0	0	0	0	0	1	1	0	1	2	3	**3**	**5**

- In 2016, Karibib (SB# 524) was bred with our Kangal male, Firat (SB# 431), for the third time. She gave birth to 12 (4M, 8F) puppies on 19 December 2016. One (1F, SB# 678) was a stillborn. The necropsy showed that the puppy never took a breath, but no other conclusions could be determined. One (1F, SB# 677) died two days after being born; we believe Karibib laid on her by mistake. One (1M, SB# 670) was euthanised on 4 January 2017 due to decreasing health. The necropsy showed a possibility of vascular ring anomaly, which occurs when a congenital heart abnormality causes the oesophagus to become compressed. One (1F, SB# 672) was euthanised on 7 February 2017 after decreasing health. She always had trouble with bloating after eating and despite a diet change and seeming healthy otherwise, she eventually just crashed. The necropsy showed the cause was probably a viral infection picked up at birth or in the womb. However, all

other puppies were healthy. Six puppies were placed on farms between February and March 2017, while two puppies (SB# 667 and SB# 675) were not placed until April 2017 due to tick bite fever (for more information look under section 4, Dog Health). One male went to a resettled farm. One male and three females went to communal farms. One male and two females went to commercial farms. One of the males (SB# 669) placed on a commercial farm is the first puppy from CCF to be placed with cattle. The introduction to the herd has been slower than it will be for small stock as cattle are much larger and not as accepting, but they are gradually accepting the puppy and he is going out with the herd. The puppy is making good progress.

- Taya (SB# 490) was bred with our Kangal male, Firat (SB# 431), for the third time. She gave birth to eight (1M, 7F) puppies on 5 April 2017. One (1F, SB# 686) was a stillborn. The necropsy showed that the puppy never took a breath, but no other conclusions could be determined. One (1F, SB# 681) passed away on 10 April 2017. She exhibited similar symptoms to the puppies in Karibib's litter. Organ samples were sent in to Pathcare in South Africa to see if anything could be determined. The results showed a possible bacterial infection which may have already been acquired in the uterus. One (1F, SB# 680) also had a low temperature that day and was brought in to CCF's clinic. After SB# 681 passed, SB# 680 was sent in to the veterinary clinic in town to have blood work and any other necessary tests that could not be completed at CCF. She survived the night and since she was the runt of the litter we believe she just had gotten too cold. All remaining puppies were placed in the beginning of July 2017. One male and three females were placed on communal farms. One female was placed on a resettled farm and one female was placed on an emerging commercial farm.

- Kiri (SB# 451) was bred with our Kangal male, Firat (SB# 431), for the sixth time. She gave birth to 11 (7M, 4F) puppies on 5 June 2017. All puppies survived and are healthy. All puppies were placed in August 2017. Two males were placed on commercial farms. Four males and two females were placed on communal farms. One female was placed on an emerging commercial farm and one male and a female on resettled farms.

- Lady (SB# 535) was bred with our Kangal male, Bolt (SB# 660), for the first time. She gave birth to nine (6M, 3F) puppies on 2 July 2017. One male (SB# 703) was stillborn. The necropsy showed that the puppy never took a breath, but no other conclusions could be determined. They were all placed in September 2017. One male was placed on a resettled farm and two females on commercial farms. Four males and one female were placed on communal farms. Three of the males (SB# 698, SB# 699, SB# 701) placed on communal farms were placed in the Opuwo district via the Tusk Trust Grant.

- Aleya (SB# 424) was bred with our Kangal male, Bolt (SB# 660), for the first time. She gave birth to three (1M, 2F) puppies on 1 August 2017. All puppies survived and are healthy. One female (SB# 708) was placed on a communal farm in October 2017. The second female (SB# 709) stayed at CCF for working and breeding purposes. The male (SB# 707) puppy was donated to Cheetah Outreach in South Africa for their breeding programme.

- Repet (SB# 507) was bred with our Kangal male, Bolt (SB# 660), for the first time. She gave birth to 12 (6M, 6F) puppies on 8 August 2017. One male (SB# 715) was stillborn. The necropsy showed that the puppy never took a breath, but no other conclusions could be determined. One female (SB# 718) stayed at CCF for working and breeding purposes while all other puppies were placed in October 2017. Two males were placed on resettled farms. One male and one female were

placed on commercial farms. Two males and four females were placed on communal farms. Of the six puppies placed on communal farms, one male (SB# 714) and one female (SB# 720) were placed in the Opuwo district via the Tusk Trust Grant.

- Susie (SB# 628) was bred with our Kangal male, Bolt (SB# 660), for the first time. This was Susie's first litter as well. She gave birth to five (2M, 3F) puppies on 15 November 2017. All puppies survived and are healthy. Puppies will not be placed until the end of January 2018.

The farmers receiving puppies participated in CCF's mandatory one-day course 'Puppy Information Day', where the farmers are trained on the correct methods of raising a livestock guarding dog. The courses cover care and training of livestock guarding dogs, as well as predator-friendly livestock management.

3. Follow-up on Prior Placements and Health Survey

Before any dog is placed on a farm in Namibia, CCF conducts a pre-approval farm visit to ensure that the farm has the facilities and capabilities to ensure the health and wellbeing of the dog, and that it can provide the right conditions for the dog to succeed as a livestock guarding dog. After a puppy is placed, CCF performs follow-up visits at three, six, nine and 12 months of age, and then yearly, to ensure the health and success of each dog. When dogs are found to be unhealthy or not doing their job, they are removed from that specific farm, evaluated, and placed on another farm if deemed pertinent or placed as pets if they are no longer able to work as livestock guarding dogs due to health or behavioural problems.

In 2017, CCF staff visited 231 (109M, 122F) dogs, this number includes dogs counted multiple times because they have been visited several times throughout the year to complete their required 3-month, 6-month, and 1-year visits or follow-up visits. Of the 231 dogs, 31 (12M, 19F) received their one-year of age visit. The dogs were vaccinated against rabies and other canine diseases, had an overall health check, and were evaluated on their working success. The following are some outcomes and findings from the visits:

Dog Deaths

- D- Nelson (SB# 361), a pet dog, died from old age in 2016. CCF was only informed in 2017 when calling for an update on the dog.

- D- Cleo (SB# 260), a pet dog, passed from old age in November 2016. CCF was not informed until 2017 when calling to check in on the dog. The owner informed us she sent an email, but unfortunately, we did not receive it.

- D- Max (SB# 423), a working dog on a commercial farm, died from either a snake bite or scorpion sting in November 2016. CCF was only informed in 2017 when calling to schedule a farm visit.

- D- Ngaihupe (SB# 601), a working dog on a resettled farm, died from a snake bite in December 2016, but CCF was only informed in May 2017 when we called to schedule a visit.

- D- Ariel (SB# 606), a working dog on a commercial farm, died from an unknown illness in December 2016. CCF was only informed in June 2017 when we called to schedule a visit.

- D- Bushman (SB# 560), a working dog on a resettled farm, died from a snake bite in January 2017.

- D- Fisher (SB# 661), was confiscated from his communal farm on 26 January 2017 as he was said not to be working properly as he had possibly bonded to the house dog at the farm. Upon arrival the dog's condition was not ideal, he had a high load of internal parasites, and he had a bad wound in his inner thigh. Fisher was treated for all of these issues and then re-evaluated with CCF's herd. He proved to do well with our herd and was then re-homed to a commercial farm on 17 March 2017. He was kept healthy at his new farm and was working well, but unfortunately, he passed away from a snake bite in June 2017.

- D- A working dog (SB# 663), on a communal farm died from an unknown cause in February 2017.

- D- Max (SB# 453), a previous working dog turned pet dog, died on 28 February 2017. The farmer believes the cause of his death is from tongue cancer as he was affected and it was becoming difficult for him to eat. The farmer received a re-homed working dog on 14 June 2017, Wagter (SB# 654).

- D- Zulu (SB# 234), a pet dog, died in March 2017 from old age. The owner is interested in a new pet dog.

- D- Looker (SB# 589), a working dog on an emerging commercial farm, disappeared from his farm in April 2017; he is presumed dead.

- P- Wolf (SB# 497), a working dog on a resettled farm, is now considered a pet since April 2017. CCF was not informed until November 2017 when scheduling a farm visit. The farmer took the dog to his home as he felt his workers were neglecting the dog and now his family has become attached and the dog will stay permanently.

- D- Johnny (SB# 561), a re-homed working dog on a communal farm, died from a snake bite on 11 April 2017. This farmer will receive a puppy from Taya's 2017 litter due to the proper care she provides to her dogs and her satisfaction with the LGD programme.

- P- Katepe (SB# 504), a working dog on a commercial farm, was confiscated on 18 April 2017 due to malnourishment. After gaining weight and strength, Katepe was re-evaluated with CCF's herd. Unfortunately, her chase instinct is extremely strong and she got in a fight with a warthog causing a wound to her back-left leg. CCF's herder said that she would not listen to his verbal reprimand and would not stop going after the warthog. We believe this could be the result of her hunting at her previous farm due to her lack of proper food. Although her leg wound has healed, she will be re-homed as a pet to prevent any incidents at a farm. This farmer will not receive any more dogs from CCF due to the improper care provided to Katepe. After gaining weight, she was re-homed as a pet dog on 21 July 2017. She has adapted well to her new home and plays all the time with the owners' two huskies. The owners wanted a dog for guarding the house as well and they are very happy with her skills.

- D- Spot (SB# 261), a pet dog, died from old age in May 2017. CCF was only informed in November 2017 when calling for a yearly update. The owner is interested in a new pet dog.

- D- Smaller (SB# 499), a working dog on a commercial farm, died in July 2017 from an unknown illness. She had become a pet in May 2017 as she no longer wanted to work.

- D - Boy-Boy (SB# 564), a working dog on a communal farm, disappeared from his farm at the end of May 2017. The farmer believes he was bitten by a snake out in the veld and passed on as they could not find him anywhere. He is presumed dead. The farmer will receive a dog from Kiri's 2017 litter as he has always taken great care of his dog.

- D- Remember (SB# 543), a working dog on a communal farm, died from a snake bite on 20 May 2017. This farmer is receiving a new puppy from Taya's 2017 litter as he has always taken good care of his dog.

- D- Spikey (SB# 450), a working dog on a communal farm, was killed by a snake bite on 2 June 2017. This farmer received a re-homed working dog, Susie (SB# 634), due to the good care he always provided to his dog and to his satisfaction with the LSGD programme.

- D- Witvoet (SB# 399), a working dog on an emerging commercial farm, was confiscated on 28 June 2017. The dog was in good health at his visit last year, but this year he was extremely malnourished and recently bitten by a snake. When CCF visited the farm, there was no chance of saving the dog, he had no fat on his bones, he could barely move, and had a large abscess on his neck from the snake bite. He was euthanised on his day of arrival at CCF. The necropsy revealed that he had a hole under his tongue which would have inhibited his eating abilities. This was probably the increasing effect of the dog's tongue cancer. The snake bite looked untreated and due to necrosis, death of body tissue, of the neck and throat it was assumed to be a puff adder since they release cytotoxins, a cell destroying toxin. Kidney damage was also seen which probably was also caused by the toxins from the snake bite. Although CCF was aware of the dog's tongue cancer, the farmer had not contacted CCF when the dog's eating abilities decreased and allowed the dog to get to an untreatable state. This farmer will no longer received any dogs from CCF.

- D- Cheetah (SB# 534), a working dog on a communal farm, died from a snake bite at the end of July 2017. The farmer requested a new dog as he was very satisfied with the protection she provided his livestock. The farmer received a new puppy from Repet's litter in October 2017 as he always took good care of his previous dog.

- D- Murize (SB# 671), a working dog on a communal farm, died from unknown causes in the field while working on 13 August 2017. The farmer received a new puppy in September 2017 from Lady's litter as the previous dog was working well and was well taken care of.

- D- Bobby (SB# 281), a pet dog, is presumed dead as of November 2017 as the farmer who owned him has died. CCF has tried contacting several other people, but no one is aware of the dog or his location.

Rehomed dogs

- R- Office (SB# 593), a working dog on a communal farm, was returned to CCF on 24 October 2016 as after a farm visit by Gebhardt via the farm manager's request, Gebhardt determined the dog was too used to staying around the homestead. He also had mange, which was being treated by the farmer. He had not been working since May 2016 despite suggestions given by CCF. After treatment at CCF and being re-evaluated with CCF's herd, he was re-homed on 27 January 2017 to an emerging commercial farm. He was visited in May 2017 to check on his condition and working skills and the herder said he has adapted well to the sheep. Office was also in very good condition.

- R- Sheperd (SB# 599), was returned from his communal farm on 9 February 2017 as he had started killing the farmer's sheep. CCF is unsure of the cause as Sheperd had grown up around the sheep since he was delivered to the farm in 2015, the farmer did not add any new sheep to the herd, and the dog was in great condition upon arrival at CCF. Sheperd was re-evaluated with CCF's herd and was a bit aggressive towards the sheep, but our herder used verbal reprimand and he would leave them alone. However, as a precaution he was re-homed to a communal farm on 28 March 2017 that only farmed with goats. Sheperd was working well at the farm, but the goats only graze in a small area so at night he would still have lots of energy and would try to play with them, the farmer asked us to pick him up on 13 June 2017. Sheperd was re-evaluated with CCF's herd and re-homed to a commercial farm on the 7 August 2017. After a few check-up visits to see Sheperd's condition and progress at the farm, we believed the farmer was not capable of properly caring for Sheperd and he was removed on 25 September 2017. He will stay at CCF permanently as a working dog.

- R- Lady (SB# 306), a working dog on a resettled farm, was brought in to CCF on 14 March 2017 due to illness. The farmer contacted us saying she was not eating for a few days and was very lethargic although she still tried to follow the herd. When she arrived at CCF she was very skinny and weak. CCF collected a blood smear, as tick bite fever is the prime cause of sickness in farm dogs. Some of her cells on the slide looked odd so we started her on a dose of Doxycycline and in 3 days she began looking better. She quickly started putting weight back on and gaining her strength again. Lady was kept at CCF for most of her medication course to make sure she was back to complete health and then she was returned to her farm on 3 April 2017 with one more week of her medication. CCF re-visited her in June 2017 to vaccinate her and deworm her and she still looks in excellent condition and is working well.

- R- Susie (SB# 634), was returned from her communal farm on 26 April 2017 as the farmer said she did not work as well as his previous dog, that was not from CCF, and that the people watching over her at the farm did not take proper care of her. Upon arrival at CCF, Susie was skinny, had fleas and ticks, and tapeworms, but seemed to have a working drive. She was re-evaluated with CCF's herd and worked very well. She was then re-homed on 8 June 2017 to a different communal farm. Susie was visited in July 2017 to see her progress. She is working very well at her new farm and is still healthy and in good condition. Her previous farmer will not receive another dog as despite the actions of his workers, he could have provided tick and flea prevention and de-wormer for his dog, thus preventing some of these issues.

- R - Wagter (SB# 654), a working dog on a communal farm, was returned on 7 May 2017 as she was said to not be working despite efforts from the farmer. When she arrived at CCF, she was in

excellent condition, but we could see her working drive was a bit low. CCF's herder took her out with our herd and re-evaluated her working skills. It took a bit of time, but she quickly re-learned her job. She was re-homed on 14 June 2017 to a resettled farm. Wagter was visited in July 2017 to see her progress, and she has settled in very well there. She is well bonded to the goats and goes out every day without a herder.

- R- Cheetah (SB# 567), a re-homed dog on a commercial farm, was confiscated on 30 May 2017 due to being underweight, visiting other farms (due to bonding with a mongrel on her farm), and having mange. She was treated with Bravecto for her mange and took time to heal, but returned to normal weight and behaviour. After being re-evaluated with CCF's herd, Cheetah was re-homed on 22 August 2017 to a communal farm as a working dog. Her progress and condition were checked on in September 2017 and she is doing great. The farmer is very satisfied with her.

- R- Pula (SB# 622), a working dog on a commercial farm, was returned to CCF on 29 June 2017 as he was found to be killing and eating the farmer's wool producing karakul sheep in the kraal and veld; however, the dog was fine with the goats at the farm. The farmer had contacted CCF first on 5 January to inform us of this issue. It was suggested to the farmer to use a run wire at night and to have someone escort Pula in the veld to see if he would stop with verbal reprimand. It is not believed that the farmer tried these suggestions, but the dog stopped killing the sheep so the farmer decided to try one more time with the dog. No response was received when the farmer was contacted in February to check on the dog. On 26 June, the farmer requested CCF to pick up the dog as he had started killing sheep again. The farmer said he had not added any new sheep to the herd, but the workers on the farm said the sheep were only recently added which would explain the incidents. He was re-evaluated at CCF and was fine with the Damara sheep. Upon arrival he was quite underweight as well. As a precaution, he was re-homed in October 2017 to a commercial farm that only farms with goats. He was visited in December 2017 and is said to be working well and in good condition.

- R- Spike (SB# 657), a working dog on an emerging commercial farm, was confiscated. We believe the farmer was struggling to care for two dogs as her other dog was always in great condition until she received a new puppy. After getting back to ideal weight and being re-evaluated with CCF's herd she was re-homed to a commercial farm on 7 November 2017. The farmer's other dog, Pohamba (SB#616), was not working despite efforts so was traded out for Spike. Spike was visited at the end of November 2017 to check on her condition and how she was adjusting to the farm. The farmer is very satisfied as she is working well with the livestock and herder. She was also found in great condition.

- R - Dog (SB# 675), a working dog on a commercial farm, was confiscated on 6 November 2017 due to malnourishment. She was severely underweight and her growth has been stunted. This farmer will never receive another dog from CCF. Dog will stay at CCF until she is healthy and then will move to CCF's herder, Armas Shanika's farm to become his new working dog as her working skills were never an issue.

- R- Pohamba (SB# 616), a working dog on a commercial farm, was no longer following the herd so she was traded on 7 November 2017 for Spike (SB#657), a previously confiscated dog at CCF who was ready for placement. Pohamba is in decent condition, but was not willing to follow the herd despite the farmer's efforts. She will be re-evaluated with CCF's herd and then a decision will be made on whether she can be placed as a working dog or a pet.

- R- Penomundu (SB# 607), a working dog on a communal farm, was confiscated on 10 November 2017 due to an infestation of ticks and a hematoma, a solid swelling of clotted blood within the tissues located on the right hind thigh. The overall weight of the dog was not very bad so the owner will be given one more chance. If the dog is found in this condition again, she will be permanently removed from the farm and the farmer will never receive another dog from CCF. She will stay at CCF for a few weeks for the hematoma to be treated then returned to the farm.

Pet Dogs

- P- Wagter (SB# 630), a working dog on a commercial farm, is now considered a pet since May 2017. The farm manager left the farm so now the goats stay out far on a rocky hill and do not return at night to the kraal so the dog has been kept behind.

- P- Smaller (SB# 516), a working dog on a commercial farm, is now considered a pet since May 2017 as she no longer stays with the goats while they graze. CCF was only informed in November 2017 when calling to schedule a farm visit.

- P - Bonzo (SB# 365), a working dog on a commercial farm, is now considered a pet since October 2017 due to his old age.

- P - Bravo (SB# 653), a working dog on a commercial farm, was returned to CCF on 7 December as the farm manager found she was killing and eating goat kids and attacked a calf along with some other dogs. It was determined that two previous workers had taught her to hunt for them along with the other farm dogs. The dog was in very good condition, but unfortunately as this is a trait that cannot easily be fixed, she will not be able to work again and as a precaution she will be placed as a pet dog.

