

CHEETAH CENSUS IN KENYA
PRIORITY 1: SOUTH WESTERN KENYA.
2004-2005



SUBMITTED TO:
EAWLS STICHTING-NETHERLANDS.

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1.1 EXECUTIVE SUMMARY

The goal of the Cheetah Census Project was to collect baseline information on cheetah (*Acinonyx jubatus*) population and conservation needs in Kenya. The project covers the entire country in three Priority Areas (Priority 1, 2, and 3).

This first Priority (hereafter referred to as Priority 1) covered the southwestern part of the country including selected areas in Narok, Kajiado and Transmara districts, Masai Mara National Reserve, Nairobi National Park, Amboseli National Park, Tsavo West National Park, Magadi and their adjacent wildlife dispersal areas. The EAWLS, KWS, and CCFK jointly conducted the survey, which was implemented in October 2004 to February 2005 after receiving financial support from Stichting Netherlands.

Prior to the joint project, CCFK initiated cheetah census in Kenya through detailed interviews in three of Kenya's Wildlife Forum areas (Nakuru, Machakos and Laikipia). At the same time KWS conducted baseline evaluations at Nairobi National Park, Baringo/Bogoria Region and Masai Mara National Reserve and the adjacent wildlife dispersal areas. These studies were taken into account in discussions under Literature Searches.

KWS incident report data was evaluated to estimate areas of cheetah presence. Field exercises supplemented the areas where presence was determined. The frequency of cheetah reported incidences vary from year to year, but show an overall increase and localized increases in the Tsavo, Kajiado Nairobi and Mara ecosystems. The Amboseli and Naivasha ecosystems show little change. The increase in incidences could mean either an increase in cheetah numbers or an increase in conflict opportunities.

The field exercise can thus be used to evaluate the area for habitat, water availability, land use and livestock management. Interviews and observations can be used to evaluate relationships with other predators and to estimate cheetah population numbers. The use of GPS data and interview results can show the population estimates and compare them to the results of the KWS incident data. There is a strong correlation between the areas of incident reports and cheetah reports.

Using a combination of recent CCFK and KWS studies and the EAWLS/CCFK field exercises a total of 190 cheetahs are estimated in the Priority 1 area. The areas where no numbers are given are likely to be areas absent of cheetahs, however security issues and funding for local field assistants limited our ability to confirm cheetah absence in some areas. The total area covered in this survey is 67,854 km² (16,762,579 acres).

The focus of this report is in the Priority 1 region while the Priority 2 and 3 regions remain incomplete at this time. The overall aim of the project is to determine the conservation status of cheetah in its traditional range in Kenya. In this document the cheetah's ecological requirements, project objectives, site, field interviews, findings, challenges and recommendations are discussed. The CCFK and KWS cheetah surveys are also discussed in summary, as they are part of the project site.

1.2 ACKNOWLEDGEMENT

The participant organizations, the East African Wildlife Society (EAWLS), the Cheetah Conservation Fund Kenya (CCFK) and the Kenya Wildlife Service (KWS) would like to thank the Stitching Netherlands for making it possible to initiate the cheetah census in the southwestern parts of Kenya. We appreciate their financial support not only for the cheetah project but also for the entire species conservation program at the EAWLS.

EAWLS provided staff and office space, staff for data collection, analysis, information dissemination and guidance on the census exercise under Hadley Becha, Deputy Director and head of Programmes. CCFK provided guidance, data collection, analysis and expertise in cheetah census methodology and mapping. The KWS played a crucial role in providing permission for conducting the survey, access to the KWS library and National Parks in the study area and collaborated through their rangers in the collection of cheetah conflict information.

Special thanks and appreciation goes to all the people who gave us places to stay during our fieldwork such as the Mbirikani and the Kilimanjaro Lion Project, Porini Camp, KWS Rombo, Shompole Ranch, Kishushe Camp, Mara Conservancy, and Morijo loita Camp.

Last but not least we also thank all the communities and people we interviewed during the survey for their positive response and assistance.

