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CONSERVATION STRATEGY FOR THE LONG-TERM SURVIVAL OF CHEETAH IN NAMIBIA

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I. INTRODUCTION

The Cheetah Conservation Fund (CCF), founded in 1990, has as its mission to secure habitats for the long term survival of cheetah and their ecosystems through multi-disciplined and integrated programs of conservation, research and education.

CCF's base of operations is in Namibia which has the largest population and one of the few remaining sustainable populations of free-ranging cheetah. Cheetah have special problem compared to larger cats such as lion and leopard. Because of conflict with these and other predators, which steal their kills and kill their young, cheetahs are driven out of protected areas and onto the farmlands.

Approximately 95% of cheetah in Namibia live on commercial farmlands where they come into conflict with human and livestock interests. Thus the cheetah's survival depends on the total farmland ecological system, including farmland management, prey species management, and habitat stability. CCF's focus is working with livestock farming communities developing ways to reduce conflict and devising a conservation plan that secures habitat for species while accommodating farmers' land use needs. Research activities encompass the development of an in-depth database on the cheetah and its ecosystem, including habitats, home ranges, prey species, livestock predation, demographics, and local attitudes. Conservation activities use the database to develop non-lethal predator control methods and community education.

A great deal has been accomplished in the initial phase of six years. This success has created an increased demand for all facets of CCF's activities. The current work has also led to several new programs which will be important complements to the basic program now in place. CCF is a dynamic organization and as such is prepared to meet new challenges as opportunities arise.

1I. OBJECTIVES

CCF's main objective is to develop and implement a global master plan for the long-term survival of the free-ranging cheetah through programs based in Namibia, and where these model programs can be adapted for use in other countries where the cheetah is in need. The specific objectives fit into the three categories of: (1) research, (2) conservation, and (3) education. Because of the special requirements of cheetah existence, each of these three categories include activities related to both the cheetah themselves and their habitat.

III. ACTIVITIES AND METHODS

CCF's International Research and Education Centre is the base for all CCF's activities. The Centre is located on the 10,300 ha farms, Elandsvreugde and Osonanga. The farm base is in prime cheetah habitat and a wildlife friendly area, with neighboring farmers who believe in conservation ethics, thus ensuring a large prey population which is important for the cheetah population. CCF is an active member of the Waterberg Conservancy, which encompasses 200,000 ha of private farmland, surrounding the Waterberg Plateau Park - a national reserve dedicated to rare and endangered species. The Conservancy's wildlife is cooperatively managed for long-term sustainability by the farmers who own the land, thus providing habitat and prey base for the cheetah.

CCF is currently involved in the following areas of research, conservation and education:

1. Identifying key components in farmland ecosystems, including habitat and prey base that are necessary to sustain healthy cheetah populations.
2. Evaluating current livestock practices and their impact on cheetah and addressing conflicts between farmers and predators in order to develop a conservation and management strategy that benefits both humans and cheetah.

3. Researching, evaluating and implementing various non-lethal livestock management techniques that will assist farmers in predator control, thus reducing conflicts and removals of cheetah.
4. Conducting field research to learn more about the biology and overall health of Namibia's wild cheetah population and to gain information about the animals' movements through the farmlands.
5. Making every Namibian aware of the plight of the cheetah and their role in its long term survival. Conducting conservation education programs and teacher training in Namibian schools to increase awareness about cheetah and the predators role in the ecosystem, the environment, and to encourage students of all ages to participate in cheetah conservation efforts.
6. Bringing global awareness to the plight of the cheetah by developing links to other organizations and individuals.
7. Expanding CCF's Research and Education Centre to assist in accomplishing CCF's mission.
8. Adapting model programs developed in Namibia for use in other countries by coordinating work with wildlife officials and other non-government organizations.
9. Developing an international network that financially aids CCF with accomplishing its goals.
10. Creating and implementing eco-tourism programs that financially assist CCF to achieve its objectives.

IV. PROGRESS DURING 1997

During the past year, CCF has made progress in many different areas and public awareness about the cheetah has grown. In January, an additional farm of 3,300 hectares, Osononga, was purchased by CCF's main sponsors, Carl and Cathryn Hilker from Cincinnati, Ohio, USA. During the year this new farm has been a focal point in many of CCF's educational activities.

In 1997, CCF began serving as a field station for EarthWatch International. A total of 28 EarthWatch volunteers assisted in daily activities from data input to the collection of biological samples from cheetah. Many of these volunteers maintain contact with CCF after leaving, giving slide shows and promoting CCF's efforts.

Developments at CCF's Centre have increased the efficiency of the Centre's operations. A new electrical line was laid and a new electrical system was installed which included the purchase of a new and more powerful generator through a donation from the Cincinnati Zoo's Conservation Committee. Because of the expansion of the generator facilities, CCF has now been able to supply CCF farm workers houses with electricity. Water pipes were also laid to the farm workers houses, bringing on-tap water there for the first time. Other developments include, a new dam and improvements to the roads on Osonanga, and the construction of a game viewing platform. Through the harvesting of hay on CCF's farm, hay has been stored in the barn for future sales.

A. RESEARCH ACTIVITIES

1. Cheetah Research

The Fund conducts field research to gather data on distribution, behavior, biology, demographics and overall health of the cheetah populations. CCF asks farmers to participate in research through live capture of cheetah on their farms. They assist in collecting biological samples and measurements, allow for ear tagging, radio collaring, and release and report other cheetah/livestock interactions. Movements of these cats are reported back to them by CCF at personal meetings or at farmer's association meetings. During the year, volunteer Research Assistant, Bonnie Schumann has been a great asset to CCF's work with cheetahs and farmers.

Between 1 January and 31 December 1997, CCF dealt with 53 cheetahs of which, 15 (10.5) were released back into the wild, 11 (6.5) were tagged and released and 4 (4.0) were radio collared, 4 (2.2) were placed into a captive breeding program at the Johannesburg Zoo, 13 (8.5) were shipped to Cango Wildlife Ranch in South Africa by two farmers; another 5 (3.2) are in holding at a farm pending export to Cango Wildlife Ranch. Eleven (5.6) animals were dealt with in captivity, one young wild-caught female is being kept at CCF along with 2 males that are under medical care. Necropsies were conducted on 2 (1.1) cheetah.

a. Interesting Case Histories

Of the cheetahs that were caught during the year, only 2 cats were caught directly killing livestock. One cat, an old female trying to feed her 8 month old cubs, had few very rotten teeth and was in a very poor condition, this being the reason for her becoming a .problem animal". A local dentist provided his services to repair the female's teeth, including 2 root canals and the extraction of 3 molars. Because of her age and inability to fend for her cubs, this female and cubs would not be able to make it back in the wild. They were therefore transported to the Johannesburg Zoo, courtesy of Air Namibia and TransNamib, and have been placed in the Regional Cheetah Management Program for Africa, called the African Preservation Program (APP). This is the first time that wild-caught cheetahs from Namibia have been sent down specifically as part of this program.

The behavioural problems of another cheetah caught as a problem animal were caused by a neighbouring farmers actions. A female cheetah was moving through a farm accompanied by her two ±10 month old cubs. A farm worker near one of the cattle posts spotted them and speared the mother. Within a week, the neighbouring farmer started experiencing problems with two young cheetah trying to catch his goats. They were, however, very inexperienced and chased the goats around some time before managing to pull one down. The farmer shot one of the cheetahs, but decided to trap the other one when it did not leave the area as expected after its sibling was shot. CCF was called to come and collect this cheetah. These two cheetahs were both just over a year old. Being too young to hunt wild game properly, they resorted to catching "easy prey" such as goats. Thus two problem animals were created, where before there had been none and serves to highlight the problems caused by indiscriminate killing of cheetah.. This particular incident resulted in the removal of three female cheetahs from the wild population, a population that is already genetically compromised and can ill afford to lose such valuable genetic stock.