Theft

- Theft and Gabes (SB# 494) and SB# 658, both pet dogs at the same home, were stolen from their home in December 2016. Despite numerous efforts to find them including radio updates, flyers, neighbourhood watch groups, we were unable to locate them. We believe that the thief was looking for pure bred dogs as the two mixes at the farm were left behind.

Other than routine vaccinations, CCF provides de-worming tablets, veterinary supplies for minor injuries, and topical anti-parasitic agents that are available from donations. The medical supplies ensure that the dogs' health is a priority. Dog food is offered for purchase at a discounted rate to the farmers to encourage that a correct diet is followed consistently. The dogs' working success has been correlated with good care from the owner. Many farmers are part-time and thus their attention is divided between their farm and other business activities; however, this is not a problem if they have good herders who assist with livestock and dog care. It is important that the owners are in touch with the developmental phases of their dogs so that problems can be dealt with immediately as they occur, preventing bad habits from developing and the dog failing as a result.

4. Dog Health

All CCF's Anatolian shepherd and Kangal dogs, as well as the scat-detection dogs, are enrolled in a preventative medicine programme. Every month, a broad-spectrum anti-parasite product for endo-parasites is administered. The product utilised is rotated continually to help prevent development of resistance. Every four weeks an ecto-parasite prevention product is applied topically to prevent fleas, ticks, and mites. Each dog receives vaccinations annually against canine distemper virus, canine parvovirus, adenovirus, parainfluenza virus, and rabies virus. Each month every dog is weighed to make sure they are at a healthy body weight.

Three puppies SB# 667, SB#671, and SB# 675, from Karibib's 2016 litter, all started not eating well after their sterilisation on 13 and 14 February 2017. A blood smear was taken on each puppy and some engulfed bacteria was seen in the neutrophils, possibly indicating tick-bite fever. They were started on antibiotics as well as medication to help stimulate their appetites as it is highly crucial for a puppy to eat daily. We gave them anything they wanted to eat and they slowly improved. Two of the puppies SB# 667 and SB# 675, took longer than the other puppy and stayed at CCF until we were sure they were healthy enough to go to their farms. All three puppies were placed and are working well on their farms.

Death of CCF Dogs

Wagter or Noodle (SB# 363), a pet dog at CCF, was brought in to the clinic on 8 February 2017 after having no appetite and being lethargic the day before. She was reluctant to move in the morning and had a tense abdomen. She had been living with lymphosarcoma, cancer of the lymphocytes (a type of blood cell). She was sent in to the town clinic to have blood tests. The tests indicated gastritis and she was administered medication to help stop any infection and to help with any stomach issues. She was also given fluids. Unfortunately, she passed during the night on 9 February 2017. The necropsy showed it was acute gastritis and possible toxin ingestion.

On 29 March 2017, Tylee (SB# 240) had been seen vomiting and said to be very weak and not able to walk properly. She was checked on and seemed dizzy and was having a nystagmus, a condition when the eyes move rapidly and uncontrollably. Her appetite had also been down for the last few days. She was given fluids, as well as medications to prevent infection, increase her appetite, reduce inflammation and stop the vomiting. Blood samples were also sent in to Pathcare to be analysed. On 31 March, she had a bit of an appetite, she seemed more alert, and the nystagmus was slight, but she still would not stand. On 2 April it was decided to start her on tick bite fever treatment and was also given an injection to help with possible inflammation around her spine. Over the next few days she still could not stand and would not eat much, so for her quality of life it was decided to euthanise her on 10 April 2017. The blood work showed she had cancer and the necropsy showed signs of cancer in the spleen and between her bones.

On 14 May 2017, Uschi (SB# 269), stopped eating and was having trouble standing due to a swollen paw. She also began panting (even in the cool weather) and vomiting. We believe this was all due to her chronic heart failure. She was given Vitamin B shots to try and increase her appetite and fed chicken or meat, but she didn't show much improvement. She was given medication to reduce any fluid build-up around her lungs. She continued panting, shaking, not eating, and being lethargic over a course of four days so the decision was made to euthanise her on 18 May 2017. The necropsy

showed aortic stenosis (narrowing of the aortic valve) and mitral valve fibrosis (degeneration of the mitral valve) which all can lead to the heart shutting down due to added pressure placed on the heart to help fix the proper flow of blood. There were also signs of fatty liver, calcification of the lungs and fibrotic spleen.

B. CCF Model Farm

CCF's farm provides the opportunity to practice and experiment with optimal methods of livestock and non-lethal farm management practices, especially acting as a showcase model of success. The cattle, goat, and sheep herds at CCF continue to increase and selected herds have been used during various Farmer Training programmes. Table 12 provides an overview of CCF's livestock.

Table 12: CCF livestock from January to December 2017.

	Stock Start	Born	Purchased	Sold	Died	Slaughtered/ CCF use	Stolen	Stock End
Cattle	**455**	139	0	183	3	0	0	**408**
Boer Goats	**164**	77	0	64	12	0	0	**165**
Damara Sheep	**134**	63	0	52	3	0	0	**142**
Dairy Goats	**152**	63	0	43	7	0	0	**165**
Donkeys	**11**	0	113	0	0	120	0	**4**
Horses	**12**	0	5	0	0	11	0	**6**

CCF's Farm Manager, Johan Britz; Large Stock Assistant Manager, Bessie Simon; Small Stock Manager, Tyapa Toivo; Small Stock Herder, Armas Shanika, and the animal health team carry out proper management to maintain the general health and welfare of the animals.

During this period, CCF farm staff continued to work on fence repairs and basic farm maintenance. Work also continues on firebreaks, road maintenance, as well as weed control and eradication of alien species.

1. Cattle

CCF cattle are managed in a 100% predator-friendly environment. A cow-calf system is in place and weaners are sold before one year of age based on market conditions. Factors such as severe bush encroachment continue to be a challenge.

Normal management is done in coordination with nature, therefore mating seasons differ yearly but generally it is from January to the end of April. This period has been extended since CCF only owns three bulls instead of the usual 12 to 15 bulls. However, when necessary, CCF utilises six to eight bulls

that are on loan. Pregnancy determination is normally done in July or August. Dehorning and castration are done as needed during the calving season.

By end of December 2017, CCF had 408 cattle compared to 455 at the end of 2016. Total cattle production for 2017 included 139 calves born (69M, 70F), and 183 sold (14 cows, 7 heifers, 48 female calves and 114 male calves) (Table 13). Cheetah Conservation Fund also rents grazing land to two farmers for their cattle (approximately 700 herd total), thus providing an extra income.

Vaccination Programme

CCF firmly believes in farming with animals adapted to the Namibian climate with a strong natural resistance to most diseases. As such, unnecessary vaccinations are avoided to minimise costs and reduce stress on the animals. Compulsory brucellosis and anthrax vaccinations are administered and other vaccinations are done purely as needed. Periodical internal and external parasite control is also in place.

Other

Since cattle falls under the Fanmeat scheme of Namibia, CCF must ensure compliance with the European Union (EU) and the Fanmeat scheme. Fanmeat stands for Farm Assured Namibian Meat, which is a standard for meat production, specifically for cattle, that involves the traceability, animal health and welfare, record keeping, and animal movement in Namibia. The CCF cattle recordkeeping and data have passed inspection every year, and our cattle operation is mentioned by the Directorate of Veterinary Services as an excellent standard when it comes to the fulfilment of these requirements.

2. Small Stock

Goats and sheep are an essential part of CCF's LGD programme as the puppies must be raised amongst the goats and sheep in order for them to form a close bond with the livestock. As part of CCF's Model Farm, dogs and small stock are used during farmer-training programmes as a method to raise livestock around predators without using lethal methods to prevent predation.

In addition to the 19 Anatolian shepherd and Kangal dogs mentioned in the previous section, as of December 2017 the kraal contains 165 (7M, 127F, 31 wethers) dairy goats, 165 (10M, 127F, 28 wethers) Boer goats, and 142 (5M, 102F, 35 wethers) Damara sheep (see Table 13).

Boer Goats

Of the 82 Boer goats that were bred between February and April 2017, 49 females gave birth between July and September 2017 to a total of 77 kids, six of which were stillborn, one was premature, and one due to vitamin D deficiency. The 33 females that did not kid were later rebred in November 2017 and are expected to kid in March 2018.

In addition to the loss of six kids, one goat was euthanised due to old age and six died due to causes that include bloat and pneumonia.

CCF's Boer goats are managed for meat production. Castrated males and old or inferior does are sold at auction. In 2017, 64 goats (36F, 2M, and 26 wethers) were sold. No Boer goats were purchased.

CCF's strategy is to keep improving on the quality of its Boer herd by bringing in quality bucks and continuing to improve the selection of animals for breeding. This will provide more income from the sales of these goats, as some can be sold as breeding animals as opposed to only selling them for meat.

Damara Sheep

The Damara sheep herd stood at 142 (5M, 102F, 35 wethers) at the end of this reporting period, up from 134 at the end of 2016.

From September 2016 to the end of October 2016, 70 sheep were bred and finished lambing by March 2017. During 2017, a total of 63 ewes gave birth, with a conception rate of 90%. In total 63 (37M, 26F) lambs were born, however one male lamb was stillborn. Forty-nine ewes were bred between August and September 2017 and they are expected to start lambing between January and February 2018. To increase the muscle mass of the Damara sheep, CCF bought a Meat Master ram to crossbreed with the Damara sheep. The Meat Master ram was bred with 23 ewes between October and November 2017. They are due to lamb between March and April 2018. Two ewes (SB# 246 & SB# 374) and one male castrate (SB# 352) died from ingesting poisonous plants (*Tribulus terrestris*).

A total of 52 sheep (19F, 33M) were sold during this period.

Dairy Goats

The dairy goat herd increased by 13, from 152 animals at the end of 2016 to 165 (7M, 127F, 31 wethers) at the end of 2017.

The dairy goat does are managed in such a way that when half of them are being bred, the other half are lactating to keep a continuous production of milk. Between March and June 2017, 54 does were bred and started to kid between August and December 2017. Out of 54 does that were bred, 44 successfully gave birth to a total of 63 kids (34M, 29F). Two does had miscarriages; one had a bridged kid that could not be saved alive. Six does did not get pregnant and were rebred in November 2017. They are expected to kid in April 2018. Seven dairy goats died this year, including one pregnant doe as a result of bloat. Other death causes include snake bite, old age and dystocia.

Milk Production

There are several major factors that play a role in the amount of milk given by a specific goat. These factors include: the breed, age of the animal, lactation stage, amount and type of feed, temperature, milking frequency, availability and duration of free ranging, animal health condition, and the type of management practice. Each goat is milked twice a day, although the number of goats milked each month depends on their lactation stage.

In 2017, up to 47 goats were milked every day for a total production of 16,358.2kg of milk. Of this milk, 5,682.5kg were used to raise goat kids and 10,675.7kg was supplied to the creamery (Table 13).

Table 13: Goats milked, amount produced, and how much allocated to kids and creamery in 2017 (kilograms).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Goats milked	47	47	46	46	45	38	32	21	34	38	46	46
Total Produced	2581.8	2804.5	1947.1	1303.2	637.9	449.6	402.8	248.9	1055.4	1463.3	1813.9	1649.8
Used to Raise Kids	1300.0	690.0	0	0	0	0	0	0	450.0	1097.0	1019.5	1126.0
To Creamery	1281.8	2114.5	1947.1	1303.2	637.9	449.6	402.8	248.9	605.4	366.3	794.4	523.8

The amount of milk each individual goat produces is monitored on a daily, weekly, monthly and annual basis. This allows us to determine when they are producing the most milk and then compare the amounts produced to the feed they are given. Figure 31 displays the number of goats milked and total milk produced per year since inception in 2010. The highest number of goats milked and milk produced was in 2016, with 49 goats, and 17,863.8 kg, respectively.

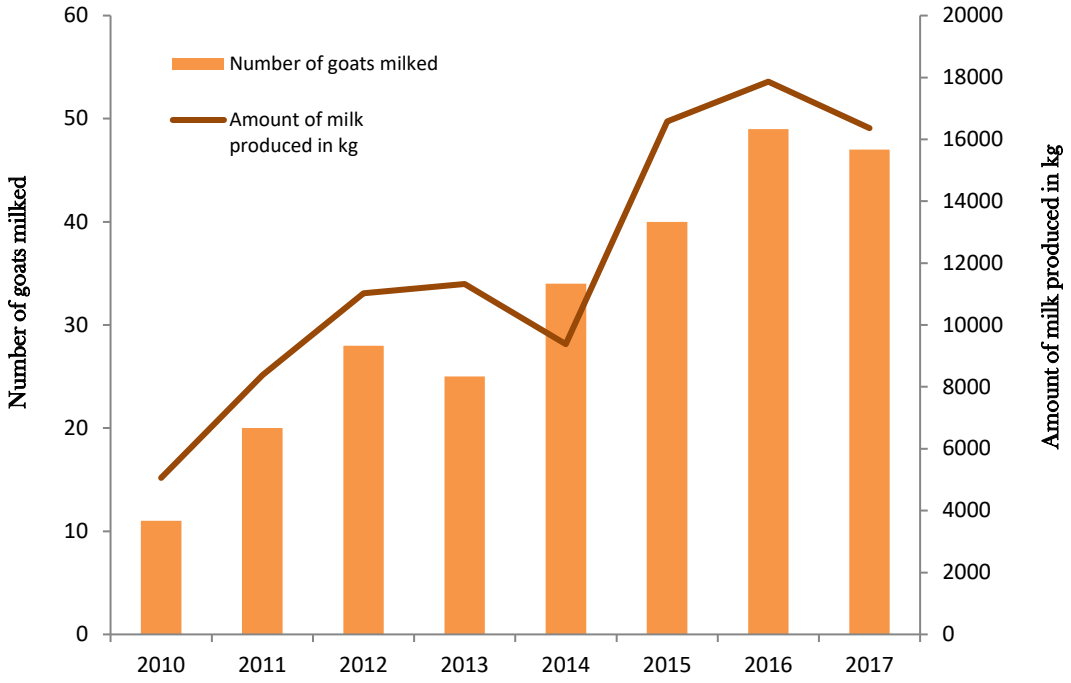

Figure 31: Number of goats and milk produced since inception in 2010.

Feed provided to CCF Small Stock

To ensure the health of all our goats and sheep we constantly monitor their food requirements and intake. We currently use four feed products to provide the correct variety of nutrients to our animals. They include: Alfalfa hay; ram, lamb, and ewe pellets; milk goat pellets; and grass hay. Figure 32 shows the amount used for each during this reporting period.

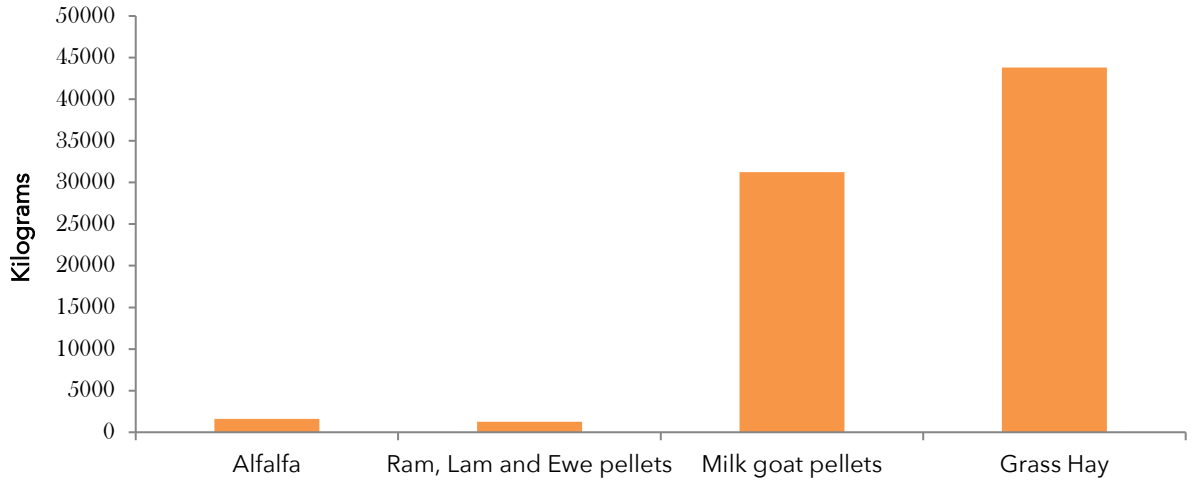

Figure 32: Amount of feed provided to CCF small stock in 2017.

Vaccinations and De-worming

All CCF's small stock is treated for internal and external parasites on a quarterly basis in January, April, July, and October of each year. The product used for internal parasite treatment rotates between the following four products: Fenbendazole, Ivermectin, Albendazole, and Doramectin. The product used at each treatment is determined by which product was used previously; anthelmvehiclintic products are rotated between drug classes to help prevent development of resistance among the parasites, which can happen when the same product is used repeatedly. Both before and after each quarterly parasite treatment, a herd-wide Faecal Egg Count (FEC) is performed to determine the internal parasite burden in the animals. This is done by collecting representative faecal samples from various areas in the *kraal*. The pre- and post-treatment testing helps ensure that the treatments reduce the parasite burden in the animals, which helps to ensure efficacy of the products used. For external parasite (tick, fly, and lice) prevention Paracide (Pfizer Animal Health) and Ultra-Boss Pour-On (Schering-Plough Animal Health) are rotated at each quarterly treatment. In addition, this year CCF vaccinated all small stock against Anthrax. Vaccines are applied as follows:

- Glanvac 3 – for the control of caseouslymphadenitits (*Co rynebacteriumpseudotuberculosis*) and prevention of enterotoxemia, pulpy kidney disease (*Clostridium perfringens* Type D), and tetanus (*Clostridium tetani*).
    - Adult female animals are vaccinated one month before giving birth (parturition).
    - Adult male animals are vaccinated once annually.
    - New-borns are vaccinated at three and four months of age and then annually thereafter.
- Pasteurella – for the control of Pasteurellahaemolytica respiratory infection ('shipping fever').
    - All adult animals are vaccinated annually.
    - New-borns are vaccinated at three and four months of age and then annually thereafter.

- Brucellosis – for the control of *Brucellaovis*and *Brucellamelitensis*, a bacterial infection of the reproductive tract.
    - This vaccine is given only once and provides life-long immunity; all young animals are vaccinated at four months of age.
- Enzootic Abortion – for the control of Chlamydophilapsittici, an organism that causes early and late term abortions.
    - All female animals are vaccinated one month before breeding on an annual basis.
- Rabies – for the prevention of rabies virus which causes fatal encephalitis.
    - All adult animals are vaccinated yearly.
    - All new-borns are vaccinated at nine months of age and then annually thereafter.

3. Hay Production

In 2017, CCF produced no bales of hay.

4. Wild Game Hunted on CCF Property

As part of CCF Model Farm's sustainable wildlife management practices, CCF hunts several wild game species for consumptive purposes, including oryx, kudu, red hartebeest, and warthog. Figure 33 below displays the amount of wild game removed for consumptive use for this reporting period.