1.3 KEY WORDS

Shamba = Permanent residence and property, usually some agricultural usage on property

Manyatta = Temporary/semi permanent residence usually Maasai, typically with more than one household and a fence creating an inner boma for keeping livestock.

Boma = Semi permanent livestock shelter

Shoat = Sheep and goats grazed together.

Bore hole = Deep hole drilled in the ground by a machine for the purposes of getting water.

Scheme = Division of property according to clan, managed as a group without subdivisions into title deed properties.

Group Ranch = Shareholders of a section of property agreeing on some settlement, but managing the land cooperatively. Sometimes subdivision occurs in part of the area.

Subdivision = Land divided into title deeded sections with property boundaries. Often a village is formed within subdivisions to provide health, school and other services.

Pastoralists= A community of people who are solely livestock keepers. Some move from one place to the other in search of pasture and water (nomads), while others settle permanently in some areas.

National Park = Area set aside for wildlife management/conservation which is managed and fees are collected by the governmental organization of KWS.

National Reserve = Area set aside for wildlife conservation whose management is under the local county councils. Local administration determines allowances for grazing livestock in some areas during times of drought.

Conservancy = A privately managed conservation area for wildlife for the purposes of tourism. Benefits are shared between the investor and the local people.

Safari = A journey /an excursion into tourist sites/ a game drive.

2.0 INTRODUCTION

A *census* can be defined as a count that includes details of sex, age, and numbers for a population of a given species (Davis and Winstead, 1980). The census of predators is a difficult task, which requires large resources for its success. It is very difficult to come up with the exact numbers and sexes but their population estimates are necessary in order to know the areas that pose the greatest need for conservation action. Global estimates indicate that cheetah numbers have decreased from 100,000 in 1900 to as low as 12,000 in 1995 (Marker, 2003). Population estimates in most other cheetah range countries indicate that as much as 90% of cheetahs live outside the protected areas. Namibia has the largest population of approximately 2500, while Kenya is believed to have viable cheetah populations.

In past studies the Kenya cheetah population has been evaluated in relation to the entire East African population. In Kenya cheetahs live both inside and outside protected areas. Cheetahs that spend most of their time in parks become habituated and are easier to study than the shy and elusive ones who live outside of the parks. Several studies have been attempted to try to prove or contradict the issue of declining cheetah populations in Kenya. (Graham and Parker, 1965; Meyers, 1975; Hamilton, 1986 and Gros, 1989-90). While these studies give conflicting results in estimating the trend, the final one found that cheetah populations had remarkable stability in Kenya. Contrary to studies in many of the other cheetah range countries, Gros' study also found that cheetah populations were higher inside of the protected areas than outside.

The cheetah in Kenya have probably never had a population density to match those of other large predators (Myers, 1975). Its low density coupled with human activity has significantly led to declining numbers in cheetah population. Human population in Kenya has been steadily increasing over the past few decades hence necessitating a high demand for arable land and settlement. As a result, large tracts of wild habitats have been cleared in a relatively short space of time hence reducing wildlife habitat. Settlements around National Parks and Game Reserves have led to human cheetah conflict as cheetahs kill domesticated animals and man retaliates by killing cheetahs.

Another factor in the cheetah's decline is the international fur trade. It is hunted and killed for its skin, which is exported to the world markets through Ethiopia, Djibouti, and South Africa (Myers, 1975). This has been coupled with live export trade (exporting young cheetah as pets). The threat to cheetah is aggravated by its unusual sensitivity to modification of the physio-biotic environment: such as an increase in competition from other carnivores. A shift in the make up of its prey and a spread of bush growth can equally well serve to induce significant instability in cheetah population (Myers, 1975).

The cheetah has a very low genetic diversity hence could be more susceptible to infectious diseases and reduced ability to adapt to changes in their environment. Pocketed cheetah populations in Kenya could further decrease the genetic diversity resulting in higher incidences of inbreeding problems.

Due to the above factors, a cheetah census is of paramount significance before engaging in any comprehensive conservation strategies. Issues of problem animal control and orphan cheetahs are dependant on fact-based decisions and a management plan. Concentrated studies can be focused in areas of highest need once the nation-wide census is complete.