CCF is holding 2 cheetah that were caught in gin traps following game losses on a game farm. One cheetah's knee was seriously injured as a result of being caught in a gin trap. The gin trap was set at a cheetah play tree, which the cheetah managed to climb after being trapped. The chain of the trap caught in the fork of the tree and resulted in the cheetah hanging by his leg during the night, tearing the ligaments in his knee in the process. Two surgeries have been performed to replace the knee ligament. This was the first time this operation has been performed on a wild cheetah. Besides the knee injury, both cheetahs suffered extensive injuries caused by the gin trap, exposing the bone and tendons in the feet and the second cheetah's toes were broken. Both feet were badly infected due to a delay in treatment following their capture.

Over the past six years, the vast majority (95%) of cheetahs that CCF has dealt with were not trapped because of livestock predation but just because the farmers saw them. This indiscriminate catching can cause greater problems by opening up territories, thus allowing other cheetahs access to the area. In certain cases, indiscriminate catching can actually create a problem animal, for example, through the separation (breaking up) of a family unit (female and sub-adult cubs). It is not always easy to find a solution for each cat caught, but we work in cooperation with the farmers and other organizations to find the best solution. CCF's policy is to release non-problem animals in the same area where they were caught and if a re-location is attempted, the animals are not problem animals and are monitored by radio-tracking.

b. Biological Analysis

CCF collects biological samples opportunistically to assist in evaluating the health of the cheetah population. A full set of measurements, blood samples and skin biopsies are taken on all animals as well as semen samples from male animals, to monitor the genetics, virology, morphology, reproduction, and contributing to a genome resource bank.. This is the first in-depth biological information collected on free-ranging Namibian cheetah. CCF collaborates with other researchers and institutions from the United States, Europe, Namibia and South Africa. This collaboration has allowed experts in genetics, reproduction, veterinary medicine, pathology and conservation to work with CCF thus expanding the use of this valuable database. To date over 270 cheetah have been sampled and an extensive database has been developed, with new data continually being added. During 1997, 53 cheetahs were dealt with, some more than one time. These studies are on-going.

Dr. Linda Munson, from the University of Tennessee and now the University of California at Davis, visited CCF twice during the year to collaborate on analyzing research data and preparing it for the publication of two papers. Preliminary research findings were presented at the Annual Namibian Veterinary Congress. The 1997 Namibian Veterinary Congress was the 50th anniversary of the Veterinary Association as well as the 2nd African Veterinary Congress. In honor of these two events, CCF was asked to chair a major session of the Congress in cheetah research. Five papers were presented by CCF, including The impact of capture and captivity on the health of Namibian farmland cheetahs (Acinonyx jubatus), by L. Munson and L. Marker; Morphological abnormalities in Namibian cheetahs (Acinonyx jubatus), by L. Marker; Prevalence of antibodies to viral diseases in Namibian farmland cheetahs (Acinonyx jubatus), by L. Munson, L. Marker, S.J. O'Brien, J. F. Everman, and J.A. Spencer; Measuring gonadal and adrenal steroids in the feces of wild and wild-caught Namibian cheetah (Acinonyx jubatus), by K.A. Terio and L. Marker; and Lymphosarcoma in a captive Namibian cheetah (Acinonyx jubatus), a case study, by L. Marker (Abstracts are attached).

In collaboration with Dr. Linda Munson and Dr. Karen Terio, her PhD student, CCF is continuing the fecal hormone project. A protocol has been developed to extract stress hormones from feces. Fecal are collected daily on all cheetahs that CCF deals with, those in short and long-term holding, as well as CCF's two tame cheetahs. Behavioral observations are conducted on the tame cheetahs to correlate with fecal collection to monitor reproductive cycles. Preliminary results show that the females' cycles are being detected. Both of these studies are ongoing.

Genetic analysis on the samples collected by CCF is being done at Dr. Stephen O'Brien's laboratory at the National Cancer Institute in the United States. Ali Wilkenson, a CCF volunteer, has recently joined this lab to obtain her PhD. Ali is currently in the process of extracting cheetah DNA and CCF's samples will be analyzed for family relatedness and regional genetic differences, as well as morphological abnormalities which are seen in the wild Namibian population.

2. Radio Telemetry Monitoring

a. Cheetahs

At present 8 cheetah are radio-collared (totaling 20 cheetahs being followed) in CCF's research area encompassing approximately 10,000 km^2 in the Waterberg- Otjiwarongo region of the north-central part of Namibia. During the past four years of this research, over 30 cheetah have been collared, providing information on nearly 100 cheetah. All of these radio-collared animals have actually provided information on more than just that animal collared, as some of the females have cubs, and most of the males are part of coalitions (male groups). Radio-collared animals are tracked weekly by fixed-wing airplane.

Radio-telemetry is a powerful tool and is important to CCF's work with the farming community. The data collected from the tracking is used to show the farmers the actual movements of the cheetah through their lands. CCF can identify which regions cheetah are more prone to travel and what times of the month or year they frequent specific farms. The information collected also illustrates where cheetahs are in relation to their calving herds, indicating areas on farms where cheetahs are attracted and indicates the duration of time spent in an area. Furthermore, it demonstrates to farmers that cheetahs range over large distances and that an individual animal may be seen on many farms.

CCF is also monitoring the movements of cheetahs to evaluate the home range requirements and migratory behavior of cheetahs on farmlands. 'Home range' has been defined as the cumulative area required by an animal for feeding, breeding, and shelter requirements, as well as social interactions. CCF is monitoring the movements and actions of these animals to define the home ranges and to better understand if these movements change weekly and/ or seasonally with overriding stimulus, e.g. movement to escape from predators or humans, or movement of prey species.

All captured cheetah CCF examines are ear-tagged and many are released back into the wild. During 1997 CCF tagged and released 15 cheetahs. By ear-tagging cheetahs, we have been able to monitor the cats gross movements if they are re-caught. This information is valuable for understanding the movements of cheetah in different regions of the country. Over 120 cheetah have been ear-tagged and released by CCF in cooperation with the local farmers.

With the severe drought at the end of 1996, many of CCF's collared cheetahs moved in unusual patterns. One male coalition killed a male cheetah from another coalition, in a territorial battle. Two females gave birth, 1 female we have been monitoring for 2 1/2 years while she was pregnant with her last litter. Four cubs were born to her this year with 3 remaining. She gave birth on the same farm as before. The second female moved quite far north of her home range to give birth to 4 cubs, 3 cubs are now with her. A third female remained in her area to birth, (5 cubs) but unfortunately after 5 months died of an unknown cause.

One male was relocated at CCF. Prior to being trapped north of Windhoek, the brother of this male had been shot. The two cats were catching springbok in a farmers game camp. The male was held in CCF's holding pens for two months and then released. Over the course of 4 months he covered a vast distance in an extremely irregular pattern but has returned to the Waterberg area, near where he was released, and appears to be settling down. Two males also relocated at CCF are heading back to the north-east from where they were originally caught four months ago.