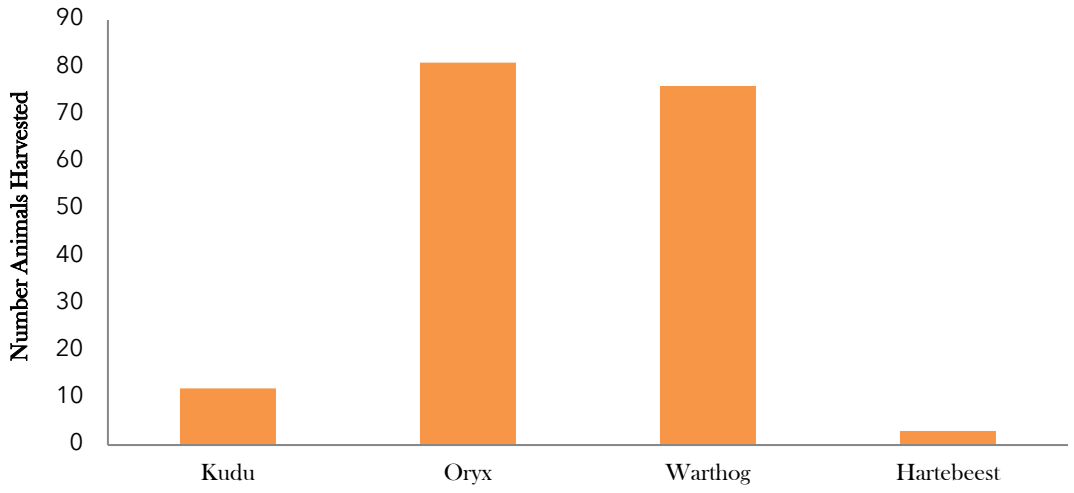

Figure 33: Amount of game (male and female) utilised by CCF in 2017.

C. Sustainable Economic Programmes Supporting Local Communities

If the world's fastest cat is to survive in the wild, humans must coexist with it. The following progress has been made on CCF's activities that seek to assure the economic well-being of people living within the cheetah's range and provide resources to support CCF's long-term activity.

1. Certified Wildlife Friendly

CCF is a cofounder of The Wildlife Friendly Enterprise Network (WFEN), which is a 'global community dedicated to the development and marketing of products that conserve threatened wildlife while contributing to the economic vitality of rural communities'. The WFEN provides the 'Certified Wildlife Friendly' trademark (Figure 34) that distinguishes enterprises that meet the highest standards of being wildlife friendly. CCF's Bushblok and Dancing Goat Creamery are both Certified Wildlife Friendly.

Figure 34: Certified Wildlife Friendly logo.

2. Bushblok

Operations

Production in 2017 amounted to 283 tonnes with sales of 223 tonnes. Table 14 shows the monthly block production during this reporting period.

Table 14: Monthly block production January to December 2017.

Month	Amount (tonnes)
January	11
February	6
March	5
April	12
May	12
June	58
July	53

August	27
September	13
October	34
November	34
December	18
Total	**283**

General Information

The production of carbonised block and wood continued in 2017. Construction work on the Biomass Technology Demonstration Centre (BTDC) at CCF also continued and some of the equipment from town has been moved to the facility at CCF headquarters. The Bushblok factory is planned to move completely to CCF's BTDC in 2018.

Maintenance on the extruders and cut off saws at the Bushblok factory continue to be a challenge.

Dr Bruce Brewer, CCF's General Manager, remained active in groups involved with bush encroachment in Namibia. These included the National Rangeland and Bush Encroachment Forum, which is convened by the Ministry of Agriculture, Water and Forestry, the Namibia Biomass Group (N-BiG), a newly established industry founded through the support of the GIZ Support to De-bushing Programme, and the GIZ/MAWF De-bushing project, which is supported by the German Development Authority. There was much interaction with the GIZ group as a joint marketing company is under consideration.

3. Cheetah Country Initiatives

Dancing Goat Creamery

Background

CCF began producing fresh goat cheese in August 2009 using the milk from six CCF's dairy goats, which came from the award-winning dairy farm Fairview in South Africa. The programme aims to facilitate training and skill development around the production of dairy goat products, thus enabling livelihood diversification and supplemental income to both CCF and community members.

In early April 2013, CCF opened the Dancing Goat Creamery, where high-quality artisanal fresh goat cheeses, as well as a variety of goat milk ice creams, fudge, and soaps are produced daily by CCF's Creamery Manager Hanlie Visser, and head cheese maker Sherien Garoes. Sherien, having worked at CCF for over 10 years, has been making CCF's cheeses for five years. Hanlie has a degree in Hospitality and Catering from Boland College in Stellenbosch. With the opening of the new creamery, CCF also launched a new label for their cheeses.

The herd has grown slowly over the past few years, as it takes approximately one and a half years to get a goat kid into production. At the end of 2017, there were over 100 dairy goats at CCF with up to

47 being milked daily for a daily average of 44.82 kg per day. Milk yields from the dairy goats have steadily increased since the inception of the dairy goat programme.

The Dancing Goat Creamery is an essential part of CCF's Model Farm, which alongside its celebrated Livestock Guarding Dog Programme, allows CCF to demonstrate how cheetahs and livestock can live together and how local farmers can be successful using non-lethal predator management and alternative income source strategies to protect their livestock and thus their livelihoods.

As with the CCF International Research and Education Centre, the CCF Model Farm and Dancing Goat Creamery are open to the public daily and local farmers are encouraged to visit.

Production

CCF's Dancing Goat Creamery was supplied with 10,675.7kg of milk from CCF's Model Farm in 2017. Table 15 shows amounts of milk allocated to production of each creamery product.

Table 15: Milk allocation per product from January to December 2017.

Product	Milk Used (kg)
Feta	5,202.6
Chévre	3,218.9
Ricotta	1,009.2
Mozzarella	321.2
Fudge	805.0
Ice cream	118.8
Total	**10,675.7**

Of this milk, 78.9% was used to produce two of the Creamery's original cheeses, feta and chèvre. Figure 35 displays the total amount of cheese produced per year since 2011. Table 16 shows the amounts of these varieties produced each month. In addition, the Creamery produced a total of 90.09 kg of fudge, 155.81kg of ice cream, 142.66kg of ricotta and 41.64kg mozzarella cheeses. Figure 37 displays the total amount of cheese produced per year since 2011.

Table 16: Feta and chèvre monthly production (kilograms) in 2017.

Month	Feta	Chèvre	Total
January	50.03	20.55	70.58
February	71.91	41.33	113.24
March	121.98	52.64	174.63
April	140.62	35.12	175.74
May	48.90	15.69	64.59
June	27.28	13.60	40.89
July	43.37	15.13	58.51
Aug	38.51	6.10	44.61

Sep	58.17	40.15	98.32
Oct	21.29	23.28	44.58
Nov	23.24	32.45	55.68
Dec	28.43	29.93	58.36
Total	**673.73**	**325.97**	**999.70**

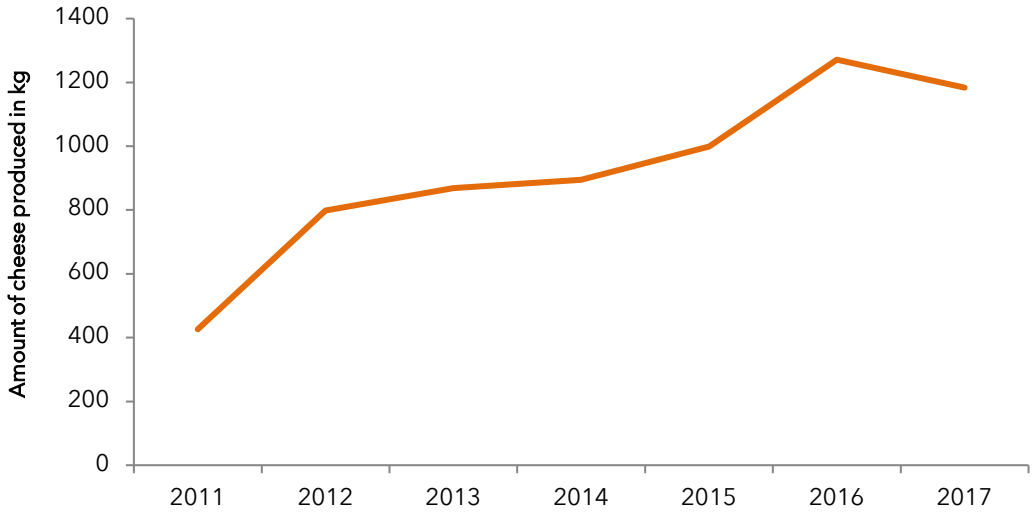

Figure 35: Amount of cheese produced by the CCF creamery per year since 2011 (note that inception of creamery was in 2009).

Sales

Creamery product sales totalled 1,357.6 kg, while 25.8 kg were distributed as promotional samples and gifts at events such as agricultural shows, farmer's markets, and tourism fairs, and 44.8 kg of products were left in inventory, and resulted in N$176,441.28 in revenues.

Cheese deliveries were made to approximately 25 different customers, nine of which order on a regular basis. CCF's main customers include Maerua Super Spar, Desert Hill, Fruit and Veg, Theo Spar, and the Frans Indongo Lodge.

The Dancing Goat Creamery also creates a secondary industry for CCF with increased revenues for its eco-tourism business by offering its products for sale to visitors at the Cheetah Gift Shop at retail price. As shown in Table 26, during this period the Creamery supplied the Gift Shop with 100.9 kg of product (cheese, fudge, and ice cream).

The Creamery also supplies products to the CCF kitchens at Babson House, Cheetah Café, and the Hot Spot. During this period, the CCF kitchens were supplied 1,144.9 kg of ice cream, fudge, cheese, and soap.

At the end of this period, the remaining inventory in CCF's freezers was 35 kg of cheese, 4.9 kg fudge, and 4.9 kg of ice cream, as every product made at the Creamery is regularly sold.

Client Development

All the cheese recipes have been perfected to ensure consistent high quality and to ensure client satisfaction. Based on customers' suggestions, the Creamery team worked on the development of a variety of flavours for its existing cheeses. Goat yogurt and Mozzarella are being developed, and future plans include Brie and Camembert.

CCF will continue to place special emphasis on customer satisfaction and quality assurance in an effort to continue its growing sales trend. In addition, CCF will intensify marketing and sales of its new cheese types while continuing to develop new products. Consequently, this growing demand for Creamery products will require increasing milk production.

The Chewbaaka Memorial Garden

CCF's Chewbaaka Memorial Garden continues to produce fresh vegetables for consumption by more than 40 CCF staff and volunteers, as well as visitors to the Cheetah Café and Babson House guests. Namibia imports approximately 80% of its fruits and vegetables, mostly from South Africa, transporting it across long distances and increasing use of fossil fuels and carbon emissions that contribute to climate change. By localising food production, CCF is not only reducing the environmental and social impacts of transporting food, but is also providing fresher, tastier, and more nutritious meals while saving money.

To counteract the heavy clay-sand soil, CCF uses aged manure from its farm animals and a by-product from its Bushblok production: wood dust. These materials are mixed into parent soil to improve fertility and organic matter content. CCF is also creating compost from food scraps, which is an essential ingredient for any organic garden. CCF staff, volunteers, and CCF gardeners, Hendrik Hoeseb, Magdel Ngandi and Julia Bernard, have been trained in proper composting techniques. CCF is consistently harvesting a variety of salads and vegetables including beans, beetroot, carrots, daikon radishes, peas, squash, lettuces, turnips, parsnips, rutabagas, cilantro, chard, endive, mustard, rocket, spinach, radishes, and okra. Figure 36 shows the amounts of vegetables and herbs harvested in 2017. Cucumbers, gem squash and tomatoes were the most harvest with 201.9 kg, 136.4 kg and 78.8 kg respectively.

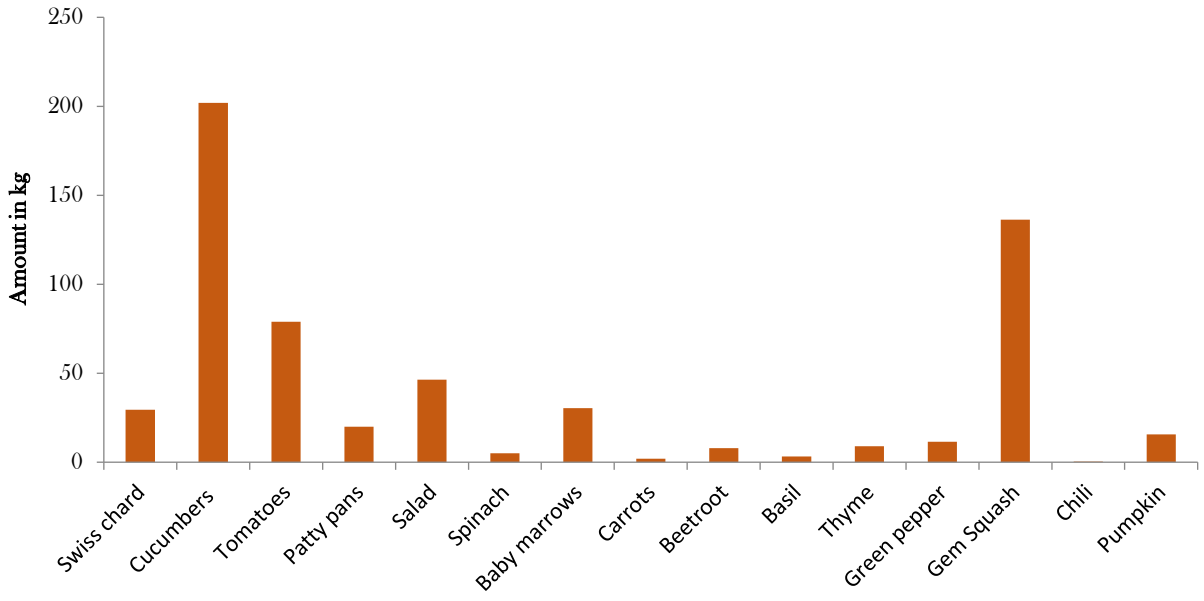

Figure 36: Vegetables and herbs harvested from the Chewbaaka Memorial Garden in 2017.

Since its inception, the garden's harvest has continued to grow. By having diverse plantings in a small space, the garden remains chemical-free because it invites beneficial insects to do the work of managing unwanted insects. Sunflowers and other flowers attract pollinators. The vegetables are therefore healthier for the environment, the growers, and the consumers. Seeds were provided courtesy of Baker Creek Heirloom Seeds, an American company based in Missouri that distributes from California. We have 42 varieties of heirloom vegetable seeds.

Because of a designated gift from CCF USA Trustee Candice Clough in honour of her father, a new greenhouse and pond were installed in May, including electric and water servicing.

The garden is one more step in CCF's sustainability programme, which includes an extensive recycling programme and composting. CCF includes the Chewbaaka Memorial Garden and Sustainable Practices in farmer training programmes as yet another way to promote alternative livelihoods and economic growth in Namibia.

The Apiary

The colony that took over one of CCF's existing colonies continues to do very well at CCF's apiary. A third super (hive extension) has been added and for this super a queen excluder has been added to allocate this super solely to honey.

Another colony that moved into the old tire hive from which the past colony absconded seems to be doing extremely well. Plans are in place to modify the hive to allow supers to be added.

Having bees at CCF is beneficial for many different reasons. Honey harvesting and sales will add to CCF's diverse income and food sustainability. In addition, bees pollinate the crops at CCF's organic garden and increase food production. CCF intends to build up the apiary to teach more aspects of

sustainability to visitors and local farmers, and to produce honey for food and added income. Along with CCF's Model Farm, the apiary will help to demonstrate predator-friendly farming techniques, as honeybees are part of an integrated farming system that diversifies income and adds value to the landscape. The first honey harvest is expected in May 2018.

CCF Vineyard

The grapes are doing very well. Three hundred fifty kilograms of grapes were harvested in January 2017. Grapes were pruned during August and we expect harvest of January 2018 to be the biggest one yet. Weed and grasses were cleared during November and ploughed back into the ground.

D. Eco-Tourism

Tourism is one of Namibia's fastest growing industries, with a large number of developments emerging in the Otjiwarongo area over the past couple of years. CCF's eco-tourism potential continues to grow, as it has become one of the region's leading travel and tourism destinations, thus boosting the local businesses of Otjiwarongo. In June 2017, CCF opened its new Cheetah View Lodge. CCF strives to provide supporters and guests the best stay and experience at its accommodations and during visits at its Centre.

1. Visitors to CCF

By the end of 2017, CCF had received a total of 11,393 visiting tourists, of which 724 (Cheetah View Lodge & Babson) were overnight tourists. This represents a 15.52% increase from 10,237 in 2016. In terms of income, this period saw a 22.84% increase at N$6,041,842.00 compared with N$4,662,160.00 in 2016. In addition to school groups and film crews mentioned separately, CCF hosted many CCF friends, supporters, and collaborators in 2017, many of them on return visits.

In April, CCF staff was honoured to host Princess Michael of Kent, who agreed to become CCF's Royal Patron. She inaugurated the Cheetah View Lodge during her visit. CCF also hosted the Dixit Family, the Warren Family, the Columbus Zoo, and Susan Janin, all of who sponsored rooms allowing the completion of the Cheetah View Lodge, and have been honoured with a Room Dedication. Additionally, donors Nina and Nick Gibson, who also visited CCF in 2017, dedicated their room to the First Lady of the World, Eleanor Roosevelt, whose legacy lives on through CCF.

Long-time friends and supporters who visited CCF during this period included CCF USA Board members Roswitha Smale, who returned in September 2017 and again in December 2017, and Susan Janin, who was here with a photography group co-ordinated by Suzi Eszterhas. Susan stayed a few extra days volunteering at CCF and taking new images of our Lodge.

We hosted return guests Sven and Linda from Afrika Hust (Netherlands) at Cheetah View Lodge. Dave and Bonni Canary, from CCF's Portland Chapter, visited in September 2017. Regina Mohr had a return visit to CCF and for her 70th birthday she donated 1,000 Euros. Isabelle Groc came at the end of August. She is a freelance writer, photographer and filmmaker based in Vancouver, Canada, specialising in endangered species and conservation. She is currently completing a book for youth on endangered species, focusing on personal stories of encounters with endangered species and profiles

of people engaged in conservation initiatives, with the aim of giving young audiences inspiration to take action for endangered species. Photography will also be an important part of the book and wants to feature CCF's work in it.

In September we hosted Prof. Ben Allen and his Associate, Pip Masters. Prof. Allen has a wealth of knowledge on dingo-livestock conflict in Australia. He has used “invisible fence” technology. His main interest is forging partnerships between his university and institutions in Africa. At the recommendation of our CCF USA Board member Eric Berman, we hosted Charlie Ross, who came to CCF to learn more about our work and our land acquisition plan.

Brigitte and Alain Petraz, our French supporters, were our first guests at the Babson House in April via Nightsbridge, our new online booking system. Other CCF supporters who stayed at Babson were the Dixit family, and Kathy Snowden with a group of friends from St. Louis, Missouri (USA) in May. Dr Ilana Struble, and three other veterinarians, who won a stay at CCF at the Gala auction and agreed to help our injured Scat Detection Dog, stayed at Babson at the end of August.

2. Visitor and Guest Analysis

As tourists are increasingly becoming seasoned international travellers, they become more discerning and choose those destinations that can provide a more memorable experience and good value for their money. Therefore, CCF strives to ensure that the product offered to the tourism sector is sufficiently attractive.

Day Visitors

This reporting period saw a strong growth with 6.96% increase in visiting tourists at 10, 949 compared to 10, 237 in 2016 (Figure 37).