2.1 PROJECT SITES

The Global Cheetah Master Plan is an international project, which evaluates cheetah issues in the remaining cheetah range countries. Under this project a Global Cheetah Census committee has been formed. Representatives from EAWLS, KWS and CCFK attended a workshop on cheetah census to establish guidelines for census methodology. In the workshop Kenya was divided into priority areas and time lines as follows (Figure 1):

Priority 1 – Establish Presence/Absence/baseline estimates to fill in the gaps where focused studies have already been done. This includes selected areas in Narok, Kajiado, Nakuru and Transmara districts, Masai Mara National Reserve, Nairobi National Park, Amboseli National Park, Tsavo West National Park, Lake Magadi and their adjacent wildlife dispersal areas (Target #1).

With the EAWLS-Stitching Netherlands funding the areas under Priority 1 have been evaluated (discussed in this report). The project targeted both protected and non-protected areas within the country with much emphasis on areas where cheetahs are known to exist. The remaining areas will be covered later.

Priority 2 – This area has less infrastructure and fewer past studies, but there is still a high need for data on presence/absence/baseline estimates. It includes parts of:

- Tsavo East, Marsabit, Laikipia, Samburu (Target #2)
- Nasolot, South Turkana, Kamnarok, Baringo, Bogoria (Target #3)
- Wajir, Mandera (Target #3)
- Turkana, Meru Conservation Area, Kora, Rahole (Target #4)
- Tana river, Ijara, Lamu, Garissa (Target #5)

Priority 3 – This area has little past records of cheetah and has high human numbers. It includes: Ruma (from Masai Mara), the area from Nairobi (Thika) to Tsavo East, Shimba Hills (South of Tsavo) (Target #6)

2.2 OBJECTIVES

The goal of the project is to establish a cheetah database through a nation-wide census.

Objectives:

1. To determine areas of cheetah presence /absence in Kenya and assess local peoples' attitudes towards its conservation.
 - List of areas with cheetah species
 - A Cheetah distribution map of Kenya
 - Effects of human activity and land use changes on cheetah and its habitats
 - Cheetah population estimates
 - Cheetah data base
2. To determine cheetah trends by analyzing and comparing previous information in areas with viable cheetah population for recommendations of further research.