Three cheetah that CCF were tracking in 1997 died. One was a female with 4 cubs, who died of unknown causes. The second was a female that was reported by a Taxidermist as having been trophy hunted, but the collar was never turned in to CCF. The third was a single male, where the collar was retrieved with no sign of a carcass, the cause of death was therefore unknown.

b. Leopards

Along with the cheetah, in order to understand interspecies habitat use and movements, CCF is radio-tracking 4 leopard, 1 brown hyena and 1 caracal. The collared leopards form part of the Waterberg Conservancy and the Ministry of Environment and Tourism's (MET) Leopard Research Project. CCF's assistance was requested with providing the radio-collars and tracking the leopards regularly.

A female leopard that CCF had been following for over a year was trapped, together with her two nine month old cubs, by a neighbouring farmer after killing a calf. CCF and the farmer correlated the movements of the leopard with the movements of cattle on the farm. In this way it was established that this was the leopard's first calf kill. The kill had taken place in the southern most part of her range. The farmer agreed to release the leopard again and the cattle were moved to a camp adjacent to the kill area just outside the leopard's range. The questions now posed are: Will the leopard move in pursuit of the cattle, or will she continue moving within her home range? Will she kill again or was this just a case of the calf being in the wrong place at the wrong time? Was it possibly sick? This is the first time that this unique situation has presented itself. For the past 6 months the leopard has not made another calf kill and recently has moved north over 80km from her home range.

A male leopard which had its home range at the base of the Waterberg for over one year moved 100km west. and appears to have established a new range. This male was trapped by a farmer in this area and was returned to its original home range. However, it traveled back within two weeks of being returned and is still resident in this new home range.

The data from the past year shows a continued wide range of movement from both cheetah and leopard. Some of the cheetahs are consistently covering over 1,500 km^2, and yet some others have reduced their area. The leopards, which are consistently in one relatively small area, periodically expand their home range for a few weeks at a time. Since CCF's radio-tracking program began in 1993, an interesting range variation continues to take place at the beginning of each year's rainy season.

3. Ecosystem Research

Assessment of the farmland ecosystem for long-term habitat viability for the cheetah is being conducted. The farmlands support a rich prey base as 70% of the country's game inhabits these commercial farmlands. CCF assesses the farmland ecosystem and monitors the wildlife prey base available to predators in CCF's primary research area. Several techniques are used for these assessments and include ongoing research and monitoring.

This research is conducted in cooperation with members of the Waterberg Conservancy. As a model for the Conservancy, CCF began an ongoing wildlife monitoring program on its farm, designed to understand game

densities, movement, demographics, and habitat utilization. The monitoring involves conducting visual road strip and counts of game at regularly measured points throughout the farm at various times of the day, tracking and counting spoors, categorizing vegetation types, densities and distribution, and soil analysis. All these studies have been carefully planned; the assays have been derived from other studies and extensive research. Information derived from these methods and techniques is yielding estimates as to which animals are utilising CCF's farm. Furthermore, they should indicate, as a percentage, the utilization of the various sample areas within the farm, by the species identified. Information gathered from these results will be useful in helping identify areas and patterns of utilization of the farm by wildlife and provide valuable information leading to management decisions and further methods of monitoring wildlife and the ecosystem in this area. This project has been on-going for the past 2 1/2 years and will continue.

For the third year, the Waterberg Conservancy conducted a twenty-four hour full moon wildlife count. This year over 50 waterholes were counted by over 100 volunteers and Nature Conservation students from the Polytechnic of Windhoek. CCF is responsible for organising, coordinating and training the volunteers to carry out the counts, as well as analysing the data from the 24-hour counts. Concurrently, CCF is also conducting twenty-four hour full moon counts on its farm regularly. Earthwatch and Raleigh International volunteers, along with groups of learners from the Okakarara secondary school have been assisting with these counts. An accurate assessment of the types and numbers of wild game found in the Conservancy will provide valuable insight into the factors that have helped sustain a population of cheetah on Namibian farmlands. Perhaps more importantly, the research is serving as a basis for future monitoring and management of wildlife populations on farmlands, with the goal of ensuring long-term viability of cheetah habitat and preserving the integrity of the farmland ecosystem as a whole.

Several base-line vegetation studies have been carried out on CCF's farms, the most recent of which were conducted by two Polytechnic students as part of their in-service training for their Diploma's in Nature Conservation. An extensive grass survey was carried out on the farm Elandsvreugde by Matti Nghikembua. The project was titled: Bush encroachment and it's effects on grass species. The study was conducted in six different vegetation densities. The aim of the study was to determine the effect of bush encroachment at different densities on the frequency, density and species composition of grasses. The three most common grass species in each zone were also measured for grass yield production. The grass species in each sample area were identified and grouped according to ecological status, succession stage and whether they were annual or perennial. The results from this grass study will help in setting up a management plan for the farm by providing data on the condition of the veld. Matti received distinctions for his paper.

An in-depth vegetation survey was carried out on the recently acquired farm, Osononga. This is the first research conducted on this farm and provided base-line data which identified and mapped the different vegetation zones. The project, titled: Vegetation Classification of the farm Osononga, was completed by Johnson Ndokosho. This initial survey will form the basis of future vegetation studies on the farm.

Mr. Dewey Hollister, a botanist from Cincinnati, Ohio, visited CCF to gather information and compile a photographic collection of the plant species on the CCF farms. The information was gathered for the planned publication of a book titled The Cheetah's Garden.

B. CONSERVATION ACTIVITIES

1. Livestock and Wildlife Management

Livestock loss to cheetahs is an emotional issue. While farmers perceive cheetahs as having an excessive economic impact on their livestock and wild game industries, many Namibian farmers have done little from a management perspective to mitigate or alleviate their problems in a non-lethal manner. By addressing conflicts between farmers and predators, CCF is devising a conservation and management strategy that benefits both humans and cheetahs, thus ensuring the species' survival on livestock farms. CCF has identified many farmers who have found solutions to their cheetah problems which CCF shares with the farming community. Through the publication and distribution of its book in 1996, Cheetah Survival on Namibian Farmland, CCF has made available simple and effective management plans which are easily put into practice by the farmers.

Through direct contact with individuals, farmer association meetings, a bi-annual Farmer's Newsletter and survey forms, CCF informs the community of its progress and encourages it to remain actively involved in all aspects of its programs. The Fund has noticed a marked positive change in many farmers' attitudes toward the cheetah over the past few years. By involving farmers in all aspects of CCF research, it then becomes their work with their animals, thus empowering them with the knowledge to incorporate educated management decisions.

2. Livestock Guarding Dog Program

CCF's Livestock Guarding Dog Program has continued to grow. Livestock guarding dogs provide a method of non-lethal predator control that protects the farmer's livelihood while also conserving the predator species. To-date nearly 50 dogs have been bred and donated to farmers. In 1997, 20 puppies were bred and placed on farms by CCF. The dogs continue to be monitored through bi-annual evaluation of adult dogs and monthly monitoring of puppies for the first six months. CCF is currently developing a Livestock Guarding Dog and Livestock Research Program at the farm base, and continues as a breeding facility for these dogs.

This year a pilot project was started in the local communal farming area of Hereroland with the first placement of dogs there. CCF's Community Development officer, Mr. Don Muroua, spent a great deal of time with the community in development efforts. Another important aspect of CCF's Livestock Guarding Dog program was the placement of a puppy on the farm of the President of Namibia, His Excellency Dr. Sam Nujoma, protecting his goats, thus showing his support of CCF's work.

3. Controlled Taste Aversion

Research on Controlled Taste Aversion (CTA) is being conducted at CCF. CTA is an effective non-lethal predator control method. Predators, such as cheetahs, jackals, leopards, lions and hyena are baited using livestock which has been laced with a substance that makes the predator ill when eating the bait. This teaches the predator that livestock is "poisonous", creating an aversion for that prey.