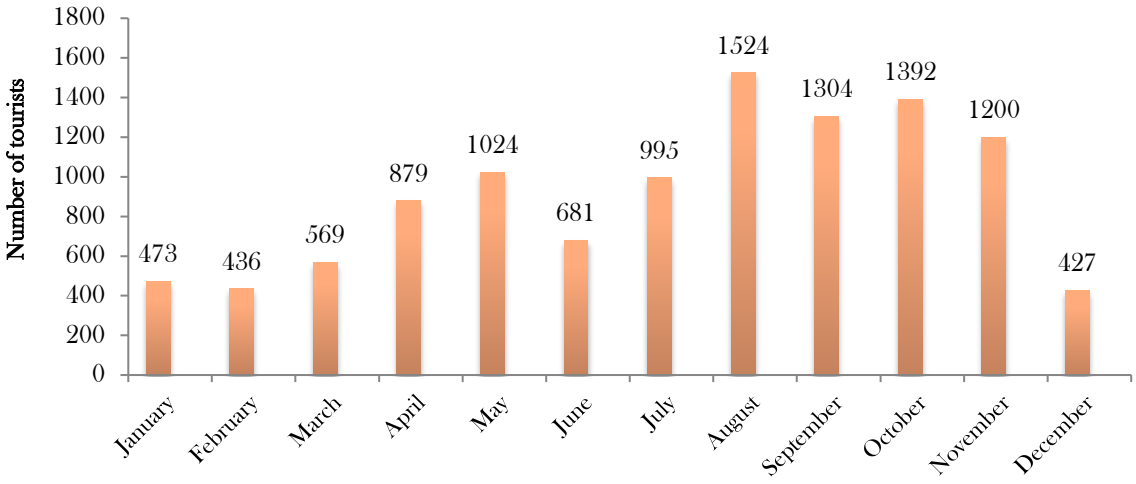

Figure 37: Number of visitors to CCF per month from January to December 2017.

The predominant language spoken by visitors during this period was English (36%), followed by German (29%), and French (28%; Figure 38). In terms of nationalities, the majority of visitors were from Germany, followed by USA and France (Figure 39).

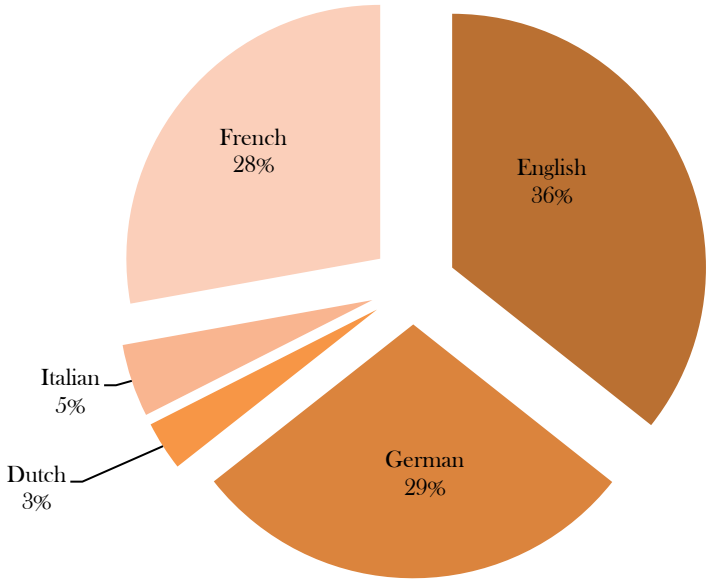

Figure 38: Languages spoken by visitors January to December 2017.

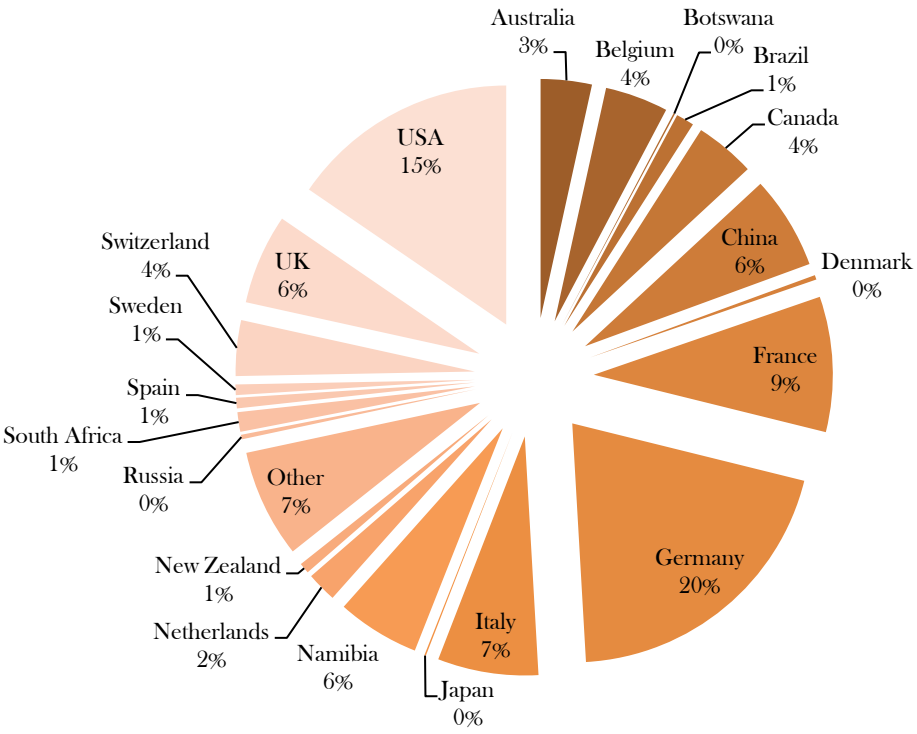

Figure 39: Percentage of visitors per country from January to December 2017.

Most visitors continue to be walk-ins, representing 50% of all sources with 5,631 in 2017 compared to 5,494 in 2016 (Figure 40). The number of visitors booked by CCF's reservation agent, Exclusive Reservations, increased from 3,359 in 2016 to 4,458 in 2017, representing 24.65% increase.

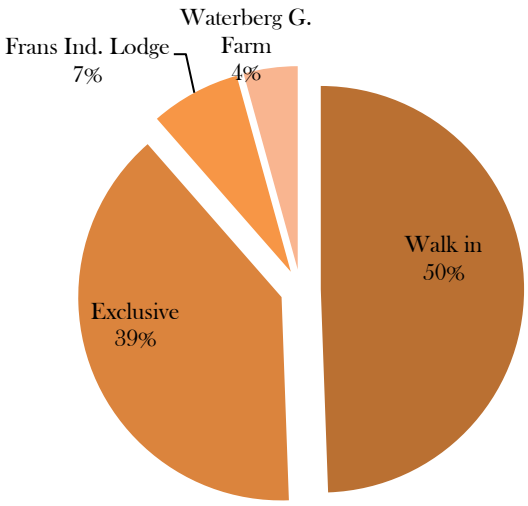

Figure 40: Source of Visitors from January to December 2017.

Financial

In terms of tourism revenue, CCF saw a robust increase of 22.84% during this period, at N$6,041,842.00 compared to N$4,662,160 in 2016 (Figure 41).

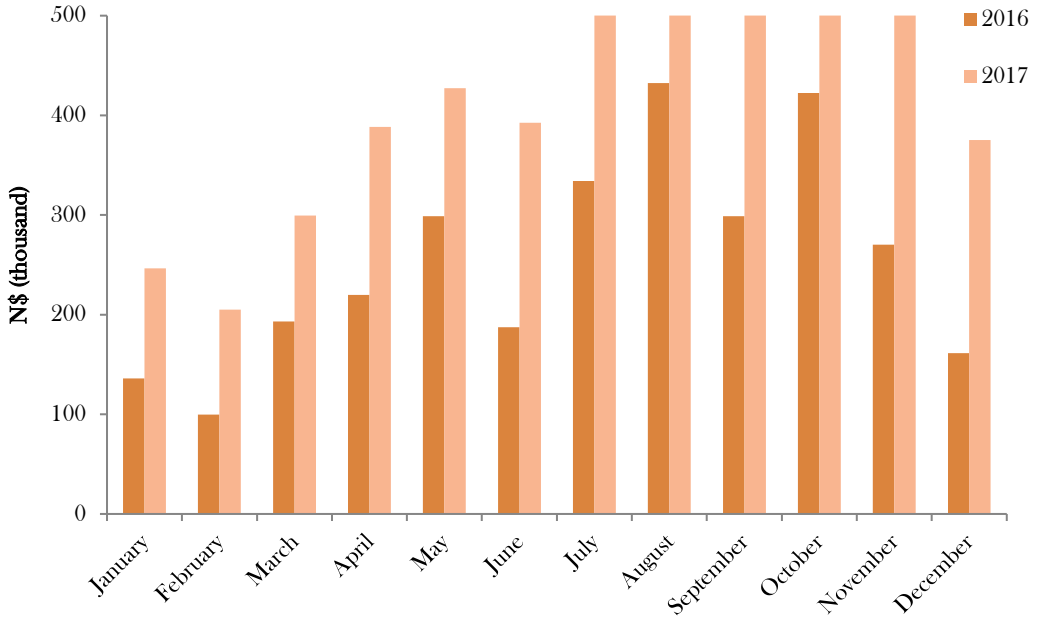

Figure 41: Tourism income (N$) comparison 2016 versus 2017.

In terms of individual activities, the month with the highest average of expenditure per visitor was December and the lowest month was May. The average amount spent by visitors at CCF shows a 12.06% increase in 2017 with N$517.90 compared to N$455.42 in 2016. Cheetah Drives (Elands) represented the highest income source during this period, at 34.65 % of the total income. Gift Shop revenue showed a 10.10% increase against 2016 and places Centre Tours as the third highest revenue driver.

Cheetah View Lodge

CCF proudly opened their new Cheetah View Lodge in June 2017. Overnight guest number recording started in June 2017 according to the amount of bed nights (Figure 42). The total number of bed nights during the recording period was 927, with the highest number of overnight guests in October with a total of 208 bed nights, and the lowest number in June with 41 bed nights.

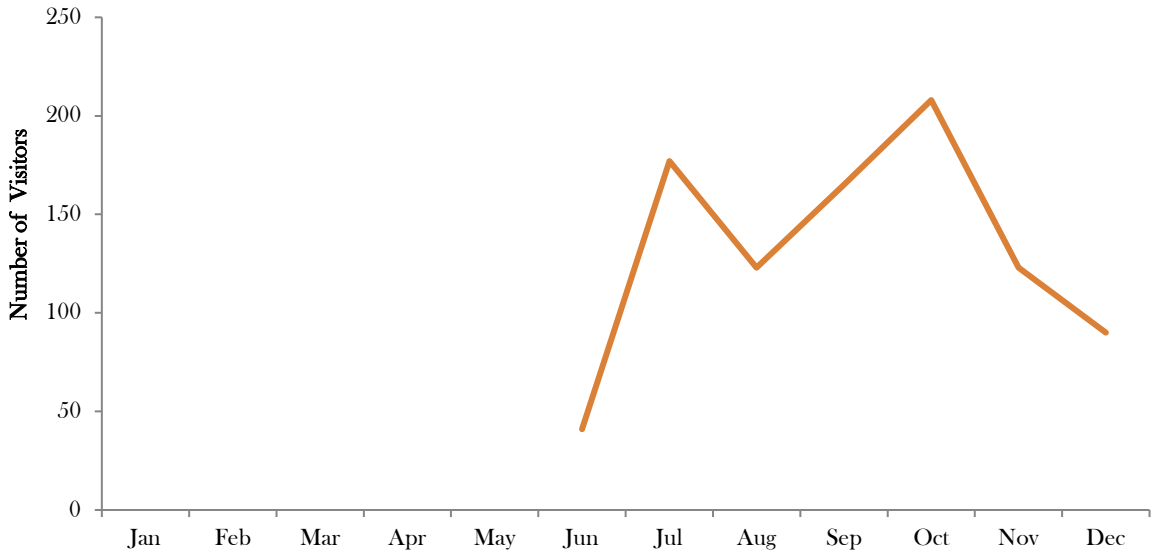

Figure 42: Number of bed nights at Cheetah View Lodge as from June 2017.

Most visitors continue to be private, representing 32% of all sources (Figure 43) with 76 private bookings from June to December 2017. The total amount of bookings we received in this period was 300. The number of guests booked by tour operators via Exclusive Reservation Bookings, CCF's reservation agent, is 255 including Namibia Tracks & Trails with a total of 46 bookings. The other 45 where via Booking.com, Expedia and direct bookings.

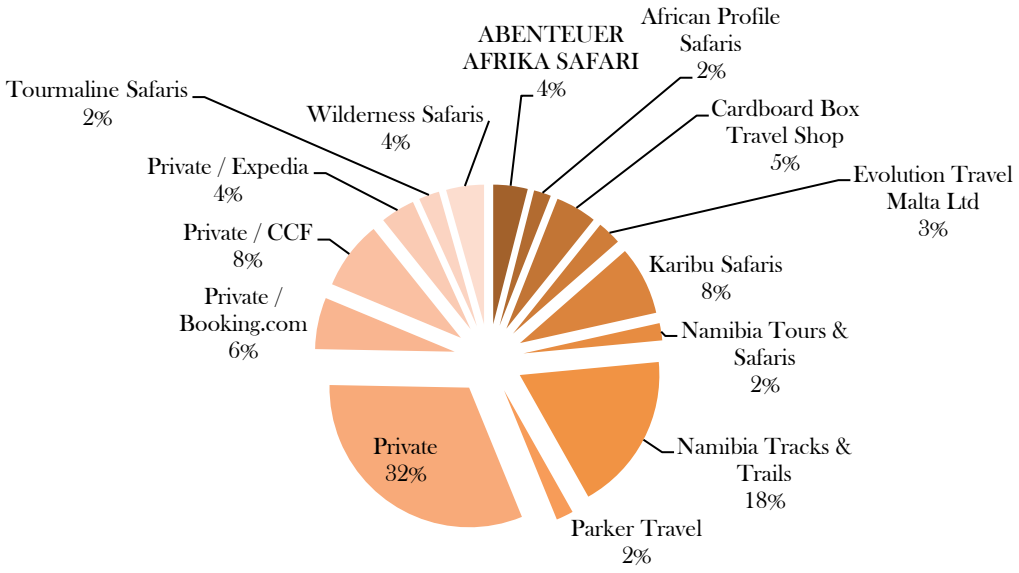

Figure 43: Booking sources for Cheetah View Lodge, 2017.

In terms of nationalities, most guests at Cheetah View Lodge were from Germany (29%), followed by USA (16%) and Italy (12%; Figure 44).

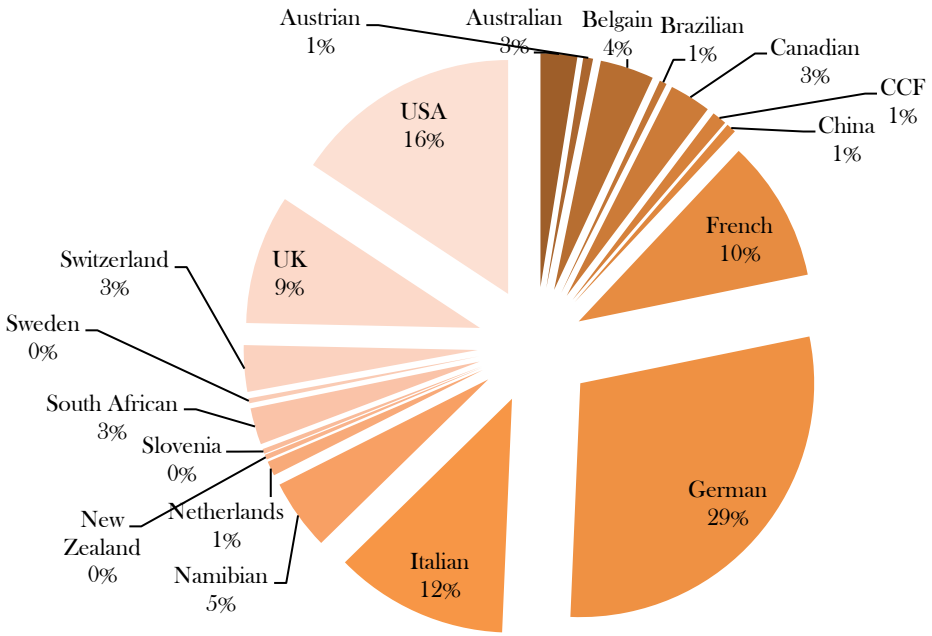

Figure 44: Nationalities of visitors staying at Cheetah View Lodge, 2017.

Babson House

Babson House is now open to the public with bookings via Nightsbridge, Booking.com, Expedia, or our booking agent Exclusive Reservations. Overnight guest number recording for Babson House started in April 2017 according to the amount of bed nights (Figure 45). In 2017, the number of overnight guests was in total 267 bed nights. The highest number of overnight guests was in July with a total of 72 bed nights. The lowest number of 3 bed nights was in April.

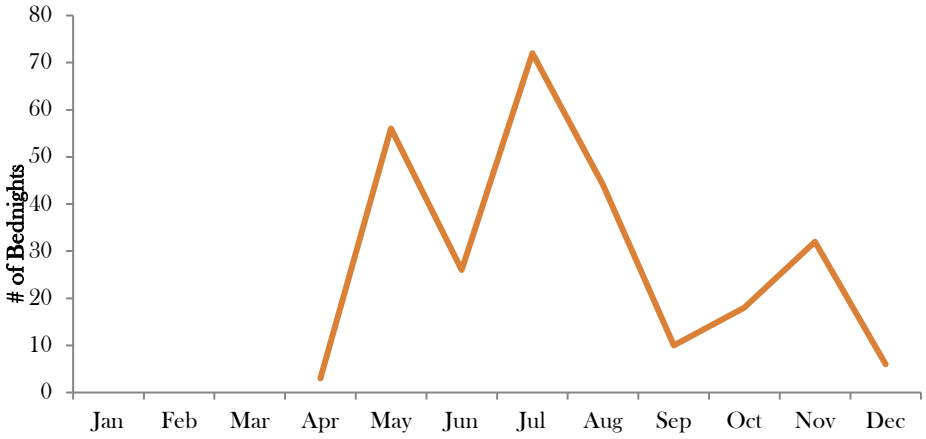

Figure 45: Babson House bed nights as of April 2017.

Most of Babson House guests continue to be from private CCF bookings, representing 37% of all sources (Figure 46) and private Exclusive Reservations bookings at 34%. The total number of bookings

we received in this period were 40. The tour operator with the highest percentage of bookings (7%) was Namibia Tours Safaris. In terms of origin, most overnight visitors came from the USA and Canada, followed by France, as shown in Figure 47.

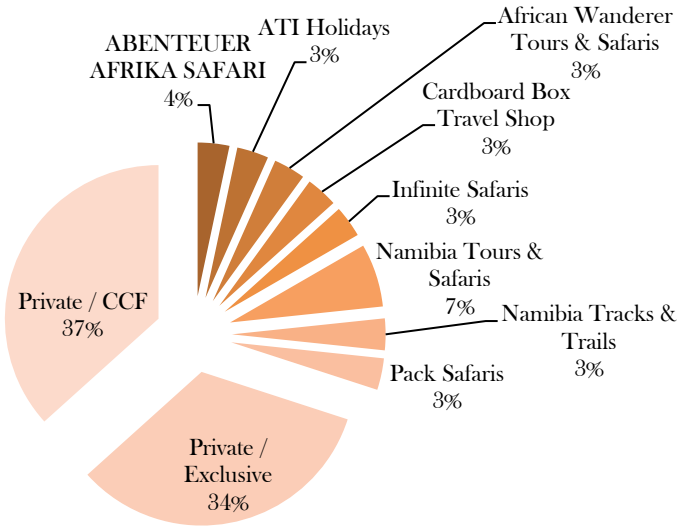

Figure 46: Sources of Babson House bookings, 2017.