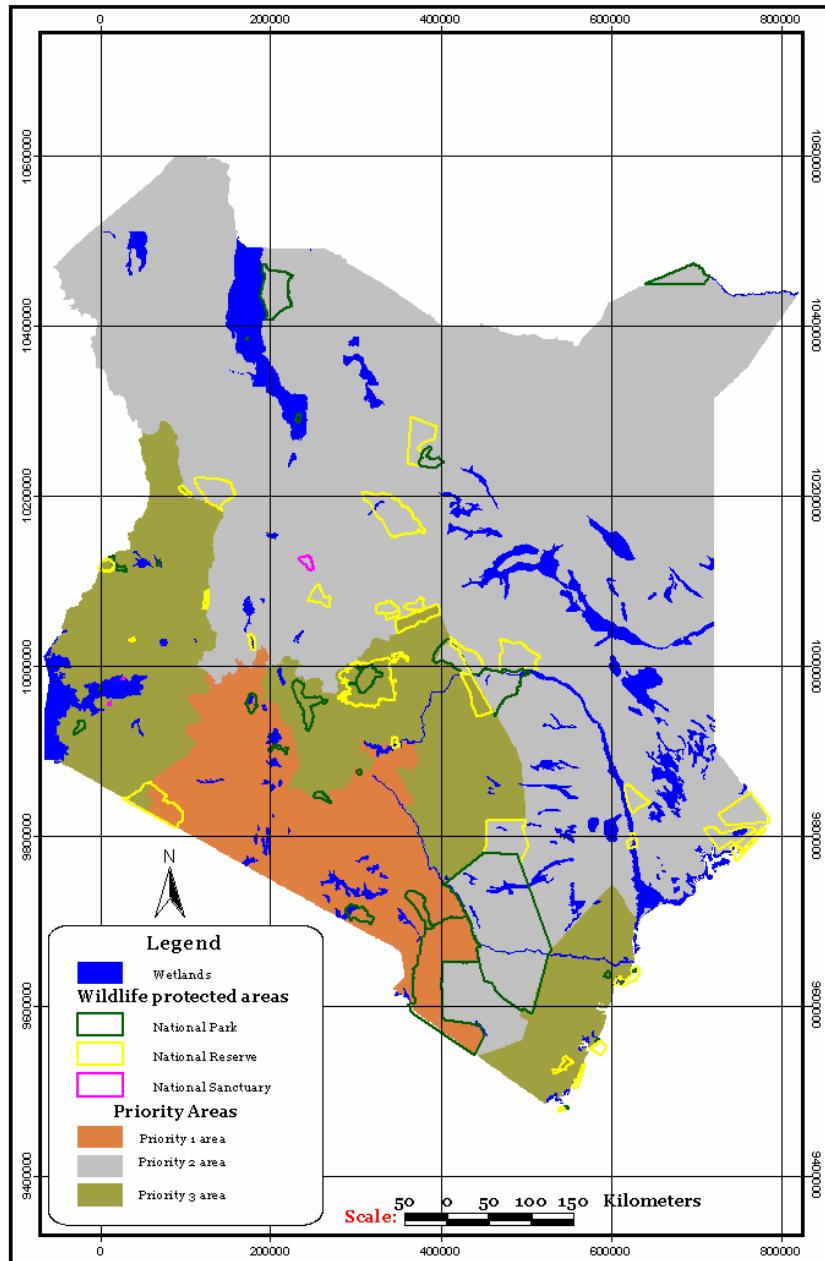


Figure 1: Map of Kenya-Census Priority Areas

2.3 METHODS

In accordance with recommended methods of cheetah census by The Global Cheetah Master Plan a multi-faceted methodology was chosen by programme coordinators for EAWLS, KWS and CCFK. This census programme used dedicated EAWLS staff to coordinate and analyze information from detailed KWS record Review, field evaluation and informal interviews. CCFK staff guided the process and participated in data collection and communications with KWS. Authority and actions by KWS allowed Park access and data search staff at KWS outposts.

a) Literature Review

Background information was compiled using past studies on cheetah behaviour, diet, habitat use, population studies, trend analysis and threats facing the species.

Recent information from current and ongoing studies were also used as the starting point for compiling data in the Priority 1 area chosen for this evaluation. These reviews came from KWS and CCFK unpublished and internal reports.

b) KWS record and incident reports.

Record searches included incident and occurrence books at KWS headquarters Nairobi and at KWS field outposts within the Priority 1 Areas. An in-depth study was conducted for all predator conflict data, threats to livestock or humans, and other incidences involving predators. From the overall predator records the cheetah specific incidents could be compared with those of predators in general. The cheetah incidents could also be used to develop a map of areas where cheetah presence could be identified. An evaluation of the number of cheetah incidents could then be used to estimate areas of potential cheetah population densities. Using the comparison of cheetah incidents with field observations and interviews will develop a model for using frequency of incidents with cheetah population density.

c) Field Work

i) Field Observations

The Priority 1 area was divided into blocks of 20 km squares. In each of the blocks field observations included taking GPS coordinates of prey, human development (people sighted, villages, markets, shambas, manyattas, water points, dipping posts), other predator sightings or spoor.

ii) Interviews

Informal interviews were conducted (when appropriate) with farmers, traditional pastoralists, researchers and conservationists, personnel managing protected areas, tourists & tour guides. Questions were asked in regard to cheetah sightings, predator issues and livestock management, this was guided by a questionnaire developed previously by CCFK.

iii) Photographs

Photographs of land and habitat were taken over random intervals. These photographs will be used when evaluating cheetah habitats and in future recommendations for more detailed census activities where viable populations are estimated to exist. Photographs and GPS coordinates were also taken of spoor (tracks) of any predator.