The research is being conducted in collaboration with Dr. Debra Forthman, Director of Field Conservation at Zoo Atlanta who visited CCF in November to develop research protocols with CCF's staff. Dr. Forthman is an internationally recognised expert in the theory and application of CTA. This method of predator control was introduced during a number of lectures given by Dr. Forthman to representatives from MET and local farmers.

4. Large Carnivore Management Forum

CCF has been attending the meetings of the Large Carnivore Management Forum initiated by MET. The Group consists of members from MET, NGO's and veterinarians concerned with carnivore conservation. The group meets every eight weeks to discuss issues pertaining to carnivore conservation in Namibia. This is the first time that so many different parties involved in such a diverse range of activities concerning carnivore conservation, have come together to exchange views and formulate strategies to promote conservation of predators.

5. Waterberg Conservancy and CANAM

CCF continues to be an active member of the Waterberg Conservancy, the third of eight established in Namibia to date. CCF's Director serves on the executive committee and was nominated to the executive board of the Conservancy Association of Namibia (CANAM). CANAM is the umbrella body for conservancies in Namibia. Through conservancies, sustainable utilization of natural resources through cooperative management based on sound conservation principles, is encouraged. During the year major issues being addressed by both the Waterberg Conservancy and CANAM is gazetting a law officiating conservancies in the new wildlife and environment legislation act which is being worked on by MET.

C. EDUCATION ACTIVITIES

1. School and Community Education

Public education and the development of an active grassroots constituency are integral components of the overall cheetah conservation program. The CCF is educating farmers, teachers and the public about the need and ways to conserve Namibia's rich biodiversity and the role of the cheetah and predators in healthy ecosystems. Public education and the development of national pride in the cheetah are critical to its survival in Namibia.

Communication with farmers (commercial and communal) and wildlife and agricultural officials form an important component in the program's work. CCF presents information from its survey on wildlife and livestock management, farmer's attitudes toward predators, and non-lethal measures farmers employ to reduce livestock loss to cheetahs at farmer association meetings throughout the country. The Fund encourages farmers to think creatively about solutions to conflicts by presenting livestock management practices employed by other Namibian farmers, who have shown that cheetah problems can be dealt with successfully by using non-lethal techniques.

CCF continues to conduct interactive assembly programs at schools throughout the country, and distribute teachers' packets for cheetah education work in the classroom and activity sheets to learners to increase awareness about the plight of the cheetah. During 1997 over 3,000 learners participated in these assembly programs. Since CCF's education program began, over 45,000 learners have participated in an assembly. CCF continues to conduct teacher's training workshops at schools where assembly programs are conducted using our Teachers Resource Guide entitled, Cheetah: A Predators Role in the Ecosystem.

CCF's work with colleges remains important, as these students will soon take on important roles as teachers, wildlife managers or farmers. This contact provides valuable opportunities to inform students about the alternatives to lethal predator control, and the value of the cheetah to the health of the Namibian farmland ecosystem and as part of Namibia's national heritage. This year lectures were given at the Polytechnic and Neudamm Agricultural College. Early in the year, CCF worked on five cheetahs trapped at Neudamm. Students and lecturers assisted in the collection of biomedical samples and accompanied CCF staff to release the cheetahs on a nearby farm.

CCF staff have spent much time working with the school children in the communal area of Okakarara, as many of these children have no exposure to conservation concepts. Students from the Waterberg Secondary School participated in an awareness campaign organized by Matti Nghikembua from CCF, as part of his inservice training for a Diploma in Nature Conservation at the Polytechnic. Students participated in the planning process and talking to fellow learners.

Don Muroua, CCF Community Development Officer, accompanied by Johnson Ndokosho, Polytechnic Nature Conservation student conducting his practical at CCF, carried out an extension project in Bushmanland after other CCF staff had conducted school assembly programs in the area. Discussions were held and learning games played to carry the message of conservation and the role of predators in the environment. Another presentation entailed introducing the Livestock Guarding Dog programs to communities in the northern parts of Namibia.

CCF staff presented education programs to visiting school groups at the Otjiwa Game Lodge. This forms part of an ongoing relationship with Otjiwa whereby CCF regularly presents programs to learners visiting their game farm.

CCF attended the Otjiwarongo Agricultural Show. With the help of Earthwatch volunteers, CCF manned an exhibit, distributing information on CCF's activities and speaking to farmers and other members of the public attending the show. CCF participated in two other exhibits in Windhoek, one was for World Environment Day at the main mall, and the other was a month long educational exhibit at a local restaurant which also included a cheetah coloring contest.

Kim Bendheim, CCF volunteer education officer and Don Muroua attended the bi-annual Namibian Environmental Education Network (NEEN) conference. They presented a working section on interactive student activities which are conducted at CCF's Education Centre. Aaron Conrad, CCF volunteer assisting with farm management and wilderness efforts attended the Ecotourism conference in South Africa.

2. CCF Education Centre

CCF's Research and Education Centre provides for on-site public education and student training (local students of all ages and for foreign university students), for integrated studies on the cheetah's habitat and prey, and space to demonstrate non-lethal livestock/predator management techniques. CCF's Education Centre hosts school and community groups. At present, the Centre consists of a lecture room/natural history museum with poster displays. Games and activities have also been developed to further enrich the students learning experience while at the Centre. During the past year over 300 students visited CCF's Centre from environmental clubs and schools throughout the country, as well small groups of visiting public which regularly visit.

With the help of Earthwatch volunteers, a Resource Centre was completed, in addition to its existing Education Centre. Members of the Okakarara Nature Club painted the front wall of the Resource Centre with colourful conservation drawings and slogans. Game animals, domestic animals and people are portrayed under the message 'We can live together'. Earthwatch volunteers also assisted in the laying out of a nature trail. The trail highlights the ecology of the farmland ecosystem, focusing on key elements and the valuable role predators play in this system. The volunteers helped design a brochure for the trail as well.

CCF hosted the game farm management students and lecturers from Neudamm Agriculture College for a three-day workshop at the Centre.. to learn about the practical applications of veld management and livestock management practices to reduce losses to predators. A neighbouring farmer introduced the concept conservancies to the students and their role in the conservation of Namibia's natural resources. Two groups of students from the Ongongo Agricultural College visited CCF to learn about veld management and the effects of bush encroachment.

The Fund assists Namibian and international students, both young men and women, with research projects and in-service training. Through internships, students become empowered and acquire skills necessary to carry forward CCF's objectives. During 1997, a collaborative agreement was made with the University of Oregon education system to provide an internship to one student every three months through their Global Graduates Program. The first student was with CCF the last three months of the year. Two students conducted their inservice training from Namibia's Polytechnic and a Phd student from Germany conducted field work.

In August a group of Namibian and American youths combined forces to build a tented camp on CCF's farm. These learners formed part of the Youth Beyond Borders organisation which brings youth from different countries, cultures and backgrounds together to enable them to expand their cultural horizons. The US students donated tents, sleeping bags and kitchen camping equipment. The Namibian students were from the Paresis High School Earth Care Club. CCF has maintained a long and fruitful relationship with learners from this school. This camp will be used by visiting school groups and will enable them to spend longer periods on the farm participating in environmental education programs.