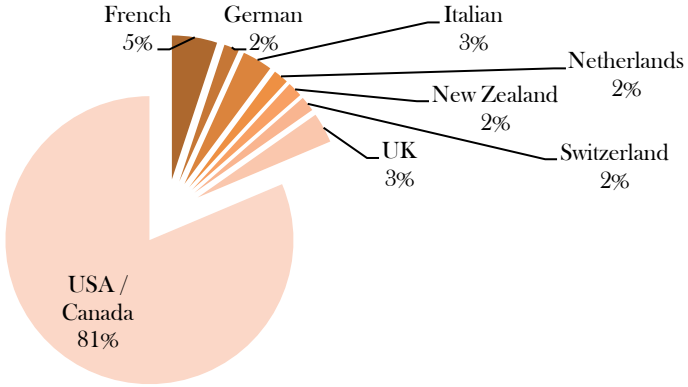

Figure 47: Nationalities of overnight visitors at the Babson. 2017.

3. Food Expenses

at CCF's community dining room, Hot Spot provides lunches and dinners, each month to staff, working guests, volunteers, and interns. Although the number of people eating at CCF differs every day, a total of 32,919 meals were cooked during 2017 for an average of 90 meals per day.

Almost half of the meals (49.39%) served at the Hot Spot were for CCF staff members. Volunteers and interns represented 36.54%, while Working Guests (WG), Babson Guests (BG), and other guests represented 12.04% (Figure 48).

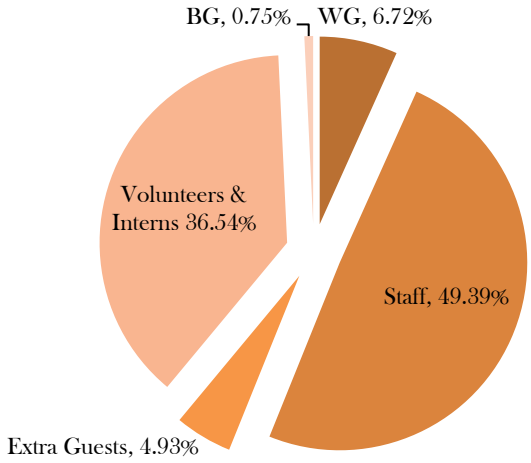

Figure 48: Overall categories of people served at the Hot Spot in 2017.

4. Marketing

For the fifth consecutive year, CCF received a Certificate of Excellence from TripAdvisor in December 2017. This award is given to tourism businesses that consistently receive high ratings from TripAdvisor travellers. Only the top 10% of businesses worldwide on TripAdvisor receive this award. Also, CCF is now working on separating the Cheetah View Lodge and Babson House from the CCF page on TripAdvisor in order to compete against the neighbouring lodges and hotels.

Between January and December 2017, CCF had several site inspections for agents from Abenteuer Afrika, Ultimate Safaris, Discover Namibia, G- Adventures/ NatGeo, Dunas Safaris, Wild Focus Expeditions, Terra Nova, Namibia Tracks & Tails, Matiti Safaris, Voyage Gendron, La Palma Explorers and Enchanting Travels.

CCF's marketing agent, Exclusive Reservations, continues to support our eco-tourism efforts both with bookings, and its objective of transforming the CCF brand to make it distinctive and different. Exclusive Reservations also promotes CCF by regularly visiting other tour operators in Windhoek and organising meetings for companies based in Swakopmund. During this period, Exclusive participated in expos based in South Africa, including Africa's largest travel show, INDABA Durban and the World Travel Market in Cape Town. Exclusive also organised an educational visit with some of the Namibian tour operators on 28 February 2017 to promote CCF's new Cheetah View Lodge and to familiarise the tour operators with CCF's work as an education and research centre. CCF was also represented by the Tourism Manager together with Exclusive Reservations at the 30th annual Hospitality Association of Namibia Conference which took place in November in Windhoek.

Throughout the year, CCF has continued its advertising partnerships with numerous publications and online channels adding a few to the accommodations. This included Brochures Namibia, Where to

Stay, Namibia Travel Info, NamibiaTourism.NET and the Namibia Tourism Trade Directory, Explorer Magazine, as well as AA Traveller Magazine.

Attractions that encourage tourism operators to market CCF as a destination continue to be evaluated, as do the information and materials supplied to visitors on departure to encourage them to become engaged and share their experience with their closer and wider networks once they have returned to their homes. CCF staff actively promotes our social media websites (Facebook, Twitter, YouTube, TripAdvisor, and LinkedIn) to all guests visiting CCF.

5. CCF Cheetah Café

Since the opening of CCF's Dancing Goat Creamery early in 2013, menu items at the Cheetah Café include the very popular CCF Goat Cheese Platter, local platter, and baked feta, as well as fresh muffins, scones, quiches, wraps, a cake of the day, and goat milk ice cream, which is a favourite on hot days. Fudge produced at the Creamery is also offered for sale at the Gift Shop.

After a lightning fire on 16 October 2013 destroyed the CCF Visitor Centre, which housed the Cheetah Café, operated from a small room in the Cheetah Museum building, until the re-opening in June 2017, which is now seeing benefits as Lodge guests can now enjoy a light lunch, snack or coffee at the café between activities at CCF.

Total revenues from the Cheetah Café during this period were N$444,950, up from N$313,003.00 during the same period in 2016. A la carte sales accounted for 60% with revenues of N$266,241. However, the popularity of pre-booked lunches with tour groups like African Eagle and Karibu, continues to grow, having more than doubled from N$80,200 in 2016 to N$178,709 this year. We plan to increase the booked lunches even more in 2018 and promote the different booked lunch menus.

E. Association and Conservancy Relationships

1. Large Carnivore Management Association (LCMAN)

CCF is a founding member of LCMAN and Dr Laurie Marker has been the Chair of the organisation for the past three years. LCMAN continues its work as a stakeholder of this group of NGOs, researchers, farmers, and governmental departments and helps guide the conservation and management of large carnivores in the country and facilitates communication among the stakeholders to ensure a coordinated approach. This association also functions as a resource for the Namibian Ministry of Environment and Tourism (MET) to provide expert advice and guidance during policy making procedures.

LCMAN continues to work with farmer organisations such as NAU and CANAM in providing support to the farming community in order to reduce human wildlife conflict. A farmer hotline is available at CCF and an LCMAN email exits to ensure constant communication with farmers or other people when they notice any stray carnivores in or near their farms or when they experience conflict with predators.

LCMAN held its Annual General Meeting (AGM) on 22 November 2017 in Windhoek, which was fully represented by different member organisations including NAU/CANAM. During the AGM, the

Treasurer presented the LCMAN proposed budget and all members who were present approved it. Two other meetings were held in March and June 2017 where various member- organisations gave progress reports of their current projects and members were updated about the Pathways Africa 2018 training and conference of which LCMAN was a co-host. At the June meeting, Dr Chris Brown of NCE presented the IUCN Red Data Book process. After some fruitful discussions, it was agreed that a Red Data assessment workshop should be conducted.

Red Data Assessment

One of the biggest milestones in 2017 was the successful Red Data Assessment and National Action Plans Symposium that took place from 8 to 10 November 2017 at B2Gold Otjikoto. It brought together researchers from across Namibia to assess the conservation status of the country's 34 carnivore species. This symposium represented the first step in the compiling of a Namibian Carnivore Red Data Book and was coordinated by LCMAN, MET and the Namibian Chamber of Environment (NCE). The symposium was facilitated by Dr Chris Brown, CEO of NCE and sponsored by B2Gold. Over 20 people attended the Symposium (some participants pictured in Figure 49 below) and presentations were given on each of the 34 carnivore species that occur in Namibia. In addition to MET and NCE, the Symposium was attended by representatives from the University of Namibia (UNAM), LCMAN member organisations including Namibian non-governmental organisations and carnivore researchers, environmental scientists, farmers, and private individuals. All participants demonstrated the wide breadth of knowledge concerning the distribution of Namibia's carnivores, and helped to highlight existing research and knowledge gaps. Additional anthropogenic threats, information on species ranges, population trends, data sources, and conservation actions were discussed. Species leads and team members were identified and agreed upon among attendants, who will share data among themselves to create historical, past, and current distribution maps and compile species accounts for the Namibian Carnivore Red Data Book.

Distribution maps of the 34 species on Namibian carnivores, ranging from nine species of mongoose, two otter species, three species of genets, and a variety of the large and smaller carnivores will be compiled from expert data and knowledge by Alice Jarvis from JARO Consultancy, who manages the country's web-based Environmental Information service (EIS). The book will be compiled by the various species' teams, edited by John Pallett, and is slated to be completed by August 2018. Workshop presentations can be found on http://www.the-eis.com/searchresults.php?action=carnivore_red_data_symposium

Figure 49: Participants that attended the Red Data Book Assessment and National Action Plans Symposium. Representatives were from LCMAN, MET, Academia, NGOs, as well as carnivore specialists.

Pathways Africa

Much of Dr Marker's focus and that of Faith Munyebvu-Chambara, the LCMAN Project Coordinator, has been on the Pathways Africa 2018 Conference, that is being co-hosted by CCF and Colorado State University (CSU) and will take place at Safari Hotel, Windhoek. The Training will be held from 6 – 8 January 2017 followed by the Conference from 9 – 11 January. All the planning is progressing and so far, over 40 trainees from across Africa have received scholarships to attend the training and conference from sponsors such as USAID, WWF- EFN, WWF Namibia, First National Bank Namibia, Go Green, Cincinnati zoo, San Diego Zoo Global, CCF and CSU's Human Dimensions and Natural Resources Department, among others. Local, regional and international trainers will facilitate the training sessions. More than 150 people from across the globe have registered, so far, to attend the conference with over 100 research presentations. We anticipate a successful conference, which is only the second time for Pathways to be held in Africa.

Carnivore Tracker App

The Carnivore Tracker App has continued to be an important citizen science project administered by CCF. In June 2017, up to 876 sightings of 28 species have been sighted. Regular updates to the Carnivore Tracker are found on their Facebook page https://www.facebook.com/carnivoretracker/, which is a platform to raise more awareness. Interestingly, as of 5 November 2017, the sightings of carnivores that were logged across Namibia had shot to 1,081. This is due to all the participants who keep recording their sightings. The data from the App is regularly uploaded into the EIS carnivore atlas for use by anyone who has an account. Figure 50 shows the distribution of five large carnivores using the Carnivore Tracker App.

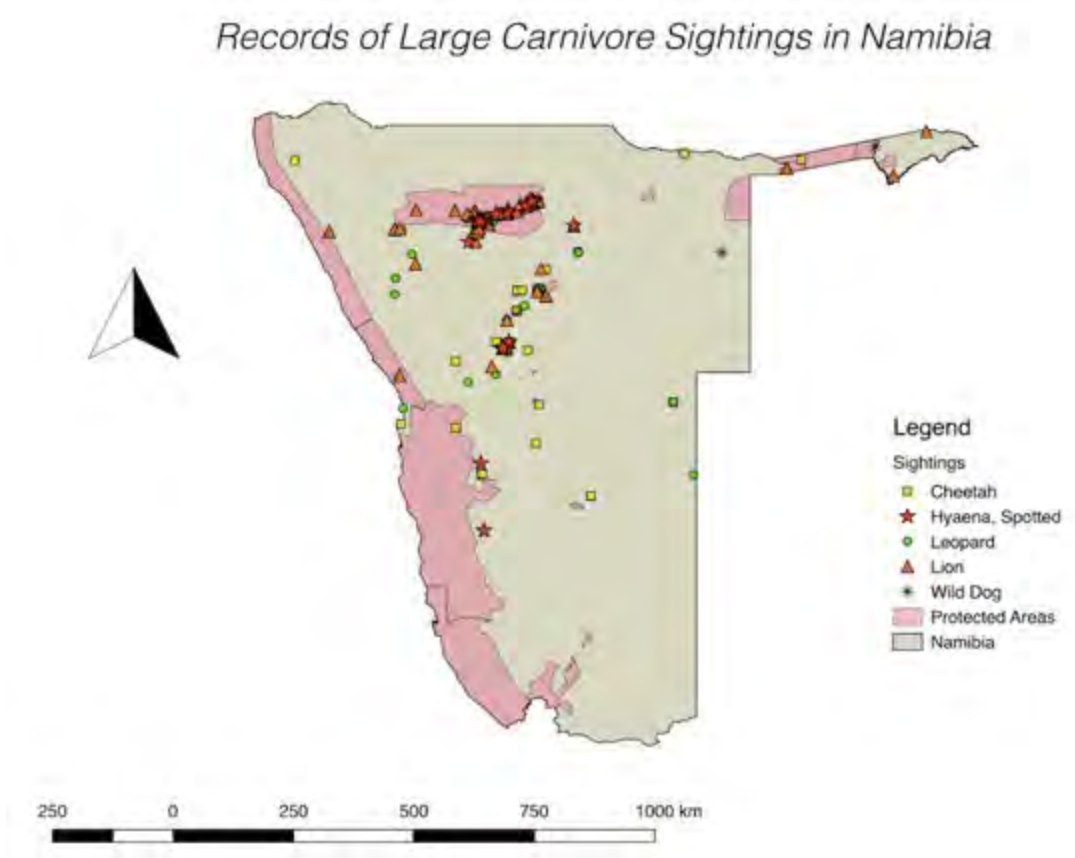

Figure 50: Distribution of large carnivore sightings in Namibia from Carnivore Tracker App 2015-2017.

2. The Ministry of Environment and Tourism (MET)

On the 15 and 16 June 2017, CCF staff visited the MET at Okamatapati. The visit was brought about by the need of CCF's Human-Wildlife Conflict team to meet and discuss pertinent issues with the MET Head of Carnivores research unit and the regional head. CCF's Matti Nghikembwa, Richard Siririka and Ismael Makamba met with the MET staff, Uakendisa Muzuma and George Kandingua.

The MET expressed their commitment to mitigating human-wildlife conflict and indicated that they wanted these issues resolved by the end of the year. They therefore welcomed partners such as CCF to achieve this. The MET had covered the following areas and encountered the conflicts with the following carnivores:

- Omaumbanje – cheetahs
- Ondekeremba – reports of African wild dogs and livestock killings
- Okaheke – cheetahs (seen that week)
- Okamatapati- Omuserekumba – African wild dogs (seen that week)
- Okamburaso – reports of African wild dogs

- Otjituuo – reports of African wild dogs and killings

The following were the requests made by MET to CCF regarding the Action Plan on Human-Wildlife Conflict, especially on African wild dogs:

- Submit a detailed report of all the previous findings on African wild dogs including pictures (as evidence).
- Gather systematic information on the ecology of African wild dogs, which MET lacks. CCF sent formal Research proposal to MET on African wild dogs.
- Placement of collars for purposes of tracking and monitoring these packs.
- More research on farmer awareness, attitudes and perception to African wild dogs.
- Share information when it is available with both MET and the farmers at AGM's.
- Establish an Event Monitoring Handbook in the conservancies for close monitoring of conflict cases.

The meeting ended with both parties acknowledging the efforts being made and hoped to visit more villages before leaving the conservancy.

African Wild Dog incident: 18 and 19 June 2017

CCF received a call from the chairperson of the Okamatapati conservancy on a possible killing of African wild dog puppies in a village 120 km east of Okamatapati. CCF's Chief Ecologist, Matti Nghikembua, and Research Veterinarian, Dr Ismael Makamba, headed there immediately after Dr Laurie Marker talked to MET's Kenneth Uiseb, and MET Carnivore Coordinator, Uakendisa Muzuma and left a message with Regional Warden, Rudolf Haufiku, with the hopes of using the puppies at the den to lure the adult wild dogs to re-unite them with their parents. CCF staff arrived on the farm where the puppies were being held along with the Chairman of the Okamatapati conservancy on the morning of 19 June 2017 and their findings were as follows:

- The farmers discovered a den with six puppies on Friday 16 June 2017 whilst tracking African wild dog paw prints on horseback. They killed three of the puppies and kept the other three with the intention of selling them. CCF staff found two puppies at the homestead with one having died the previous day and buried. CCF staff asked to retrieve the dead puppy for necropsy, but they said that their domestic dogs would have already dug up the pup by then and probably eaten it.
- The puppies were in a tire on the ground with a lid over them. They looked lively and did not show signs of dehydration. CCF estimated their age to be three to four weeks as the deciduous incisors and canine teeth had erupted but not the molars and premolars.
- The farmers told CCF staff that the den was about 15 to 20 km away from the homestead in thick thorn bush.

- The farmer had lost five cattle with one injured in the previous week alone.
- African wild dogs are seen regularly in this area and the farmers do not want them; however, they co-operated with CCF in the request to find them and place tracking collars.
- The farmers expressed willingness to help CCF when they returned to find the dogs.

Action plan

- CCF staff managed to bring the two puppies from the June incident back to CCF headquarters and passed through the Okamatapati MET office to get clearance from them. The head of the office also got clearance from the main office in Windhoek.
- CCF planned to coordinate with MET and Okamatapati conservancy to set up camp in the area and track African wild dogs for the purpose of placing GPS collars and to increase our monitoring efforts so as to understand their movement and feeding patterns more.

African Wild Dog incident: 5 August 2017

CCF was again called for another wild dog incident in Okondjatu, on a commercial farm belonging to Mr Saki Malima. This farm is a mixed livestock and game farm. The farmers found a den with nine puppies, and wanted to use them to capture the adult wild dogs, and so they had dug a trap hole and placed the puppies in it. The pack was estimated to be made up of 10 0r 11 adults.

CCF staff eventually had a meeting with MET representatives, and farmers who wanted to kill the puppies. It was agreed that the puppies be used as bait to lure the adults so that a collar can be put on one of the adults. After two days with no success, MET called it off. MET took the puppies; however, Dr Laurie Marker picked the puppies up in Windhoek after successfully convincing MET that CCF would take care of them for now. One of the puppies unfortunately died from canine distemper on the way to CCF. The remaining eight wild dogs are among the ones at the CCF quarantine pens.

Livestock Management Scorecard and Brucellosis Sampling 16 June 2017

CCF staff also wants to follow up on previously trained farmers with the Livestock Management Scorecard, and to collect blood samples for a study on Brucellosis in goats, as well as a questionnaire on risk of transmission of the disease from goats to humans in the communal areas.

Ten communal household livestock management infrastructures and their practices were inspected, and 196 blood samples were collected from goats for Brucellosis testing.

The samples were tested using the Rose Bengal Agglutination Test, which is widely used as a screening test for Brucellosis. Of the 196 samples collected and analysed, three tested positive for Brucellosis (showing 1.53% prevalence). The results indicate that Brucellosis in goats is less prevalent in communal lands, as well as the risk of zoonosis associated with it.

The Livestock Management Scorecard is an ongoing project. The farmers expressed willingness to receive more training or field days in livestock management.

3. Communal Conservancy Development

CCF's Community Relations and Education Department Manager engaged in multiple national workshops and meetings during 2017. By going to these meetings, CCF is giving its voice concerning the Community-Based Natural Resource Management (CBNRM) Programme in Namibia. Through engagement such as this CCF can continue to be a voice amongst the other CBNRM support organisations and encourage them to take advantage of the programmes that CCF offers. In addition, CCF has opened up to more collaborations and potential joint funding possibilities to aid conservancy development.

CCF participated in a workshop from 28 to 31 March 2017 in Windhoek. The workshop was aimed to engage Namibian National CBNRM Programme partners to reach an agreement on:

- Programme theory of change
- Programme scope: geographic coverage, implementing partners and roles, target conservancies

The current theory of change for the Namibian CBNRM Programme and its accompanying vision is: "A Namibian National CBNRM Programme which empowers present and future generations to manage integrated wildlife and other natural resources as a recognised and valued rural development option."

As a result of the workshop, the desired change that the Namibian CBNRM partners wish to contribute towards is: "People and communities in programme areas are collaborating to effectively exercise their rights and responsibilities, control decisions and equitably receive full benefits from natural resources, and contribute to the sustainable management of key ecosystems and habitats."