3.0 LITERATURE REVIEWS

3.1 SPECIES DESCRIPTION

The cheetah (*Acinonyx jubatus*) is a monospecific genus, being the only species occurring throughout Africa (Christopher, T.S and Vivian, J.W 1988). The cheetah's body is specifically adapted for high speed with a long slender body, long limbs, a small rounded head with a short muzzle. Enlarged nasal passages and a relatively large heart and lungs assist in oxygenation of the blood. The body is about 2 metres long and its tail measures 70 centimeters, with an average body mass between 40 to 60 kilograms. The body colour is tan and is liberally dotted with black rounded spots more or less uniform in size (Eaton, 1974). A clear black "tear line" runs from the inner point of each eye to the corner of the mouth. The long tail is black ringed often with a white tip. It is the only cat that does not have fully retractile claws.

Sexual maturity occurs at 20-23 months. There is no regular breeding season. The gestation period is about 95 days with an average litter size of 4-6 cubs. The cubs are often hidden in dense plant cover (den/lair) for the first 6 weeks and continue suckling until they are about three months old, by which they have lost their silvery mantle. The cubs are up to 30 cm long and their birth weight varies from 250- 300g. Up to three months of age they are smoky grey in colour with a long mantle of hair on the back of the head and neck. The mantle is thought to help camouflage the cub in the grass, hiding from predators and also works as mimicry defense, causing the cub to resemble a honey badger (ratel) (Eaton 1974). Cheetah cubs separate from their mothers at between the ages of 17 and 23 months. By this time they have learned hunting techniques such as *stalking*, *tripping*, and *strangling* as they watch their mothers.

When females separate from their littermates they become solitary and establish their own home range. Males often stay together for several years and into their entire lifetime. The associations of males are known as *coalitions* (Caro, T. and Laurenson, K. 1989).

In the Serengeti, males as well as females establish territories. Some males regularly mark their territories with urine, faeces and scratches on termite grounds, rocks and fallen trees. Territorial males, or residents, patrol and defend a well-defined area. Males that rarely scent mark range over huge areas of the park are known as *non-residents* or *floaters* (Caro, T. et al 1989). Territories are often in areas where there is a rich supply of wild game and/or water. Some males maintain territories in order to find females with which to mate. Fierce fighting may occur between residents and intruding males and these results in injury or deaths.

A cheetah's habitat includes open woodland savannah, grasslands or a combination of the two habitats. In Kenya cheetahs are also frequently reported to be seen in bush lands and sometimes noticed at the fringe of forest patches, using a wide variety of habitats (Myers, 1975). The cheetah is known to range over large tracts of land. CCF Namibia records an average home range of 1500 km square (Marker, L. 2004) while the Serengeti cheetah range covers 750 km square (Caro, T. 1994) Hence, the cheetah typically ranges through areas of human settlement at some point in their range.

The cheetah's diet consists of small to medium ungulates, and the young of larger species. The diet may also include ground living birds such as ostriches or guinea fowl, small mammals such as hares, and domestic animals like goats, sheep and calves. In most reports the cheetah's most frequent prey preference is the Thompson's gazelle (Kruuk, 1972).

3.2 PAST SURVEYS

Since 2000 a variety of studies were conducted by CCFK and KWS research personnel. Data collected from Priority 1 included a review of the following unpublished reports.

3.2.1 CHEETAH CONSERVATION AND HUMAN IMPACT: 2002 INTERVIEWS IN THE NAKURU WILDLIFE FORUM (CCFK)

The survey, conducted in Nakuru and Naivasha, had the aim of establishing cheetah conservation status and human impacts on cheetah. Interview data was collected from 36 individuals during 2002, of which 17 were farm owners, six managers and 13 community members.

Habitat/ wildlife

The three types of vegetation were; open grassland, medium vegetation (i.e. scrub, leleshwa etc.) and thick bush/forest (i.e. predominately acacia). Game present in the interviewed areas included: zebra, Thompson's gazelle, impala, Grants gazelle, buffalo, topi, waterbuck, and warthog. Predators reported by the interviewees at the time include: lion, cheetah leopard, hyena, jackal, snakes and other small predators.

Water

Water sources in the area are both seasonal and permanent. Farmers generally reported water was inadequate for livestock, wildlife, humans and crops. Areas of permanent water sources were predominantly commercial ranching and agricultural bases.