From October through to December in three different groups (45 people total) from Raleigh International constructed a Wilderness Camp on the CCF farm. This Camp will be used to expose groups of youth and public to the wilderness experience while learning about the Namibian farmland Ecosystem and the role of predators, like the cheetah, in the ecosystem. The "Cheetah Wilderness Camp" was officially opened by the British High Commissioner. The opening was also attended by representatives from the Regional Governor's office in Otjiwarongo, the Town Clerk and some of CCF board members. The First National Bank of Namibia made a sizable donation towards the purchase of a water trailer for the "Cheetah Wilderness Camp". This trailer forms the only water supply to the camp as there are no boreholes on the farm where the camp is situated. Raleigh volunteers also assisted in the construction of a quarantine area for housing sick cheetahs.

Five staff members from US zoos spent time at the Centre this year, including the Volunteer Coordinator of the National Zoo, one of their Cheetah Station members, the Veterinarian and General Curator of the Santa Anna Zoo, and a keeper of the Columbus Zoo. All participated in CCF's activities included working on cheetahs and participating in a release back into the wild. The Columbus Zoo keeper assisted with educational programs and is developing a volunteer keeper program where annually a US cheetah keeper will join CCF.

3. Eco-tourism

This year a contingent of 12 zoo directors, from leading zoos in the United States, visited CCF and were accommodated at guest homes in the Waterberg Conservancy. The directors visited CCF to learn more about important work being carried out here as several of these zoos directly support CCF. This group laid the ground work to facilitate future visits by interested Ecotourism zoo groups, thus ensuring continued zoo support of CCF's endeavours and community based tourism efforts through the Waterberg Conservancy. Two eco-tourism groups, one from the Cincinnati Zoo and the other from the St. Louis zoo visited CCF. A staff member from the St. Louis zoo accompanied CCF staff to visit a farmer and collect a cheetah he had trapped on his farm.

4. Media and Public Relations

CCF has maintained a high profile in the media through numerous broadcasts on both television and radio, as well as articles in newspapers and magazines, in multiple language., Earlier this year TV journalists from France spent three days at CCF collecting footage on CCF's activities to broadcast on French and German television. The BBC visited CCF for a children's program and interviews were conducted with learners who have participated in education programs at CCF.

The Namibian Broadcasting Network has been very supportive of CCF's work and have provided excellent coverage on both television and radio. During Cheetah Awareness week, three half-hour TV programs about CCF's work were shown, and most recently the opening of the Cheetah Wilderness Camp was televised. Radio interviews conducted with CCF's Matti Negembau in the Otjiwambo language were aired countrywide.

Numerous press releases have been published in the local newspapers and magazines. The Namibian Business Journal also regularly features articles on CCF's activities. The Journal is read in 57 countries worldwide. A journalist from Germany visited CCF to pursue interests in the plight of the cheetah for articles. Some magazines that recently featured CCF include, Air Namibia's Flamingo magazine, South Africa's Fair Lady magazine, and Africa Magazine.

A journalist from the National Geographic Magazine visited CCF to gather information for a feature on the status of cheetah in Namibia and the problems facing them. CCF introduced the journalist to a variety of people concerned with cheetah conservation in the country. He was granted special permission to attend a Large Carnivore Management Forum meeting. A photographer will return in 1998 to gather photographic material for the story.

D. INTERNATIONAL ACTIVITIES

The Fund assists in international program development and adapts model programs developed in Namibia for use in other countries, distributing CCF materials and information throughout Africa, Europe and the United States. CCF's director is one of five vice chairs of the IUCN's Cat Specialist Group and maintains cheetah communications internationally on the status of the wild population throughout its range, including its relationship with man and threats to its survival.

During 1997, two papers were published by CCF in the International Zoo Year Book. Conservation Strategies for the long-term survival of the cheetah, Acinonyx jubatus, by the Cheetah Conservation Fund, by L. Marker-Kraus and D. Kraus, and History of the Cheetah, Acinonyx jubatus, in zoos 1829-1994, by L. Marker-Kraus (abstracts attached).

1. International Cheetah Studbook

The 1994/1995 International Cheetah Studbook was published and distributed this year. The 1996 International Cheetah Studbook, which is the eighth edition of the studbook, is near completion. The studbook will be published early in 1998 and distributed to all facilities holding cheetahs. The studbook is published on an annual basis and contains a comprehensive record of all captive cheetahs. In this way factors such as births, mortality rates and reproductive success are recorded and monitored. Approximately 10% of the world's cheetah population is held in captivity, but as of yet the captive population is not self-sustaining and is being maintained by wild imports, primarily from Namibia. *In-situ* and *ex-situ* populations of cheetah must be managed cooperatively to ensure the survival of the species. Some zoos housing cheetah are setting an outstanding example by supporting CCF's *in-situ* conservation efforts.

2. African Preservation Program

CCF director, Laurie Marker is the Species Coordinator for the Cheetah Regional Captive Management program for Africa, called the African Preservation Program (APP), which was initiated under the auspices of the Pan African Association of Zoos, Aquariums and Botanical Gardens (PAAZAB). In May, CCF's director, Dr. Linda Munson, CCF Research Advisory Board Member and Bonnie Schumann, CCF Research Assistant, attended the annual PAAZAB conference. The first meeting of African facilities holding cheetahs was called during the conference. The meeting was a milestone in the history of cheetah facilities in Africa as they agreed in principle to abide by APP protocols. This region has a tradition of non-cooperation due to strong competition between facilities. APP representatives gave the Species Coordinator the mandate to put forward proposals, including recommendations for transferring cheetahs to equalize representation of founders within the captive population. Southern Africa holds 30% of the world's captive cheetah population and as such plays a major role in the future of the captive population.

A paper, titled The Role of the South African zoos in the survival of the cheetah, was presented by CCF's director (abstract attached) at the meeting. The value of the South African cheetah population was highlighted to draw the attention of the South African zoos to the historical role they have played in the removal of wild cheetahs from Namibia to replace breeding stock in South Africa. Dr. Linda Munson presented a talk on the prevalence of disease in the captive cheetah population and possible causes.

The first draft of a Cheetah Husbandry Manual was compiled by Laurie Marker and Bonnie Schumann as part of the requirements of the APP. The manual will be made available to all facilities holding cheetahs and will provide comprehensive guidelines for keeping these specialised carnivores in captivity.

3. Cheetah Outreach in South Africa

Working cooperatively with organisations located in Namibia and South Africa, CCF's programs are beginning to expand. Annie Beckhelling and Mandy Schumann have started the CHEETAH OUTREACH in Stellenbosch Cape Town. One of the main objectives of CHEETAH OUTREACH is to raise funds for the Cheetah Conservation Fund and carrying out education programs in the Cape Town area. Their cheetah, six in total, are housed at the Spier Wine Estate. Visitors to the estate now also have the opportunity to meet these tame cheetahs and learn more about cheetahs and the problems facing the survival of this species. CCF's director visited the program twice during the year to provide guidance and support of their efforts.

4. India/Iran

Since the early 1980's, CCF's director has been in communication with India's conservation community concerning the re-establishment of cheetah to India. Cheetah have been extinct in India since 1952. With the collaboration of Maharaja Gai Singh of Jodhpur, WWF India, and sponsored by the World Society for the Protection of Animals (WSPA), a preliminary site was evaluated by CCF's director for the development of a 700 ha reserve to serve as a captive breeding/holding area for cheetah, as well as an education centre. Further communication has resulted in the director of WSPA visiting CCF earlier in the year and collaborators in India stating commitment to the project. If funds are secured this project will begin in 1998.

Communications in Iran have been progressing well, paving the way for a possible visit by the director to Iran during 1998. The Iranian population of cheetah is estimated at about 100 animals and represents the sole remaining population of free ranging cheetah in Asia.