The achievement of this desired change requires the following three conditions to be in place:

1. Community-based organisations (CBOs) and NGOs have the capacity to drive change towards responsible and inclusive natural resource management (NRM). This condition is deemed important, because we assume that:

    a) Effective CBOs / NGOs will represent the voices of all in the community/society;

    b) NGOs and CBOs are part of a collaborative and inclusive process of skill-sharing and building.

2. Individuals are empowered to engage in and make decisions about sustainable NRM. The assumptions are that:

    a) With power comes responsible action, people feel safe and are aware of their rights and responsibilities, knowledge raises awareness and motivation is key to CBNRM;

    b) Social and cultural norms and traditional/informal institutions are aware, supportive, and accommodating, such that sustainable NRM will be enabled, promoted, and more effective;

c) When there is greater empowerment of members in conservancies, there will be improved stewardship of natural resources and committees will be held accountable (unlike the current problem where committees are not held accountable, and members are not adequately involved in key decision-making).

3. Systems/mechanisms are in place that allow conservancies and communities to equitably benefit from sustainable NRM. We assume that:

   a) If people feel that they are benefiting from NRM, they will be more motivated to practice sustainable resource management;

   b) Benefit sharing mechanisms will improve household livelihoods

The extent to which the Namibian CBNRM partners meet the above three conditions and the extent to which their underlying assumptions are true will determine their success in addressing the first problem outlined in the above problem statement that relates to weak CBO governance.

The conservancies in which CCF operates are culturally unique and compose a very difficult landscape in which to work. The area is highly populated but has very little tourism opportunities, low wildlife numbers, high cattle numbers, overgrazed lands and heavy bush encroachment, limited water supplies, and high levels of human-wildlife conflict (HWC) between people and predators.

CCF has worked with farmers in the area for the past 25 years (pre-gazetting of conservancies) on best practices in integrated livestock management, HWC mitigations, diversification of livelihoods, and has assisted with a few partner organisations on the gazetting of conservancies and the establishment of the GWL. With dwindling interest from partner organisations and decreased funding there has been a significant drop in governance and institutional capacity building in the region as well as limited support in Small-Medium Enterprises (SME)/Tourism development and NRM. With only CCF and MET working in the area, a greater need for support and collaboration between the two parties has been identified.

With both parties having extremely tight budgets, funding is a serious constraint on the amount of work that can be done towards capacity building within the region. Despite these constraints, CCF's Education and Ecology departments have made efforts to combine work plans and activities with MET in 2018 to meet key objectives for the region.

Following the biannual communal conservancies regional chairpersons' forum in September 2017, a number of concerns were raised by the Deputy Director of Parks and Wildlife and the Regional Governor, particularly about governance of the north-central communal conservancies, HWC, lack of transparency in activities and meetings, tense relationships between traditional authorities, and poaching. In the later part of the year MET and CCF jointly worked with Otjituuo Conservancy in their pre-AGM planning and post-AGM evaluations. The four communal conservancies that CCF works with have struggled with their governance and, due to lack of income through private sector investment, the management committee and conservancy staff works on a voluntary basis. For rural full-time farmers this is a commendable effort. With support from the MET CBNRM Warden and CCF, Otjituuo met all the requirements to meet their Standard Operating Procedures (SOP). This is an achievement they have not managed to fulfil in over five years (MET –Scoping Study on Performance and Management of Conservancies in Namibia - 2017). CCF assisted the management committee to

formulate their 2017 financial report and balance their accounts, produce a draft budget for 2018, develop an annual work plan for 2018, produce minutes for the AGM and do a pre- and post-AGM evaluation.

During 2017 CCF also assisted with Conservancy Governance Development. CCF's Nadja le Roux was selected by NACSO to attend a community mentorship workshop held on 14 September 2017, and had participants from stakeholders and CCF collaborators from other supporting NGO's, government and private sector. The aim of the workshop was to strengthen community support through mentorship programmes that help develop capacity and offer technical assistance in the governance and management of communal conservancies. This also included a second workshop hosted by MET to develop plans and structures that assist communal conservancies to implement standard operating procedures as per the Communal Conservancies Act. For a conservancy to remain gazetted and a legally recognised body managing their wildlife, conservancies should:

- hold a constitutionally correct AGM
- have constitutionally correct management committee elections
- have a benefit distribution plan
- have a wildlife management and utilisation plan
- provide an annual financial report.

In late 2017, regional consultative meetings were held on the amendment of the Protected Areas and Wildlife Management Bill. This is the 8th amendment of the bill, which is incorporated into the Nature Conservation Ordinance, 1975. CCF participated in the consultative workshop, which engaged all stakeholders in the region. The national consultation is planned for 2018 with CCF planning to attend. The national HWC Policy was also reviewed in 2017, which is an insurance scheme that compensates farmers for losses of livestock through HWC. The policy is strict and farmers must fit certain criteria to qualify for compensation showing that they actively implement conflict mitigation strategies. Challenges brought up included the untimely response by MET, which takes too long, that farmers become despondent, and that the allocated funds for compensation do not reach the full value of the animal lost. The scheme has undergone a review of the amounts and has since increased the compensation farmers receive.

F. Global Management Planning/Policy Involvement

CCF assists in international programme development and adapts model programmes developed in Namibia for use in other countries, distributing its materials and information throughout Africa and the rest of the world.

1. International Cheetah Studbook

Dr Laurie Marker is the International Cheetah Studbook Keeper. The International Cheetah Studbook is a voluntary register of all cheetahs in the world held in both zoological and private facilities, and providing information about existing animals by publishing the studbook contents, thus creating the preconditions for selecting breeding animals. The Studbook records captive animals from around the world. It includes wild-caught and captive-born individuals alive in 1980 and after, as well as founders with live offspring since 1980. Each registered animal has a studbook number. Bi-annual

questionnaires are sent to all facilities holding cheetah and information is checked through support of the International Species Inventory System (Species360) and personal communications.

The 2017 studbook is currently in preparation. The 2016 studbook was completed and distributed in November 2017 with the assistance of Becky Johnston. In 2016, 302 (138.125.39) new animals were registered, representing births and newly imported wild-caught animals during this period, as well as animals that had been brought into the captive population prior to 1 January 2016, but had not been reported until after the publication of the 2015 Studbook. Captive-born cubs from known breeding facilities totalled 194 (85.72.37) born in 54 litters in 29 facilities in 13 countries. The captive cheetah population on 31 December 2016 was 1,835 (920.904.11) animals in 289 known facilities in 49 countries (Figure 51).

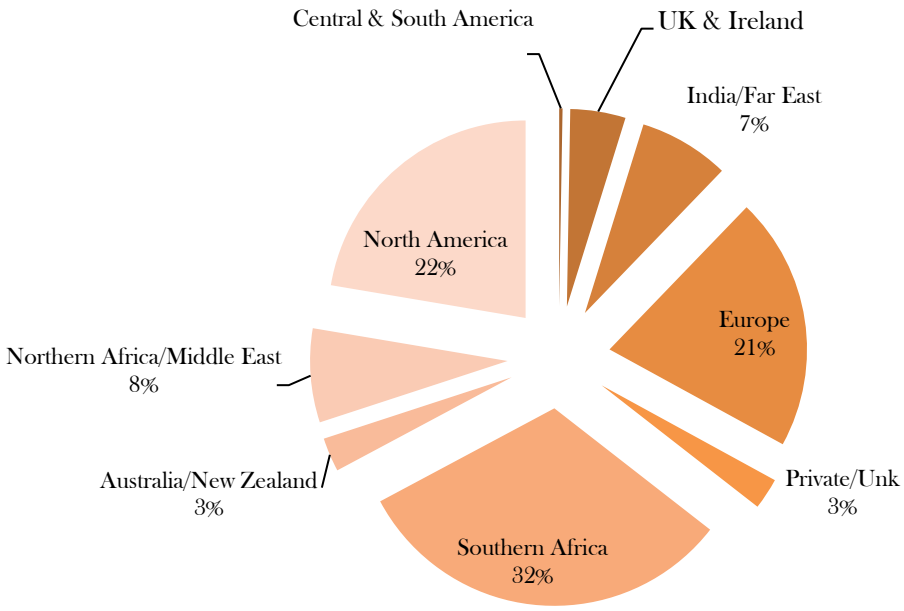

Figure 51: Captive cheetah populations by region: 1,835 (920.904.11) cheetahs.2016.

2. Illegal Wildlife Trafficking (IWT)

CCF first became actively involved with issues involving the illegal taking of live animals in November 2005, when it arranged for the confiscation of two extremely unhealthy cheetah cubs which were held around ropes outside a restaurant in Ethiopia. Since then, CCF's Assistant Director for Strategic Communications and Illegal Wildlife Trade, Patricia Tricorache, has been monitoring illegal cheetah trafficking and organising confiscations through the proper authorities whenever possible. Even though the intrinsic nature of IWT makes it difficult to collect information, CCF has knowledge of over 2,000 cheetahs involved in illegal wildlife trade cases gathered between government and direct reports, as well as direct observations and media articles. Although geographically widespread, most of live animal cases compiled by CCF involve the Arabian Peninsula and the Horn of Africa (HoA), where CCF has a broader network. In terms of cheetah products (skins, bones, etc.), recent information regarding traditional markets indicate that South Africa has the highest incidence.

During 2017, CCF registered 41 cases of illegal cheetah trafficking involving 177 cheetahs (Figure 52). Eighty-four of these were confirmed dead at the time of the report: seven were cubs for the pet trade and 77 were for parts. The fate or status of 44 cheetahs is unknown and include 16 offered for sale in Yemen and Saudi Arabia, for which follow up was unsuccessful. Twenty-eight were part of 12 cases under investigation in Somaliland.

A total of 49 cheetahs were alive at the time they were reported. These include seven offered for sale in Yemen and Saudi Arabia, and 38 offered for sale in Somalia and Somaliland. Of the latter, 13 were recovered through confiscations or voluntary surrender. Unfortunately, 10 of these cheetahs died after confiscation as generally these animals are victims of inadequate care, compounded with a lack of veterinary services and supplies. One surviving but unhealthy cub was transferred to the DECAN sanctuary in Djibouti with special government approval, but also died a few days later. At closing of this report, CCF's associates in Somaliland were caring for two cheetah cubs and one adult confiscated in 2016.

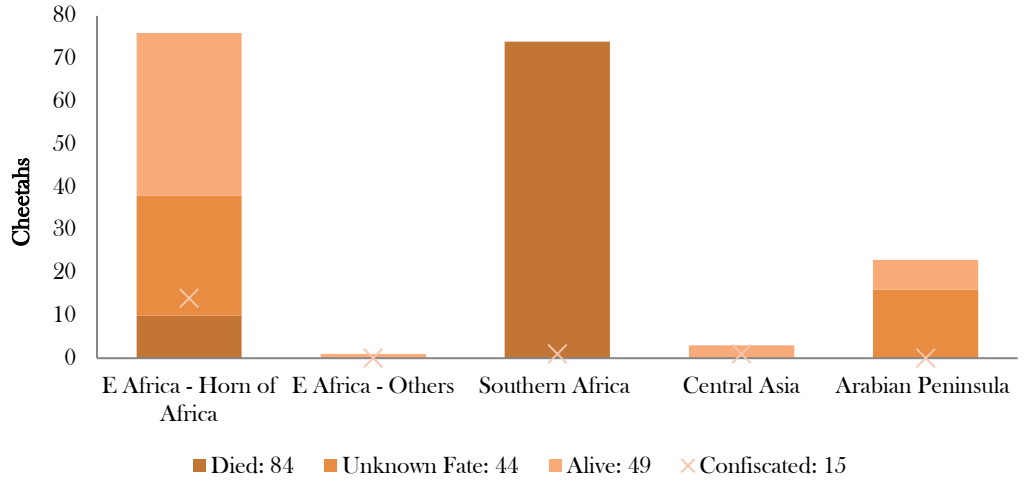

Figure 52: Summary of illegal cheetah trafficking by geographic region from January to December 2017.

CCF makes every attempt to obtain specific information on cases involving illegal cheetah trade to report them to relevant authorities. Currently, CCF and our associates in Somaliland are investigating nine cases involving 22 cheetahs.

Horn of Africa

Regional Cheetah Stakeholders Workshop Follow Up - Ethiopia

During 2017, under the International Fund for Animal Welfare's (IFAW) leadership, participants in the Regional Cheetah Stakeholders Workshop held in Ethiopia in December 2016 reviewed and approved the Blueprint for Cheetah Anti-Trafficking Strategies in the Horn of Africa. The workshop resulted in the following:

- Research baseline data for cheetah populations and cheetah-related wildlife crime in the Horn of Africa.

- Build wildlife law enforcement capacity in the region.
- Increase regional cooperation to address illegal wildlife trade.
- Promote community development to eliminate incentives for cheetah hunting.
- Create awareness, behaviour change, and demand reduction in cheetah trafficking.
- Improve capacity of confiscators in initial care of live cheetahs.
- Develop National chain of custody protocols for cheetahs from confiscation to final disposition.

The group is now in the process of seeking funding to implement these strategies.

Illegal Cheetah Trade Strategies (SL-IWT) – Somaliland, April 2017

The HoA region continues to be of major concern in terms of illegal cheetah trade due to political and economic factors that make enforcement more difficult, as well as its proximity to the Arabian Peninsula, where demand for exotic pets remains constant. With few exceptions, attempts by CCF and its network to confiscate cheetahs continue to be mostly unsuccessful.

To tackle these issues, CCF's Patricia Tricorache visited Somaliland in April 2017 and, with CCF's collaborators from the area, held several meetings with the Somaliland Minister of Environment and Rural Development (MoERD), Hon. Shukri Haji Ismail. Together, the group drafted a set of strategies to facilitate Somaliland's ability to fight the trafficking of wildlife (SL-IWT). These strategies, developed under the framework of the Regional Cheetah Stakeholders Workshop held in Ethiopia in December 2016, entail elements such as awareness, capacity building, regional cooperation and, in the longer term, a sanctuary for confiscated wildlife. Following these meetings, a core working group was formed that brings together the MoERD, CCF, Colorado State University (CSU), DECAN Djibouti, Deutsche Gesellschaft fur Internationale Zusammenarbeit – Sustainable Land Management (GIZ-SLM), the International Fund for Animal Welfare (IFAW), the IUCN Antelope Specialist Group (ASG), and the local NGOs Candlelight and the Somaliland Biodiversity Foundation. At the conclusion of these meetings, the Minister reiterated Somaliland's commitment to be a pro-active partner in the fight against illegal wildlife trade.

During this visit, Patricia also connected with other local NGOs, including the Horn of Africa SPCA (HSPCA), to explore avenues for collaboration. The HSPCA offered support in awareness raising efforts, and only three days after Patricia's departure, on 18 April, they reported three young adult cheetahs that had been smuggled from Ethiopia into the Wajale region. The cheetahs had escaped from the vehicle in which they were being transported. The information was immediately conveyed to our local associates, who got approval from the Minister to fetch the cheetahs; unfortunately, only one was rescued. The body of a second cheetah was found weeks later; the third one is reportedly held at a private residence.

On the same day, our associates learned that authorities had confiscated nine small cheetah cubs in a different location. The Minister asked our collaborators to pick up the cubs. Vehicles were rented, and a team mobilised to travel to both locations the next day. By evening on 19 April, the team had taken possession of 10 cheetahs in need of urgent medical care, food and appropriate emergency housing. Consequently, CCF approached its partner in IWT issues, IFAW, who offered immediate assistance to ensure the cubs' needs were met.

The Somaliland MoERD showed great leadership in acting swiftly against these cheetah traffickers. CCF and IFAW are engaged in discussions with the Ministry on how to provide long-term care for the confiscated cheetahs, which cannot be transferred to sanctuaries in nearby countries as current laws do not allow for confiscated animals to be transported across borders.

Strategic Planning and Development Workshop for a Proposed Wildlife Sanctuary and Rehabilitation Center – Somaliland, 9-11 September 2017

Following the April meetings, the MoERD, CSU, GIZ and CCF organised the Strategic Planning and Development Workshop for a Proposed Wildlife Sanctuary and Rehabilitation Centre in Somaliland, from September 9 to 11, 2017. The aim of this workshop was to operationalise some of the SL-IWT objectives, with emphasis on an initiative to build a rescue facility for animals confiscated from the illegal trade or inadequate housing conditions.

The workshop was held with financial support from the US-based Murulle Foundation and GIZ. Attendees included representatives from local NGOs and government institutions. Somaliland's commitment to fight illegal wildlife trade was evidenced by the participation of high-level officials, including the Chief Justice of Somaliland, the State Minister of the Ministry of Finance, and the Deputy Police Commissioner.

As a result of the workshop, a Letter of Intention signed by the Minister of Environment and Rural Development was signed, while the core group is in the process of finalising a draft Memorandum of Understanding that outlines goals and responsibilities of all entities involved in this effort. Additionally, and as part of capacity building efforts built into the strategy, two wildlife officials from MoERD have been selected to participate in the upcoming Pathways Africa Conference in Namibia in early 2018.

Public Policy

Dr Laurie Marker and staff take every opportunity to network with government institutions, and monitor important issues and government policies that affect the cheetah. CCF continues to be approached by and collaborating with various international conservation and enforcement NGOs researching IWT, and pro-actively approaches government agencies, groups and individuals dedicated to collecting information and training enforcement agencies to fight the trade. Efforts such as these enable CCF to create synergies that may result in successful actions, and to raise awareness on the urgency of addressing the illegal trade of live species as a whole, and not species specific.

CITES

Throughout the year CCF continued to follow up on CITES-related issues, particularly regarding the development of a Cheetah Trade Resource Kit, and began working with its partner NGOs in preparation for the CITES 69th Standing Committee meeting (SC69) held in December 2017. Also in preparation for SC69, the CITES Secretariat on 15 May 2017 issued a Notification to the Parties 2017/39, requesting information on progress made on all decisions and recommendations adopted in 2016. At SC69, an inter-sessional working group mandated with moving forward the development of a Cheetah Trade Resource Kit was formed. As CCF was not present at SC69, the Group Chair approved our participation at a later date. At the closing of this period, the group had not initiated activities.

Genetics

The CCF team continues to make every effort to collect genetic samples from cheetahs in the UAE and HoA, under the proper CITES permits, for a DNA database that might allow us to identify their geographic origin in support of trafficking investigations. The samples are brought and stored in Namibia. During this period, CCF's associates in Somaliland collected 10 samples from the cheetahs confiscated in April 2017.

Cyber-Crime

Throughout 2017, CCF continued its research of cheetahs offered for sale on social media in close collaboration with PEGAS (Project to End Great Apes Slavery). Information is continuously shared with relevant authorities. When appropriate and without hindering official investigations, CCF also alerts NGOs working on other endangered species found on the advertisements, e.g. chimpanzees, orangutans, gibbons and clouded leopards. As of 31 December 2017, CCF's database includes 389 dealers and partial data over a 5-year period, 2012-2017, which includes over 1,350 cheetahs offered for sale.

In March 2017, Patricia Tricorache participated in an Illegal Wildlife Cyber-Trade Information Exchange Workshop organised by PEGAS and hosted by the Ol Pejeta Conservancy in Kenya. The workshop was attended by cyber-crime researchers from IFAW and the Wildlife Justice Commission (WJC), and focused on reviewing strategies and tactics to detect and disrupt wildlife cybercriminals. Electronic information relevant to the Dark Net was provided by Joss Wright, Research Fellow at the Oxford Internet Institute and Co-Director of the Oxford University Cybersecurity Doctoral Training Centre.