Land Use

Of the farmers interviewed, 60% grew crops for either personal or commercial use. Crops for personal use were near homesteads while commercial crops were typically enclosed in electric fenced fields for protection from hippos, baboons and human theft. Livestock, including cattle, goats, sheep, donkeys and camels, were managed on all but five of the interviewed properties. The livestock ratio to total area was 0.8478 livestock animal per acre. This number is only a sample and not an overall count; pastoral and small-scale livestock owners were not completely accounted in this sample.

Livestock Management

Livestock are not permitted in the National Parks, however encroachment into the open borders of Hells Gate National Park and Longonot is difficult to control. Farmers were asked about the type of fence they used and the percentage of land covered by each fence type. Three different types of fencing were identified: livestock fence, game (non-electric and electric) fence, and live fence (planted or stone). Herds most often go into the field during the day and are kept in bomas or in corners of the field at night. Dogs and donkeys were reported by farmers to be used as guarding animals. Generally, herders remain with the stock throughout the day.

General Predator Issues

Leopards and hyenas were reported as the major source of conflict in this region. Jackals also attack newborn livestock and come for placentas just after birth. Lions rarely impact this region except for occasional issues around Lake Nakuru and Hells Gate Parks. The low number of predators in the region resulted in an overall report that predators are not a large source of conflict in the region.

Cheetah Specifics

Cheetahs are easily chased away from their kill by other predators, scavengers and domestic dogs. Many of the larger predators will kill cheetah adults and cubs. Thus cheetah numbers decline or remain the same inside of parks where other predator numbers are increasing. The majority of people interviewed thought that cheetahs were not a problem as compared with other predators. Only one farmer reported loss of small stock to cheetah in this area. From the survey, 31 cheetahs were reported in 15 sightings in 2001 (Table 1). It is likely that the sightings over the year would have repeatedly seen the same cheetah. Females reported with cubs had young of varying age making it possible that there were at least three females in the region. Repeated reports of two males would lead one to believe that there is one group of two males. The survival of the 12 cubs is likely less than 50% resulting in a maximum increase of six to the population, resulting in a realistic estimate of 12 cheetahs.

Table 1. The Number of Cheetah Sighted in Per Sex/Group

Sex/group	Number of cheetah
Adult male	3
Adult female	1
# Litters (# cheetah - dam and cubs)	15
Sex not identified	4
Adult group	8
Total	31

3.2.2 MASAI MARA NATIONAL RESERVE AND DISPERSAL AREAS (KWS)

This area was covered in a survey by KWS in 2001-2. The aim was to establish the cheetah population in Masai Mara National Reserve and gather information on issues affecting the species. A photographic survey was conducted for individual identification by use of body spots, tail bands, cheeks, location, sex and any other unique features, to identify individual cheetah. To complement the above methods interviews and discussions were conducted with tour operators, pastoralists and Masai Mara National Reserve management.

Habitat/Wildlife

Wildlife in the area is in large numbers, due to favorable habitat for wildlife and habitat conservation. The Masai Mara Reserve is predominantly grass plains and medium bush cover. The large biodiversity of the Masai Mara National Reserve has created one of the most popular regions for tourism in Kenya. Some of the common animal species are impala, Grant's gazelle, Thompson's gazelle, hartebeest, warthog, wildebeest, topi, elephant, hippo, giraffe, cheetah, lion, hyena, and leopard. While other game are seen less frequently, their presence in the Masai Mara National Reserve is significant.

Water

Water in the study area, includes permanent and seasonal rivers, bore holes and streams. The Mara, Sand and Talek Rivers are the main source of water within the reserve and dispersal area. Dams, boreholes and springs provide additional water for lodges and a few commercial and group ranch properties.

Land Use

In the Masai Mara region crop farming is a fairly new development, increasing in popularity in the 1980's. A few individuals, although not common, grow vegetables. Wheat farming is practiced in the region southwest of Narok.. Elephants raid crops and communities in the process of maintaining their traditional movement patterns in search of food and water.