5. United States lecture and fundraising tour

CCF's director conducted two lecture and fundraising tours to the United States in 1997, one in June and the other in October. NOAHS Center of the National Zoo and British Airways sponsored the round-trip tickets. In June, the main purpose of the trip was to conduct/attend a CCF Futures Search Workshop, although several lectures were given and fund-raisers were attended. In October, CCF director visited 14 cities in 8 states and presented over 28 lectures to a vast array of audiences, including, Smithsonian's Natural History Museum, Cleveland Museum, the National Zoo Docent Conference, the Pacific Rim Wildlife Art Show, the Columbus Zoo, Los Angeles Zoo, Chicago Zoo, Cincinnati Zoo, San Diego Wild Animal Park, and several public and private elementary and high schools. Media coverage was a part of presentations in each city.

CCF's Community Development Officer, Don Muroua, also traveled to the United States in October. Don's trip was supported by a grant from the Rossing Foundation to present a lecture about CCF's efforts at the American Zoo Association (AZA) National Conference. Through a grant from the AZA which supported a salary for a community development officer, Don is the first paid employee at CCF. Don then traveled with CCF's director to several fundraising events and lectures throughout the US.

E. CCF ORGANISATIONAL ACTIVITIES

1. Futures Search

In June, 27 of CCF's donors, volunteers and collaborators from four countries took part in a workshop in the United States entitled 'Building a Vision for the Future' to plot CCF's activities and direction's for the next five years. The workshop was facilitated by Dr. Susie Ellis of the Conservation and Breeding Strategy Group (CBSG) of the IUCN. The proceedings of the workshop were published and distributed to parties concerned. Much follow up work has been accomplished by CCF since the workshop, including a 5-year Business Plan.

2. Board Development

CCF Namibian Board of Directors expanded in 1997 with three new board members voted onto the Board. CCF's Board represents a broad spectrum of people from business backgrounds to conservation. An Executive Committee of the Namibian Board of Directors was established to assist CCF's Director and facilitate quick decision making and as a support structure when major decisions need to be made at short notice. In the United States, CCF has also developed an Executive Committee of major donors. This committee has been developed as a support structure when major decisions need to be made concerning CCF.

3. Volunteer Program

CCF's volunteer program continues to provide valuable support. There are typically four full-time volunteers working for CCF at any one time, and volunteer terms overlap. During the year, a total of 23 volunteers, plus 28 EarthWatch volunteer (each for 1 month), 45 Raleigh volunteers (each for 3 weeks), and 4 students have assisted in all aspects of CCF's work. These volunteers have come from the United States, Germany, United Kingdom, France, Austria, Canada, Japan, South Africa and Namibia. Terms of these volunteers have ranged from three weeks to 12 months.

V. PLANNED ACTIVITIES FOR 1998

During the next year CCF will:

- Continue developing CCF's International Research and Education Center. CCF envisions the Center to include research/clinic and laboratory facilities and a public education center, and dormitories for staff.

- Continue working with farmers in tag- and-release program and biological sampling of wild-caught cheetahs.

- Work towards a major cheetah population census program in cooperation with the Large Carnivore Conservation Group.

- Expand the radio-tracking program to include more collared cheetahs, with an emphasis on female cheetahs.

- Expand its farmland ecosystem research , including prey base and habitat use. In cooperation with the Waterberg Conservancy, 15 individuals of four prey species will be radio-collared.

- Continue working with the Waterberg Conservancy in wildlife and habitat monitoring and eco-tourism activities and promoting the concept of conservancies in Namibia through CANAM.

- Continue to expand the Livestock Guarding Dog Program through breeding and placement on dogs on farms. Develop a more comprehensive demonstration using the dogs with sheep, goats and cattle.

- Expand demonstration of livestock and wildlife management practices which reduce human/predator conflicts, including research on the use of Controlled Taste Aversion.

- Expand CCF's community development program with emphasis on Hereroland.

- Continue to conduct educational assembly programs in schools throughout Namibia and assist teachers in the use of CCF's Teacher's Resource Guide through teacher training workshops.

- Continue with student research projects in cooperation with Namibia's Polytechnic and the University of Oregon's Global Graduate's program. Other students will also be joining CCF.

- Continue as a field station for EarthWatch volunteers.

- Continue working with Raleigh International volunteers.

- Continue relations with India and Iran concerning cheetahs.

KEYNOTE ADDRESS

Lecture CH1: THE IMPACT OF CAPTURE AND CAPTIVITY ON THE HEALTH OF NAMIBIAN FARMLAND CHEETAHS (*Acinonyx jubatus*)

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Abstract : Many captive cheetahs die from one of three diseases that are uncommon in other species, veno-occlusive disease, glomerulosclerosis and chronic *Helicobacter* gastritis. None of these diseases have been noted in wild cheetahs. Because both captive and wild cheetahs are similar genetically, these diseases presumably arise from some aspect of captive management or maladaption to captivity. To investigate how containment and captivity affect the health of wild cheetahs, blood samples were obtained from cheetahs that were trapped on Namibian farmlands and then translocated to captive facilities or re-released. Blood values from cheetahs in captivity less than 10 days were compared with those from cheetahs held captive for 1, 2 or greater than 3 months. Two hundred and thirty-two blood samples were obtained from 166 cheetahs during a 5 year period. Serum alanine aminotrnsferase (ALT), aspartine aminatransferase (AST) and creatinine kinase (CK) were significantly higher in cheetahs recently captured than in cheetahs held captive for more than 30 days. Blood glucose, alkaline phosphatase, and leukocyte concentrations also were higher in trapped cheetahs. In contrast, the hematocrit and serum albumin concentration of wild-caught cheetahs decreased over time in captivity, and this decrease occurred in the absence of any apparent parasitism. These data indicate that many captured cheetahs acquire hepatocellular damage, which could result in veno-occlusive disease. The elevated glucose alkaline phosphatase and leukocyte also may indirectly demonstrate marked corticosteroid response to stress. Because an endocrine response to stress could impact on resistance to infectious disease and cause glomerulosclerosis through persistent hyperglycemia, we now plan to measure fecal corticoids in captive-held cheetahs to determine if a chronic stress response can explain in part the deteriorating health of cheetahs in captivity.

Paper CH2 : **MORPHOLOGICAL ABNORMALITIES REPORTED IN NAMIBIAN CHEETAHS (*Acinonyx jubatus*)**

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Abstract : Extensive genetic studies have shown that cheetahs are genetically homozygous, a condition that makes their survival more vulnerable to environmental and ecological changes. Three distinct morphological abnormalities have been observed in the free-ranging Namibian cheetah population. Two dental anomalies, focal palatine erosion (FPE) and crowded incisors, as well as a distinct kink in cheetahs tails.

Cheetah Conservation Fund has developed an extensive data base on over 250 free-ranging Namibia cheetah. Morphological abnormalities have been included in this data-base. Opportunistically, captured cheetahs are anesthetized, during which time physical exams and biological samples are collected for over-all health, disease and genetic analysis. A high incidence of cheetahs have been recorded with deep impressions in the upper palate, possibly a predisposition to FPE, a condition where the lower molars break through the upper palate. FPE is a serious problem that can lead to fatal disease. Previously, FPE has only been reported in captive cheetah and was thought to be a result of lack of bones in captive diets. This is the first reporting of FPE in free-ranging cheetahs. Behavioural signs accompanying FPE and treatment are presented.