Participants shared their respective objectives, methodologies, outputs and outcomes and discussed ways of improving effectiveness, including the need to adopt a coordinated and consistent approach to tackling the problem across the NGO community with the aim of increasing our impact. The following desired outcomes were agreed upon:

- Disrupt wildlife cybercrime through enforcement actions including arrests, seizures and prosecutions;
- Raise awareness with governments at an international and national level on the scale and severity of wildlife cybercrime;
- Raise awareness with buyers on the negative impact of illegal wildlife trade on both the conservation and welfare of the animals being traded;
- Effect policy and legislative trade at the international (CITES) and national level to specifically target wildlife cybercrime (i.e. adding offering for sale as an offense where this doesn't exist); and
- Ensure online tech companies (particularly social media platforms) pro-actively implement their wildlife trade policies

The group has continued to work together to explore the possibility of developing collaborative projects that would further the goal of reducing IWT, focusing initially on great apes and cheetahs.

Media

Most IWT media coverage during this period resulted from a joint CCF/IFAW press release regarding the confiscations of 10 cheetahs in Somaliland on 19 April. Coverage included some major media outlets such as The Times, the Mirror and Express in the UK, as well as The Dodo (web), Mombasa Coast (Kenya), L'Arca di Noe (TV, Italy) and, in Somaliland, The National and The Horn Diplomat. Because of this media coverage, CCF has been approached by three documentary makers interested in cheetahs and illegal cheetah trade between the Horn of Africa and the Arabian Peninsula. Conversations are ongoing.

The February 2017 issue of the Bild der Wissenschaft (Germany) included a 6-page article featuring the work of CCF, and included an interview with Patricia Tricorache regarding illegal cheetah trade titled, "Cheetahs are Status Symbols."

As a result of CCF's collaboration with PEGAS, an article in the July 2017 issue of SWARA Magazine (Kenya) titled "Concern over Social Media Trafficking of Great Apes" describes the research that the two organisations have carried out concerning cyber-crime.

CCF was prominently featured in the Middle East. An article titled "Meet the Kuwaitis Who Live with Pet Cheetahs" was published by the online news site www.middleeasteye.net on 21 June and later reproduced by Le Figaro (France) on 23 August. This article, citing data from CCF, was coordinated by one of CCF's associates in Kuwait. In the UAE, the English language Emirati newspaper, The National published two articles on 27 July: "Dubai Safari Park to include sanctuary for rescued exotic animals" and "Sanctuaries in Africa Offer to Take Exotic Pets from UAE Following Amnesty." Subsequently, two follow-up articles, "Big cats continue to be sold in UAE via social media despite federal law," and "Social media used to sell big cats in UAE despite law," were published on 18 and 19 October 2017, respectively. The latter was also re-published by Africa Geographic online under the title, "Social media used in the UAE to sell big cats despite law."

Additionally, CCF was asked to contribute to an article for the May issue of the Somaliland Biodiversity Foundation Newsletter regarding the meetings held in Somaliland with the MoERD in April 2017.

Social Media

Social media is a tool commonly utilised by wildlife dealers, and their images of animals being offered receive many compliments and "likes" by thousands of people. With this in mind, and considering that CCF's most popular post on its Facebook page in 2015 was relevant to IWT, we launched a Facebook page titled, "So you want a pet cheetah?" on 30 December 2015. The page aims to raise awareness on social media about the threat that illegal cheetah trafficking presents to the survival of the species by providing information about the trade, and about actions being taken, hoping to turn public opinion against ownership of cheetah pets and, in particular, to reach those who might own or plan to buy a cheetah. Between January and December 2017, the page "likes" increased from 867 to 1,221.

V. Education

Public education and the development of an active grassroots constituency are integral components of CCF's overall cheetah conservation programmes. CCF educates farmers, students, educators, public-policy makers, and the public in general on the value of sustainable practices in conservation, as well as on the importance and value of predators for a healthy ecosystem (Figure 53). Public education and the development of national pride in the cheetah are both critical to its survival, and other natural resources in Namibia.

CCF continues to host school groups of all ages at Camp Lightfoot and visit schools as part of its outreach programme. CCF also continues to provide in-house training to Namibian students and to host national and international students and interns.

Thirty-nine percent of Namibia's population falls within the primary and secondary school years. Currently there have been some serious government cuts in the national budget. The Ministry of Education, Arts and Culture had a 2.8% budget cut for 2017, with 85% of the budget allocated to staff-related expenditures. Highlighted as priorities for the Ministry for 2017 is a quest to upscale technical and vocational skill development in schools as well as facilities, textbooks, and other learning materials. This left very little focus and finances on excursions and environmental education. As a result, CCF's Education department saw an overall decrease of 4.1% in both national and international students participating in its various outreach programmes, day visits, and multiple day programmes.

The weekend programmes saw a 144% increase in Namibian schools (primary, secondary and tertiary level) utilising CCF's multiple day programmes, and an increase of 20% in the day visit programmes compared to 2016. Through collaborations with the Namibian Environmental Education Network (NEEN) and more engagement with schools, numbers of bookings and interests increased.

There was a 15% increase in international education groups visiting the centre for either day visits or multiple day programmes. Due to a higher demand of groups visiting the centre, we saw a 10% decrease in the outreach numbers compared to 2016.

This reporting period saw the development of an Environmental Education (EE)/Environmental Sustainability Development (ESD) Policy for Namibia, which was rolled out with several consultative meetings that CCF Community Relations & Education Department Manager, Nadja le Roux, attended and presented on a "one health vision" and collaborative field activities.

The EE/ESD policy aims are to:

1. Develop an understanding of the local, national, regional and global environment; its associated benefits, problems, solutions and approaches for implementing those solutions

2. Foster attitudes and values that develop environmental responsibility and active participation in achieving a higher quality of life

3. Share and develop skills for identifying, critically evaluating, and solving environmental problems

4. Actively encourage participation of individuals, groups and governments in acting positively in the prevention and solution of environmental problems and to support mechanisms (social, political and moral) that enable people to take control of their lives and environment

5. Be flexible and dynamic, thereby adapting as new problems and issues arise; adopting appropriate solutions; and follow guidelines and recommendations set out in International treaties, conventions, and agreements ratified by the Namibian Parliament;

6. Recognise and incorporate local and indigenous knowledge and take cognisance of cultural and religious beliefs.

As CCF always has the very same ethos in our approach to education in Namibia, it was key to ensure that the Policy was supported and moved forward with contributions to the final document.

Stemming from this process, the need for EE service providers in Namibia was identified and a group of EE service providers felt that an EE working group should be formed to pool and coordinate activities and plans, the purpose and message of service providers, and jointly address hurdles in implementation. A workshop was held at AfriCat Foundation in mid-November 2017 and brought 18 service providers and partners together. These included government, NGO's and youth group coordinators. Out of this workshop, a working document and guideline was developed. Nadja le Roux was tasked to present the findings and way forward in the upcoming Namibian Association of CBNRM Support Organisations (NACSO) members meeting in 2018 to bring to attention the importance of EE/ESD in communal conservancies and rural environments, as there is a gap in the CBNRM programme. With consistently reaching out to the youth and the EE/ESD service providers, there will be strong candidates to fill the gap alongside what NACSOs goals are.

Figure 53: Ignatius Davids (standing on the left), CCF's lead environmental educator, giving feedback after a group discussion.

A. Future Conservationists of Africa

In 2017 the CCF Education team reached 10,451 Namibian students from primary to secondary schools, as well as 382 teachers in our outreach and centre-based programmes.

Additionally, the department engaged with a large number of youth centres and centre-based programmes, as well as regional councils, overall meeting with 255 members of these institutions. In an effort to engage more with leaders in communities, discussions were held on youth involvement in conservation, future collaborations, and CCF's education programme. Financial constraints of the regional institutions came up as a challenge, as well as turnover of staff and youth leaders resulting in a loss of institutional knowledge. Solutions were discussed in the form of training of trainers (TOTs) for youth leaders in the CCF Teachers Resource Guide, more regular communication between parties and for government offices to promote environmental education within their offices, leadership, and communities.

1. Outreach

School outreach started in late January 2017. Thirty-eight schools in seven towns were visited during 2017 as part of CCF's outreach programmes. Through the visits, CCF's educators reached a total of 8,838 Namibian learners.

The presentations given are tailor made for specific audiences and run for approximately 45 minutes covering CCF's research, conservation, and education efforts. They also cover cheetah behaviour, ecology, and its conservation. The presentations and talks go further into different predator ID's, rangeland management, biodiversity as well as HWC mitigation strategies, collaborative management

tools to sustainably live with wildlife, and the economic and environmental benefits of having healthy, balanced ecosystems.

2. Centre-based Programmes: Primary to High School

Organised education programmes at CCF involved 34 Namibian groups totalling 1,613 children and youth, accompanied by 199 teachers, parents, or volunteers. Of these, 11 groups consisting of 286 children and youth with 46 teachers, parents, or volunteers, participated in overnight programmes at CCF's Camp Lightfoot (Table 17).

Depending on the length of stay and the group focus, activities included cheetah runs, museum tour, guarding dog and goat kraal talks, predator-kill identification exercises, ecological talks, and game drives.

Table 17: Namibian schools hosted by CCF from January to December 2017.

Date In	Date Out	Namibian Overnight School Groups School	Students	Adults	Total
17 Feb 17	19 Mar 17	Friederich Awaseb Combined School	14	6	**20**
03 Mar17	05 Mar 17	Gammams Primary School	30	4	**34**
31 Mar 17	02 Apr 17	KAYEC Trust	30	4	**34**
21 Apr 17	23 Apr 17	Namib Primary School	26	2	**28**
06 Sep 17	08 Sep 17	Omashashi Combined School	28	3	**31**
22 Sep 17	24 Sep 17	M&K Gertze High School	35	2	**37**
6 Oct 17	8 Oct 17	Okaepe Project School	30	6	**36**
27 Oct 17	29 Oct 17	Kalkveld Primary School	30	3	**33**
30 Oct 17	03 Nov 17	Mayuni Senior Secondary School	20	3	**23**
10 Nov 17	12 Nov 17	Dawid Khamuxab Primary School	24	8	**32**
02 Dec 17	04 Dec 17	Omaruru Children's Haven	19	5	**24**
		Total Namibian Overnight School Groups:	**286**	**46**	**332**

Date	Namibian Day Visit School Groups School	Students	Adults	Total
14 Feb 17	Kamerua Primary School	192	8	**200**
24 Feb 17	Swakop High School	60	8	**68**
19 Mar 17	!Nara Primary School	60	5	**65**
24 Mar 17	Omuulukila Primary School	15	6	**21**
22 Apr 17	Cornerstone Church Ministry	21	3	**24**
05 May 17	Rundu Senior Primary School	77	10	**87**
08 May 17	Usiel Ndjavera Primary School	72	8	**80**

08 May 17	Onesi Secondary School	130	8	**138**
23 May 17	David Sheehama Secondary School	80	10	**90**
26 Aug 2017	Kandjimi Secondary School	32	2	**34**
29 Aug 2017	Tomanus Kamunkona Secondary School	60	6	**66**
4 Sep 2017	Grootberg Primary School	27	5	**32**
4 Sep 2017	Andreas Haingura Kandjimi Primary School	70	10	**80**
8 Sep 2017	St. Michael Vision Primary School	44	7	**51**
9 Sep 2017	Osire Secondary School	22	7	**29**
12 Sep 2017	Mokganedi Thabanello High School	64	3	**67**
13 Sep 2017	Omuhatunia Primary School	56	9	**65**
5 Oct 2017	Ondao Primary School	71	7	**78**
8 Oct 2017	Kuvukiland Primary School	64	9	**73**
13 Oct 2017	Ortwetoveni Primary School	14	3	**17**
21 Oct 2017	Peri Nawa Pre-Primary	6	3	**9**
26 Oct 2017	Oraponobis Choir Day Visit	58	9	**67**
3 Nov 2017	Erongosig Primary School	32	7	**39**
	Total Day Visit:	**1327**	**153**	**1480**
	Total Namibian School Groups:	**1613**	**199**	**1812**

3. Ambassador Animals

The Education Department continued to work with some of the kraal animals to serve as Ambassadors for the different school groups that came in. Karibib (a female breeding dog) continued her role as Livestock Guarding Dog Programme ambassador, and starting in April of 2017 one Boer goat, Potjie, and one dairy goat, Lizzie, started their training as kraal ambassadors as well. Potjie and Lizzie both broke their legs at a young age, and as a result bonded not just to each other, but to people, making them an excellent choice for children to be able to meet as they love the attention. By allowing the children to meet Karibib and the other animals, the children can have a hands-on experience, touch a dog, and a livestock animal, which in many rural areas are not well taken care of or in which many children are not always taught to take good care of. Interactive experiences have always left a big impact on children, and the three Ambassador animals work together well to represent the farming and livestock management programme as they are comfortable with small children and big groups.

4. Camp Lightfoot

Camp Lightfoot maintenance was a primary focus of the first half of the year. Under the direction of CCF Educator, Ignatius Davids, several of the doors were replaced, all the ceilings were scraped and re-painted, the water tank was cleaned out, a frame for the fire pit was put up and some trees were removed to allow for a clearer walking path. In addition to this, upkeep also included the general cleanliness of the dorms and the conditions of surrounding areas, which Ignatius will follow-up on.

For the second half of the year, Lightfoot maintenance included clearing the bush from the border of the site (to open it up more), and clearing the Lightfoot Nature Trail of some of the grass growth that runs through the centre of the trail.

5. Higher Education and In-Service Training

CCF is committed to empowering Namibians to take over the conservation and protection of their wildlife. Toward this goal, for many years CCF has fostered Namibian college students' interest in wildlife conservation. CCF offers in-service training programmes for students from the Namibia University of Science and Technology (NUST), Vocational Training Centres (VTC) and the University of Namibia (UNAM). The students conduct research projects, with the goal of completing a research paper at the conclusion of their internships. Several former interns have gone on to work at conservation organisations or with MET.

During this period, CCF continued to foster nine Namibian student interns and 2 International interns who carried over from 2016, and an additional 21 Namibian interns.

In addition to the in-service training students, CCF welcomes groups from Namibia's higher-education institutions to participate in programmes aimed at enriching their skills in various study areas. From January to December 2017, CCF hosted 13 groups. A total of 163 Namibian university students participated in various aspects of CCF's work in the areas of Wildlife Management, Environmental Management, and Tourism (Table 18).

Table 18: Namibian higher-education groups visiting CCF in 2017.

Date	Namibian Day Visit Higher Education Groups	Students	Adults	Total
13 Sep 17	University of Namibia	9	4	**13**
30 Aug 2017	University of Namibia	50	5	**55**
07 Oct 17	University of Namibia	19	3	**22**
Total Namibian Day Visit Higher Education Groups:		**78**	**12**	**90**

		Namibian Overnight Higher Education Groups			
Date In	**Date Out**	**School**	**Students**	**Adults**	**Total**
16 Jan 17	20 Jan 17	NUST – SASSCAL	4	0	4
12 Feb 17	17 Feb 17	NUST – SASSCAL	4	0	4
01 Mar 17	06 Mar 17	NUST – SASSCAL	3	0	3
26 Mar 17	02 Jan 17	NUST – SASSCAL	4	1	5
10 Apr 17	13 Apr 17	Soil Scientists	0	2	2
23 Apr 17	29 Apr 17	NUST– SASSCAL	4	1	5
23 Jun 17	29 Jun 17	NUST– SASSCAL	3	0	3
01 Sep 17	02 Sep 17	University of Namibia	35	2	37
12 Oct 17	14 Oct 17	University of Namibia	24	4	28
27 Oct 17	30 Oct 17	NUST– SASSCAL	4	1	5
Total Namibian Overnight Higher Education Groups:			**85**	**11**	**96**

Total Namibian Higher Education Groups:	**163**	**23**	**186**

B. Other Collaboration with Educational Institutions

During 2017, the CCF Centre hosted 14 international groups (258 students and 35 teachers/accompanying persons) from international schools and universities participating in educational programmes, including lectures on HWC, cheetah runs, and tours of CCF's Centre. Twelve of these groups stayed at Camp Lightfoot (Table 19).

Table 19: International groups attending educational programmes at CCF January to December 2017.

Date In	Date Out	International Overnight School Groups	Students	Adults	Total
10 Jan 17	14 Jan 17	World Teach (Intl)	8	1	**9**
19 Jan 17	21 Jan 17	Wofford College (USA)	18	2	**20**
22 Mar 17	24 Mar 17	Peace Corps (USA)	15	0	**15**
13 May 17	15 May 17	University of Nebraska (USA)	12	2	**14**
15 Jun 17	25 Jun 17	Earth Expeditions	26	2	**28**
25 Jun 17	30 Jun 17	Murdoch University – Veterinary School (Australia)	12	2	**14**
14 Jul 17	17 Jul 17	Nat Geo Student Expedition (USA)	24	3	**27**
19 Jul 17	28 Jul 17	Earth Expeditions (USA)	23	2	**25**
22 Jul 17	23 Jul 17	Conservation Global (USA)	10	3	**13**
31 Jul 17	2 Aug 17	International Girl Scouts	28	5	**32**
26 Sep 17	30 Sep 17	The Traveling School (USA)	13	7	**20**
01 Dec 17	02 Dec 17	Dartmouth College (USA)	13	2	**15**
	Total International Overnight Education Groups:		**202**	**31**	**233**

Date	International Day-Visit Higher Education Groups	Students	Adults	Total
08 Nov 17	Struer Statsgymnasium (Denmark)	8	3	**11**
14 Aug 2017	Boys High (Pretoria, S Africa)	48	1	**49**
	Total International Day Visit Education Groups:	**56**	**4**	**60**
	Total International Education Groups:	**258**	**35**	**293**

C. Working Guests and International Interns

Working Guests are the backbone of CCF and vital in daily operations. During 2017, CCF hosted 24 working guests (3 returns) from the USA, Scotland, England, and Bermuda. Working Guests play an extremely important role with CCF's student interns, as they bring experience and skills with them and through daily interactions help to share and develop skills in our students. Integrating the Working Guests with student interns allows for sharing of knowledge, life experiences, cultures, and traditions.

In addition to 30 Namibian student interns, CCF welcomed 38 international student interns from the USA, France, Canada, the UK, Bolivia, Belgium, Zimbabwe, Congo, Italy, Kenya, Austria and Germany in 2017. The interns were training in veterinary medicine, zoology, ecology, wildlife science, animal science, eco-guiding, environmental studies, international development, and genetics. In addition, there were three MSc students; Calum O'Flaherty did his research on the LGD programme, Tim Hofmann on scat-dogs, and Nina Condeco on the feasibility of a biosphere reserve. In addition, CCF hosted one PhD. student, David McMillan, who was researching nesting of local bird species.

VI. Structural Activities

A. Namibian Facility Developments

1. Existing Structural Projects and New Projects

2017 saw continued investment in the CCF Namibia infrastructure. Improvements include:

- Continued upgrade of the security camera system including the erection of a broadcast tower on Farm Cheetah View. The local intranet on the campus was also adjusted.

- A design for road-signs on rock caissons was approved and installation began throughout the main campus and in the reserve.

- Cheetah View Lodge was erected in the main campus and opened in June.

- The Bushblok Project began moving operations to the Biomass Technology Demonstration Centre at the main CCF campus. By mid-year 2017, an extrusion press and the carbonising kiln were in production.

- The main battery bank was relocated to the barn power rooms and additional inverter/chargers were installed. This centralised electric distribution and monitoring.

- A 75-kw solar array was installed on the Visitor Centre roof. The Turkish Cooperation and Coordination Agency (TIKA) funded 25kw of the overall system with a grant to CCF. We were very fortunate to also receive a grant from EJF Philanthropies to fund the other 50kw, along with the associated storage batteries. There are now 252 solar panels making up an area of 455 square meters to harvest the sun's energy. This photovoltaic power system provides electricity sufficient to operate the main campus and simultaneously charge a battery system for use during the night. Previously, CCF used a diesel generator as its main source of power. The generator had to be run 17 hours a day. Generator operation still occurs so that the batteries can be charged when the sun is not intense enough. However, operation of the diesel generator has been considerably reduced.