Livestock Management

Pastoralism is the main occupation in the region with all of the interviewed dispersal area ranches rearing cattle, shoats and dogs (100%). Grazing in the reserve is permitted, but limited. Herders generally remain with the livestock by day, but are often young children. Livestock are returned to homesteads and kept in boma's at night and a few of the more permanent homesteads keep donkeys and/or chickens.

General Predator Issues

The Masai Mara Reserve is known for lion, hyena, leopard, cheetah and jackal populations. Conflicts with the pastoralists are a source of animosity between conservationists and pastoralists. The residents of this region are known for having lived with the presence of predators for centuries, but as a more sedentary life is accepted the issue has negatively affected the attitudes of the people towards the predators. Political issues of revenue sharing decrease the people's tolerance for predators making them a source of leverage in getting attention. Killing of predators, particularly lions, have been a traditional custom in the path to becoming an elder in the Maasai community.

Cheetah Specifics

Cheetah in the Masai Mara experience significant conflict with other predators, which steal kills, kill cubs, and kill or injure adults. Cheetah conflicts also occur with pastoralists in the area. During the survey period, four cases were recorded, where Morans (Maasai warriors) killed adult cheetah. Pastoralists perceive cheetah as a threat to their livestock or confuse them with leopards and will eliminate a cheetah on sight. Inside the Masai Mara there is an issue with harassment from tourists. Vehicles drive off road, surround families of cheetah and disrupt hunting activities. In several recorded cases adult cheetahs suffer from sycoptic mange, a skin disease, which causes the infected animal discomfort and weakens their immune system.

Until May 2002, a total of 38 individuals were positively identified and named in the Masai Mara ecosystem. This represents about 90.5% of the reported population and out of this, 22 are found inside the reserve and only six within Mara triangle (Figure 2)

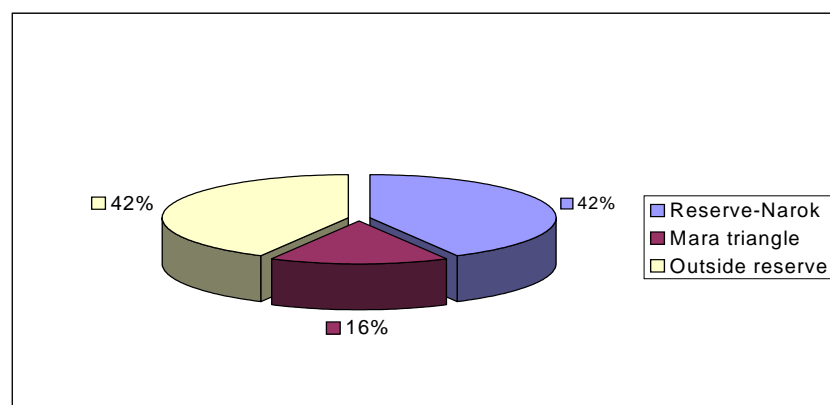


Figure 2: Cheetah Population Distribution in the Masai Mara

When compared with estimates from past authors, the above figures confirm the stakeholders allegation of the downward population trend within the Masai Mara. In 1966, Graham estimated 12 individuals in Mara triangle as compared to six estimated by May 2002, representing a 50% decline. In 1980, Burney estimated 61 individuals within the entire reserve as compared to 32 estimated by Gross and 22 in the current survey. This represents 47.5% and 31.3% decline in the two periods respectively. In 2000, Jonathan and Angela

Scott reported 60 individuals inside the reserve and the surrounding group ranches as compared to 38, the present figure a decline of 46.7%, with fluctuations both inside and outside the reserve (Figure 3).