Another anomaly includes a high incidence of cheetahs with crowded lower incisors. The crowding varies from slight to severe where incisors are arranged in two parallel rows. This anomaly has not yet been reported in literature, which makes it difficult for those who work with these animals to recognize the defect and study it further. This defect is significant due to the challenges the species face in the wild. Incisor teeth are used by cheetah to skin their prey, so a malocclusion may theoretically make skinning more difficult thus allowing more time for other predators to steal their food. Being able to quantify abnormalities is important for the conservation of species, as defects may have long-reaching affects on the survival of endangered species. If morphological abnormalities, such as those discussed in this paper, are a localized problem and continue to be passed on, they could rapidly become widespread throughout the population.

Paper CH3 : **PREVALENCES OF ANITBODIES TO VIRAL DISEASES IN NAMIBIAN FARMLAND CHEETAHS (*Acinonyx jubatus*)**

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Abstract : Common feline viruses, such as feline herpes virus (FHV) and feline enteric corona virus (or feline infectious peritonitis virus; FIP) have caused unusually high morbidity and mortality in captive cheetahs. Feline leukemia virus (FeLV) and feline immunodeficiency virus (FIV) also have been found in captive cheetahs, and wild cheetahs in Tanzania were suspected to have acquired canine distemper virus (CDV). Wild cheetahs on Namibian farmlands are likely exposed to these and other viruses through their contact with domestic animal reservoirs. Trapping of cheetahs on farms and translocating them to other farm regions further increases opportunities for exposure and spread of these pathogens. To assess the extent of exposure to feline viruses in free-ranging cheetahs from north-central Namibian farmlands, sera from 56 wild cheetahs and 139 captive cheetahs were evaluated for antibodies against CDV, FIP, FHV, FIV, FeLV, feline panleukopenia virus (FPLV), and feline calici virus (FCV). These populations had antibodies against CDV, FeLV, FIP, FPLV, FHV, and FCV, but not FIV. The exposure of wild cheetahs from northeast Namibian farmlands to FIP, FPLV, CDV, and FHV may account for some mortalities in the population, particularly in cubs. With current evidence that seropositivity does not preclude viral shedding of FeLV, FIP or FHV, these data should be considered in decisions to relocate cheetahs to areas free of these viruses, and should prompt the development of quarantine guidelines for wild-caught and captive cheetahs.

Paper CH5 : **MEASURING GONADAL AND ADRENAL STEROIDS IN THE FECES OF WILD AND WILD-CAUGHT NAMIBIAN CHEETAHS (*Acinonyx jubatus*)**

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Abstract : Gonadal and adrenal hormones can be altered by a variety of environmental factors in captive and free-ranging animals. The ability to evaluate changes in the levels of these hormones would be a valuable tool for evaluating overall health. To obtain samples for endocrine analysis, animals usually require manual restraint or anesthesia. Feces are easy to collect from captive animals and procurable from wild animals. Techniques have been validated for measuring estrogen, testosterone, progesterone, and cortisol metabolites in the feces of many species, including the cheetah (*Acinonyx jubatus*). The aim of these studies was to determine if fecal hormone technologies could be applies to field conditions for evaluating the reproductive status of cheetahs. Initially, the long-term profiles of estrogen, progesterone, and cortisol in three captive Namibian cheetahs were characterized. These cheetahs exhibited ovarian activity, but also had periods of anestrus that were unrelated to season. Additional studies determined that concentrations of reproductive hormones (testosterone and estrogen) did not influence territory markings of "playtrees" by wild cheetahs. The reproductive status of recently trapped cheetahs also was evaluated through measurements of fecal estrogen, progesterone, and testosterone metabolites. The results of these studies indicate that gonadal and adrenal hormones can be measured in the feces of cheetah. To determine if chronic stress is the basis of the unusual diseases seen in captive cheetahs, fecal hormone techniques will now be used to measure levels of the stress hormone, cortisol, in wild and recently captured cheetahs. The ability to monitor concentrations of gonadal and adrenal hormones in feces will be a powerful tool for understanding the effects of translocations and captive management conditions on the health of cheetahs.

Paper CH6 : **LYMPHOSARCOMA IN A CAPTIVE NAMIBIAN CHEETAH (*Acinonyx jubatus*), A CASE STUDY**

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Abstract : In March 1995, after a four week illness resulting in lymhademopathy, weight loss, irritability, lethargy, pica and polydipsiana, a three-year old captive female cheetah died. The cat was anesthetized so that a complete physical examination and diagnostic tests could be performed. Samples from the blood and lymph node aspirate were sent to the both the national and private laboratories. Analysis included elevated liver enzymes (ALT, AST), leukocyte count and differential, low hematrocrit (30%), and positive for haemobartonella. Preliminary diagnosis was of a form of leukemia, with no sign of bacterial infection. Conclusive analysis of a lymph node aspirate determined a diagnosis of lymphosarcoma. The cat died two days later and a full necropsy was conducted. Pathological findings included malignant lymphocytes effaced the architecture of most peripheral lymph nodes, as well as infiltrated hepatic and splenic sinusoids and the interstitium of the kidney, lung, tonsil, salivary gland, thyroid, trachea and bone marrow. Neoplastic lymphocytes included both large and small cell types, as well as histiocytic subtypes. Viral DNA extracted from a frozen neoplastic lymph node was amplified by polymerase chain reaction and then determined to be FeLV by Southern blot using FeLV specific probes.

The affected female cheetah had been housed for 15 months adjacent to a male cheetah which had tested positive for FeLV eleven months earlier. The female had tested negative for FeLV eleven months prior to the onset of her illness. The male had been housed for 12 months prior with two other cheetah at a private facility where many domestic cats resided. On retrospective serology, these other 2 cheetahs tested positive for FeLV, and one had died prior to the death of this female. The male and the other cheetah remain alive.

This is the first documented case of FeLV causing death in a captive cheetah, thus providing evidence of how a wild population can possibly be affected by proximity to domestic animals. Isolation of FeLV from the neoplasm suggests that FeLV infection was associated with the neoplastic transformation of lymphocytes in this cheetah, similar to the oncogenic role of FeLV in domestic cats.

MATYUSHKIN, E. N., PIKUNOV, D. G., DUNISHENKO, Y. M., MIQUELLE, D. G., NIKOLAEV, I. N., SMIRNOV, E. N., SALKINA, G., ABRAMOV, V. K., BASYUNIKOV, V., YUDIN, V. G. & KORKISHKO, V. G. (1996): *Numbers, distribution, and habitat status of the Amur tiger in the Russian Far East: express report.* USAID Russian Far East Environmental Policy and Technology Project Report. [In Russian and English.]
MILES, J. & JACKSON, P. (1994): *Killed for a cure.* Cambridge: TRAFFIC International.
MORSBACH, D. (1987): Cheetahs in Namibia. *Cat News* 6: 25–26.
NOWELL, K. & JACKSON, P. (1996): *Wild cats: status survey and conservation action plan.* Gland: IUCN.
O'BRIEN, S., WILDT, D. E. & BUSH, M. (1986): The cheetah in genetic peril. *Scientific American* 254(5): 68–76.
O'BRIEN, S., WILDT, D. E., BUSH, M., CARO, T. M., FITZGIBBON, C., AGGUNDEY, I. & LEAKY, R. E. (1987): East African cheetahs: evidence for two population bottlenecks? *Proceedings of the National Academy of Sciences of the USA* 84: 508–511.
RABINOWITZ, A. R. (1993): Estimating current abundance of the Indo-Chinese tiger in Thailand. *Biological Conservation* 65: 213–217.
SCHWANN, T. (Unpublished): *A preliminary report on the distribution of tigers in Thailand.* Unpublished report to Global Tiger Forum, Delhi, 1994.
WARTAPUTRA, S., SOEMARNA, K., RAMONO, W., MANANSANG, J. & TILSON, R. (1994). *Indonesian Sumatran tiger conservation strategy.* Jakarta: Directorate General of Forest Protection and Nature Conservation.
WOZENCRAFT, W. C. (1993): Order Carnivora. In *Mammal species of the world* (2nd edn): 286–346. Wilson, D. E. & Reeder, D. M. (Eds). Washington, DC: Smithsonian Institution.