- Another safari vehicle was acquired to service guests.

- The Airstrip was graded and the hangar was cleaned and re-purposed for hay storage.

- Work on erosion control and the construction of monitoring paths continued behind some of the main cheetah pens.

- The infrastructure of Lightfoot Camp was rehabilitated with new doors and porches on the cabins and the addition of an en-suite bathroom to cabin #10.

- Several boreholes were serviced and a new one was opened at Boskop.

- The goat /dog corral was revamped with a concrete floor on some of the pens.

- The SSP pens were renovated for African wild dogs.
- A pipeline was installed to take water from the Elandsvreugde boreholes to the Rhino Reserve.
- On-going staff training included discussions of general worker safety and chemical use.
- Road and fence maintenance continued throughout the farms.

2. Automotive

Vehicles and tyre repair continue to be an expensive and time-consuming problem at CCF. At closing of 2017, CCF had 24 vehicles, two of which were not in running order. 's vehicles and their condition at the end of December 2017.

B. Staffing

1. CCF Namibia Staff

As of 31 December 2017, CCF Namibia employs 34 technical staff as follows. Additionally, CCF employs four cooks, 39 farmhands and domestic workers, and 30 Bushblok project workers.

- Laurie Marker, DPhil – Founder and CEO
- Lora Allen – Cheetah Keeper
- Anne-Marie Bekker – Business Manager
- Bruce Brewer, PhD - General Manager
- Johan Britz – Farms Manager
- Tanya Britz - CCF Bush Accountant
- Ignatius Davids – Education and Tourism Officer
- Quentin DeJager – Dog Trainer
- Karin Falk – CCF Accountant
- Gabi Fleury- HWC Ecologist
- Josephine Gabriel – Tourism and Education Assistant
- Robin Gieling, DVM - Veterinarian
- Job Iyambo – Tour Guide & Cook

- Bianca Jacobs – Tourism Manager
- Ruan Jacobs – Tourism Assistant
- Becky Johnston – Studbook Keeper and Cheetah keeper
- Kristophine Keendjele – Gift Shop Supervisor
- Himee Kuhango – Tour Guide & Tourism Assistant
- Nadja le Roux - Community Relations and Education Manager
- Ishmael Makamba, DVM – Community Veterinarian
- Matti Nghikembua – Forest Steward & Chief Ecologist
- Gebhardt Nikanor – Education and Tourism Officer
- Teresia Robitschko – Personal Assistant to the Director
- Anne Schmidt-Küntzel, DVM, PhD - Research Geneticist & Asst. Director for Animal Health and Research
- Paige Seitz – Livestock Guarding Dog Manager
- Tryves Shivolo – Tour Guide
- Miriam Shuudi – Tourism Assistant
- Bessie Simon – Assistant Farm Manager
- Max Simon – Mechanic
- Heike Stackmann - Volunteer Co-ordinator and Public Relations Officer
- Tyapa Toivo – Small Stock Supervisor
- William Versfeld – Laboratory Technician
- Hanlie Visser – Hospitality Manager
- Paul Visser – Estate Manager

2. CCF USA Staff

- Brian Badger – Director of Conservation and Outreach
- Beth Fellenstein - Director of Operations and Finance

- Susan Kaufmann - Constituent Relationship Manager
- Paula Martin – Executive and Development Assistant
- Angelina Mertens – Donor Relations Associate
- Jj Muehlhausen – Development Manager (Grants and Designated Giving)
- Reid Nelson – Donor Relations Coordinator
- Heather Ravenscroft - Chapter Coordinator
- Dionne Stein – Development Manager (Events and Special Projects)

VII. Organisational activities

A. Fundraising

1. Namibia

Annual Gala Dinner

The annual Gala Dinner was a success with about 280 people in attendance. The Gala event, which is now much-anticipated by Namibian conservation circles, is a celebration of the cheetah and highlights the efforts CCF has made to ensure the survival of the cheetah in the wild for future generations. The evening included a candlelight dinner, conservation awards, bringing together guests from the business, conservation, agriculture and government sectors in Namibia and internationally. The silent auction once again was a huge success with over 120 items donated by local and international businesses, which included artwork, jewellery, Namibian craftwork and tourism 'get-aways' at exclusive Namibian and international tourist venues, including stays at the NamibRand Reserve, the Swakopmund Hotel, and CCF's exclusive Babson House to name a few.

Dr Laurie Marker presented the 2017 State of the Cheetah and emphasised the need to conserve Namibia's treasures and to foster an economic system where humans can live within the natural scope of a healthy, intact and bio-diverse landscape. The guest speaker, Dr Rogério Cunha de Paula from São Paulo, Brazil, was presented with CCF's 2017 Cheetah Conservationist of the Year award for his dedication to the Namibian environment and community conservation. In addition, Dr Marker presented three 2017 Cheetah Conservation Awards, on behalf of the CCF Namibia Board of Directors, recognising those who have helped conserve the cheetah and the Namibian environment. The 2017 Cheetah Conservation Fund Sponsorship Recognition Award was given to the Embassy of the Republic of Turkey and the Cooperation and Coordination Agency (TIKA), for their support of CCF's Livestock Guarding Dog Programme. The 2017 Cheetah Conservation Farmer of the Year Award was presented to Hendriette Nderura Rukero, for her care and dedication to her livestock guarding dog, while the 2017 Cheetah Conservation Fund Farm of the Year Award, was awarded to Farm Krumhuk. CCF has known and worked with the farm owners, Ulf-Dieter Voights and his family, since 1991. Farm Krumhuk has been a part of the Auas Oanob Conservancy since its inception and an active member of the CANAM since 1999 and has embraced integrated methods of conservation farming.

2. International

CCF USA

In addition to overseeing operations and finances, the CCF USA team handles digital media, event planning, strategic communications, US education and outreach, donor and constituent relations, and grant writing. They also lend their support to CCF's US chapters, as well as to affiliates and fundraising partners around the world.

This year's CCF's Annual Fund Campaign included four major appeals: the Spring Appeal, the Chewbaaka Memorial Challenge, the Fall Appeal, and the Year-End Challenge. Each direct mail appeal includes several mailing components to targeted audiences during the time period of the appeal and supported with e-mail solicitations. In addition to these major campaigns, several smaller, independent e-blast efforts are incorporated throughout the year, as well as two printed newsletters, two electronic newsletters, and two electronic 'Notes from the Field'.

In addition, CCF offers supporters the opportunity to sponsor CCF's non-releasable cheetahs, who receive bi-annual and annual updates on their sponsored cheetahs.

Dr Laurie Marker's Tours

Dr Marker's Spring and Fall tours this year included a total of 24 states and 44 cities in the USA, for a total of 49 lectures, conferences, zoo visits and special events supported by the CCF USA Chapters and Board members. In addition to raising funds for CCF, she introduced her first scientific cheetah book called, *Cheetahs Biology and Conservation: Biodiversity of the world.*

Chapter Events

Supplementing Dr Marker's visits to the US, regional chapters are encouraged to organize events that support CCF in US communities s. During this period, CCF's chapters organized over 30 events in nine states, including zoo talks, Cheetah Runs, International Cheetah Day celebrations, and participations in Earth Day and other community events.

International Affiliates

CCF has registered charitable organisations in Australia, Belgium, Canada, Italy, Japan and the UK. CCF also has fundraising partners in France, Germany and the Netherlands. All CCF's partner organisations promote education, fundraising and conservation awareness.

Throughout 2017, CCF Canada (CCFC) continued to build partnerships with zoological and educational institutions, including the Toronto Zoo and the University of Guelph's Ontario Vet College. CCFC also worked to build a stable of strong volunteers from across Canada who have provided expertise in social media, multi–media, and developing written material for its website and social media platforms. In October, CCFC hosted Dr Marker for two days in Ottawa, holding a public lecture, which featured an Anatolian dog, Atlas, from Toronto. CCF Canada arranged meetings with the Canadian Government's head of wildlife enforcement and a Member of Parliament with a leadership role in Canada-Africa relations.

In the UK, CCF's International Royal Patron, HRH Princess Michael of Kent, launched her book "A Cheetah's Tale" at the Royal Geographical Society in London in November, with Dr Laurie Marker in attendance, in front of an audience of over 400 people. CCF UK, in partnership with Bradt Publishers, hosted a stand at the event. Princess Michael of Kent also visited CCF in March and learnt first-hand about the work of CCF. CCF UK also participated in five additional events this year, and was chosen as the Heathfield Veterinary Clinic's charity of the year. Accordingly, they hosted numerous events, including one in September where CCF UK had a stand manned by Jane Galton and Amelia Zakiewicz. The total amount raised will be announced in February 2018.

CCF Australia (CCFA) was formed in 2014, and last year acquired tax deductible status, thus being able to receive donations. During this year, CCFA worked on webpage improvements, and its web developer, Jayson, made an appearance on national TV, following international reports on the endangered status of the cheetah. CCFA continues to receive support from Monarto Zoo (ZOOSSA) and the National Zoo in Canberra.

CCF Italy's educational outreach efforts this year included participation in three conferences as well as a training course for veterinarians in Perugia. In addition, the association organised a 2-day training course for veterinarians and university students at Parco Le Cornelle in cooperation with AETEMP and CONSERVATION GLOBAL in SA, and initiated a partnership with Parco Zoo Falconara.

In France, CCF's fundraising partner AMIFELINS focus on education and made two presentations at educational institutions in Paris and Le Mans.

Aktionsgemeinschaft Artenschutz (AGA) e.V. is CCF's fundraising partner in Germany, and its Director, Birgit Braun was awarded the environmental prize "Trophée de Femmes 2017" by the Fondation Yves Rocher, for her pioneering work to use detector dogs to protect endangered species. AGA used a part of the prize money to buy scat detection dog Levi for CCF and to support the scat detection dog programme. AGA set up various booths at fairs and festivals, and on 5 June, conducted an info booth at the zoo in Stuttgart next to the cheetah enclosure to present CCF's work and to inform everyone about all AGA's projects. In addition, AGA participated in the "Predator Day" event for kids at the zoo in Stuttgart, which was also the venue for a presentation about cheetah conservation at the zoo in Stuttgart as part of "International Cheetah Day," which included an educational programme for children. In November and December AGA promoted the CCF Year-End-Matching campaign and the International Cheetah Day in social media and highlighted it on its website.

B. PR, Marketing, and Media

1. Social Media

Facebook

Currently, CCF staff manages three Facebook pages, one for CCF @ccfcheetah, one for Dr Laurie Marker @drlauriemarker and one to raise awareness about cheetah trafficking @CCFKeepCheetahsWild (see section IV.F.2). Staff also co-manages a page dedicated to CCF's stuffed purring cheetahs that is filled with fan photos and user content shared to the page.

@CCFCheetah: As of 31 December, CCF's Facebook page has 254,374 likes, up from 250,139 on 1 January 2017. Also during the same time-period, CCF's Facebook page saw an increase in followers to 249,227, up from 244,060 on 1 January 2017.

@Chewbaaka's CheetahFriends Fan Page: CCF's purring cheetah sales initiative fan page Chewbaaka's Cheetah Friends. The initiative was developed by CCF's Southern California chapter leadership and co-managed by CCF USA staff. Updates are posted to the page showing the CCF purring cheetah and his travels. This aims to promote the purchase of purring cheetahs for participation. Facebook users

can like the fan page and share photos of their own CCF purring cheetahs. As of 31 December, Chewbaaka's Cheetah Friends fan page has ~850 likes.

@DrLaurieMarker Fan Page: Dr Laurie Marker's Facebook page is primarily photos of Dr Marker with visitors and focuses on sharing the work of CCF from Dr Marker's perspective. As of 31, December 2017, Dr Laurie Marker's Facebook page has ~3,700 likes, up from ~3,500 at the beginning of January 2017.

LinkedIn

LinkedIn is a social network focusing on professional development. CCF has two LinkedIn pages that are monitored by CCF staff: Dr Laurie Marker's personal LinkedIn account and the Cheetah Conservation Fund account.

Dr Marker's personal LinkedIn account has limited analysis capabilities as it is a free account. Analytical tools require purchasing a monthly or yearly business or premium plan. As of 31 December 2017, Dr Marker has over 5,851 connections (members that are in her network).

Cheetah Conservation Fund's LinkedIn account has Analytics enabled. CCF staff monitors the Analytics for this account. In general, academic papers, job postings and scientific announcements perform best on this platform. As of 31 December 2017, CCF's LinkedIn page has ~1,300 followers, up from ~1,100 in January.

Twitter

@CCFCheetah is CCF's Twitter feed, managed by volunteers with guidance from CCF staff. CCFCheetah currently has 16.9k followers and CCF's content had ~362k impressions over the course of this reporting period. CCF staff shares relevant content as re-tweets from select individuals and groups and individuals followed by @CCFCheetah.

Instagram

Instagram is a social media site for photo/image sharing. Posted photos utilise hashtags to be collected into groups and searchable within the site. As of December 2017, CCF's Instagram has 14.6k followers. CCF's Instagram has received 152k likes across all its posts compared to the previous reporting period 27,450.

Pinterest

Pinterest is a social media site where users can collect online content from anywhere on the internet and curate "walls" on which they display this content. Pinterest is used by teachers to collect lesson plans from each other, and by people interested in cooking, DIY (Do it yourself) and crafting. As of 31 December 2017, CCF's Pinterest page has an average of 417 monthly viewers and 31 daily viewers up from 211 monthly viewers and 8 daily viewers in 2016. In 2017, CCF's pins have an average of 68 impressions per day versus an average 17 in 2016.

DeviantArt.com

DeviantArt.com is the platform where artists can participate in groups with other like-minded artists. The artists can submit their work to boards and participate in discussions. CCF's DeviantArt page is volunteer managed. Each month there is a contest in which users can submit entries and earn currency as spots on their very own virtual cheetah. CCF's DeviantArt page has 15 members and 3,463 page views.

Reddit

In 2017, CCF has continued to be an active part of Reddit. CCF staff has been working with volunteers to find new avenues on Reddit to help further CCF's range.

The CCF account is currently a part of the following online groups:

- */r/cheetahs*
- */r/conservation*

There is no system for CCF to track how well the Reddit page is performing, so the staff must rely on Google Analytics for information. In 2017, we had 829 page visits to the CCF website from Reddit. However, on 10 March 2017, we had 504 of the total visits. The reason for the large uptick in March was a link submitted by a Reddit user and photographer named GeorgetheExplorer: https://www.reddit.com/r/pics/comments/5yn49d/ive_dreamt_of_this_shot_for_years_and_finally_i/. This link made it to Reddit's front page and was highly rated. The post mentioned CCF and linked to CCF's website in the description.

CCF Blogs

Huffington Post Blog

Dr Laurie Marker became a blogger on *The Huffington Post in 2012.* Huffington Post is considered one of the more influential Internet-based news sources, and content posted to Huffington Post often exposes CCF to new audiences. Unlike the CCF website blog, which is about CCF's programme news and staff/intern stories, the Huffington Post blog is intended to be a voice for Dr Marker herself and functions much in the same way as an op-ed page. Successful Huffington Post pieces should be timely with events of the day and have an appeal to general audiences who are not familiar with CCF. There are currently no analytics for Huffington Post blogs.

As of 30 December 2017, Dr Laurie Marker has posted nine Huffington Post blogs:

- UN International Year of Sustainable Tourism for Development: published on 24 January 2017
- Cheetah Populations Continue to Decline Across Africa: published on 2 February 2017
- Managing Grasslands to Ensure a Future for Cheetahs: published on 21 March 2017

- Earth Day 2017 – Environmental and Climate Literacy: published on 21 April 2017
- Help Support Women and Girls in Science!: published on 15 May 2017
- Spend Endangered Species Day with Chewbaaka the Cheetah: published on 16 May 2016
- Adopt A Cat Month: published on 28 June 2017
- Visit Namibia in 2017: published on 31 July 2017
- National Honeybee Day – Bee a Friend to Cheetahs: published on 18 August 2017
- Conservation Efforts Helped by Farmers Using Cell Phones: published on 27 September 2017
- Celebrate the Cheetah on December 4th: published on 26 November 2017
- Cheetah Conservation Conversation with HRH Princess Michael of Kent: published on 4 December 2017

Cheetah.org Blog

The CCF blog is hosted on our website. Posts on the blog are sent out every other month to supporters as an e-newsletter entitled *Notes from the Field – CCF's electronic Newsletter* and are also shared to Facebook and Twitter. The purpose of the CCF blog is to present longer format stories from our facility in Namibia that allow us to share with our audience the recent happenings at CCF.

From January to December, CCF Staff and guest bloggers have made 46 posts on the blog (Figure 54), covering a variety of topics, including a series of guest blogs: Charity Ride at Cyclebar in San Jose, Research Project on Hornbills at CCF, and a variety of guest and intern blogs.

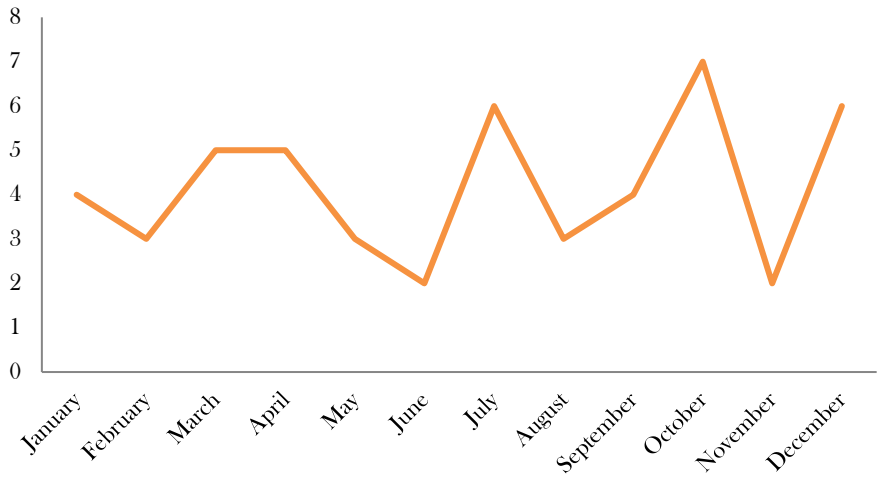

Figure 54: Number of blog posts made to cheetah.org by month.

2. Website

CCF staff monitors the general email inquiries received through its website using an inquiry form for general requests and a media form for media requests. During this period, approximately 150 direct web-based inquiries were handled. These are emails sent by donors and/or supporters and include school projects, hunting or cheetah-health related issues, visiting CCF or volunteering, media inquiries, and issues with donations, among others.

Google Analytics for cheetah.org

CCF staff utilises Google Analytics to monitor user engagement. Google Analytics is a feature that inserts code into select web pages to gather user information. Between 1 January and 31 December 2017, CCF's website cheetah.org received 846,933 (822,303 in 2016) page views and had 457,746 sessions (424,564 in 2016).

Google Analytics also monitors and assigns higher ranking based on mobile usage and sites that are mobile-friendly; as such, sites formatted for mobile phone users receive the highest ranking. CCF's website, cheetah.org does not currently have a mobile-friendly version. Mobile users represent 39% of all visitors to cheetah.org.

3. Media

CCF issued 21 press releases between January and December 2017.

CCF staff monitors media primarily through Google's free News Alerts service, using specific query terms relevant to CCF's activity. Media reports are also received through CCF's contacts, staff, and volunteers. During 2017, Google reported over 80 news items, with over 30% from non-US publications.