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History of the Cheetah
Acinonyx jubatus
in zoos 1829–1994

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Since 1829 the African Cheetah *Acinonyx jubatus* has been exhibited in over 373 zoological facilities. As at 31 December 1994 the international captive population was 1218 animals of which 880 (72%) were captive-bred and 338 (28%) were wild-caught. The steady increase in the captive population is a result of captive breeding, co-operative captive-management programmes and importation from the wild. Of facilities holding Cheetah 26% (96) have bred the species, 15% of which have bred continuously producing 63% ($n = 1580$) of all cubs born in captivity. Although the number of facilities breeding Cheetah has increased, in 1994 only 10% of them reported successful reproduction. The N_e has increased gradually and in 1994 was equivalent to 17% of the captive population. Of 1564 animals that have been imported, *c.* 20% ($n = 308$) have reproduced and in 1994 155 have living descendants in the captive population. Except for a few East African Cheetah *Acinonyx jubatus raineyi* all of the imported animals are the southern African subspecies *Acinonyx jubatus jubatus*. There has been an increase in the number of subspecific hybrids in the captive population and between 1990 and 1994 28 hybrids produced 24% (190) of cubs. The captive population is not yet self-sustaining and is maintained by the importation of wild-caught animals. Continued progress can be achieved by implication of a co-ordinated global management programme.

Key-words: captive history, captive-management plans, cheetah, pedigree analysis, registry, reproduction, studbook, zoos

The Cheetah *Acinonyx jubatus* is markedly different in both anatomy and behaviour from the other 36 felid species. It is the only species in the genus *Acinonyx* and the fastest land mammal.

Cheetahs were widely distributed throughout western Asia and Africa and in 1900 the wild population was estimated to be 100 000 animals (Myers, 1975). Today *c.* 12 000 live in 23 African coun-

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Conservation strategies for the long-term survival of the Cheetah
Acinonyx jubatus
by the Cheetah Conservation Fund, Windhoek

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The Cheetah *Acinonyx jubatus* is declining throughout its range because of loss of habitat, a declining prey base and competition with livestock interests. Throughout Africa there are less than 15 000 animals remaining. The largest wild population of Cheetahs is in Namibia, although in the last 12 years numbers have been reduced by half to *c.* 2500 animals. Significant declines have continued as farmers capture and remove Cheetahs as 'pests'. Established in 1990, the Cheetah Conservation Fund aims to secure habitats for the long-term survival of the species and its ecosystems. The primary focus of the Fund is working outside of the protected reserves with the local livestock farming communities to develop ways to reduce conflict between humans and Cheetahs. The Fund also conducts independent and collaborative research, disseminates information and recommends management techniques to farmers.

Key-words: cheetah, conservation, ecosystems, endangered species, farming, Namibia

Loss of habitat, a declining prey base and competition with large predators and livestock interests are having a serious affect on wild Cheetah *Acinonyx jubatus* populations. At time of writing there are fewer than 15 000 Cheetahs remaining in Africa and *c.* 200 in Asia (Marker-Kraus *et al.*, 1996). Most live outside protected game reserves in small, isolated groups, where they are often in conflict with human interests and livestock and most populations continue to decline (Marker-Kraus *et al.*, 1996).

Namibia is home to the largest population of Cheetahs in the world (Fig. 1). However, in the last 12 years their numbers have been reduced by half to *c.* 2500. In Namibia, between 1980 and 1991, 6829 Cheetahs were legally removed from the wild, mainly through indiscriminate catching in live traps and shooting (CITES, 1992). Significant declines in the population have continued as farmers capture and remove Cheetahs because they are regarded as 'pests' which have a severe negative economic impact on livestock and the wild game industry. If this threatened species is to be saved this perception must be reversed. The survival of the Namibian Cheetah is in the hands of approximately 1000 commercial farmers and their willingness to integrate Cheetah conservation efforts into farm management.

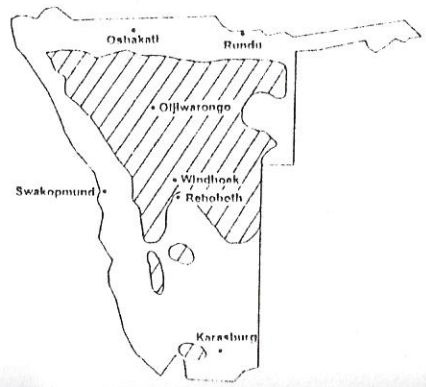

Fig. 1. Distribution of Cheetahs *Acinonyx jubatus* in Namibia in 1995.

Making the pieces work for the cheetah (*Acinonyx jubatus*) *in situ*

By Don Muroua and Laurie Marker

The survival of free-ranging cheetah (*Acinonyx jubatus*) is jeopardized by the loss of habitat due to rising human populations resulting in the conversion of land to agriculture and livestock farming thus reducing prey species and increasing human, livestock and cheetah conflicts.

The Cheetah Conservation Fund's (CCF) mission is to ensure the long term survival of cheetah and their ecosystems through a multi-disciplined and integrated conservation program of research and education in its native habitat. In 1991, CCF was established in Namibia to help insure the survival of the cheetah through stablizing this country's cheetah population, as it is the largest remaining free-ranging in the world (approximately 2,500 or 20% of the world's cheetah population). CCF is the only international organization practicing in situ conservation for the cheetah.

In situ conservation programs are critical, as 90% of Namibia's cheetah exist outside protected game reserves, on livestock farmlands and the survival of these animals is dependant on the farmer's attitudes. CCF's primary focus is working with the local farming communities to develop ways to reduce conflict between humans and cheetahs and devise a conservation management plan that secures habitat for the species while accommodating farmers' land use requirements.

Research activities center around the identification of important components of farmland ecosystems necessary to sustain healthy cheetah populations through the development of an in-depth database on the Namibian cheetah and its ecosystem. Public education and the development of an active grassroots constituency are integral components of the overall cheetah conservation program. Creative management strategies combined with knowledge of the species provides for solutions to human/animal conflicts. For the cheetah, long-term solutions will only be found through long-term monitoring and implementing integrated approaches to predator, prey and livestock needs.

ABSTRACT

THE ROLE OF SOUTHERN AFRICAN ZOOS
IN THE SURVIVAL OF THE CHEETAH (Acinonyx jubatus)

The cheetah (Acinonyx jubatus) is currently classified as Vulnerable or Endangered throughout its range and is on CITES Appendix I, with fewer than 12 000 remaining world wide. A historical overview of the available data as recorded in the International Cheetah Studbook shows that the captive population of cheetah is not sustainable and is currently maintained through the importation of wild-caught cheetah, with 99% of these animals originating in Namibia. Southern Africa currently holds 30 % of the worlds' captive cheetah population, of which 39% of these are wild caught. The removal of cheetahs from the wild population has various detrimental effects, including genetic deprivation of the remaining wild populations. Management strategies to regulate indiscriminate removal of cheetahs from the wild created by the demand from captive facilities include the implementation of the African Preservation Program (APP), created under the auspices of PAAZAB(Pan African Association of Zoological Gardens, Aquaria and Botanical Gardens) to promote both in situ and ex situ conservation of the cheetah.

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PAPER WILL BE PRESENTED BY

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