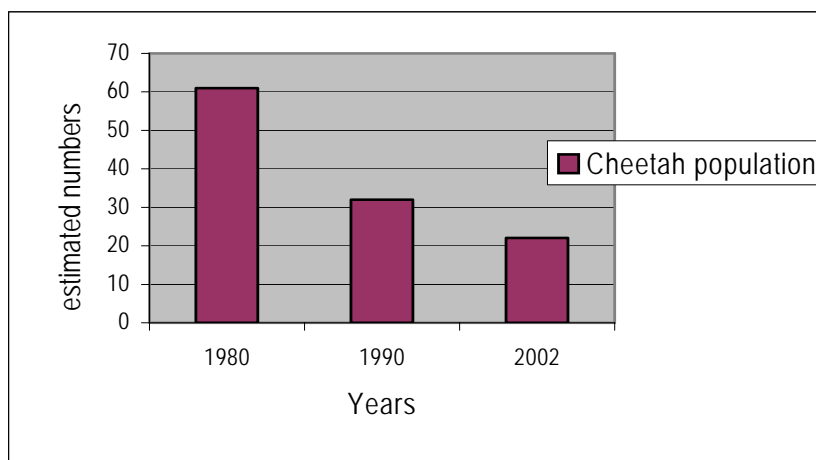


Figure 3: Cheetah Population Trend in Masai Mara

3.2.3 THE STATUS OF CHEETAH: NAIROBI NATIONAL PARK AND ADJOINING ATHI-KAPITI ECOSYSTEM (KWS)

This 2002 survey had the objective to generate data and information to support decisions on management and conservation of cheetah in the entire Athi-Kapiti ecosystem. Interviews were conducted with farmers in the Kajiado district from Nairobi through Kapiti and extending south in the direction of the Tanzania border.

Habitat/Wildlife

The Nairobi National Park (NNP) is dominantly covered by open grassland and scattered with acacia trees and semi deciduous forest covers the bank of the Mbagathi River. The adjoining Athi-Kapiti area is covered mainly by open grasslands. The area supports a wide variety of wildlife including zebra, Thompson's gazelle, hartebeest and waterbuck. Migration of wildebeest in and out of the Nairobi National Park has occurred throughout history. Reducing numbers of zebra and wildebeest moving into the Park has been of great concern to Park management. Lion, hyena, leopard and cheetah have been resident in and out of the Park due to the historically large numbers of game and the permanent water sources.

Water

In NNP the river is the only permanent water source. There are 13 dams that can dry up in the dry season. There are several wetland areas and four seasonal rivers that drain the into park. In the Athi-Kapiti area there are several small seasonal rivers that feed into the Athi River.

Land Use

The land is used both by traditional pastoralist and modern farmers. The crops grown are maize, beans and vegetables. These crops are mainly for personal consumption with a few commercial agriculture ventures. There is increasing industrialization of the areas closer to Nairobi.

Livestock Management

The majority of livestock includes cattle, sheep and goats. Livestock are generally grazed by day and returned to homesteads in the nights. Many of the respondents indicate the use of dogs to help control predation. These dogs help by alerting the herders to a predators presence in time so they can chase them away before they are attacked.

General Predator Issues

A vast majority of the respondents indicated that the predators were a problem to them and their livelihoods. Issues involving lions have been the predominant source of conflict. Hyena are also indicated as a major source of conflict.

Cheetah Specifics

Many of the respondents replied that cheetah were not useful to them because they prey on livestock, kill humans and cause economic loss. In Nairobi National Park it has been observed that about half (43%) of the cubs die in the first months of their lives, however the cause of death is unknown (Eaton,1969). Many of the deaths are likely by predation from lion, leopard or hyena, or perhaps poaching.

Past surveys indicate that the population of cheetah in the entire Athi-Kapiti plains has been fluctuating over time. In 1951 population of cheetah in NNP was six (Kenya National Parks, 1951). Between December 1968 and March 1969, there was an average of nine cheetah in the Park (Kenya National Parks, 1969). In 1972 there was significant fluctuation in the park through the course of the year with a low of 3 cheetah in April and a peak of 15 cheetah reported in May. In the year 2002 KWS estimated 13 were free ranging cheetahs in the Nairobi/Kapiti ecosystem, with only 4 being residents in the Park.

Heavy fencing limits the free movement of cheetah within the ecosystem. The park is a good breeding ground for the cheetah (Cavanaugh, personal communication, 2001), but the lack of free movement outside the protected area limits the dispersal of the cheetahs once they attain adulthood.

2.2.4 CHEETAH CONSERVATION AND HUMAN IMPACT: 2002-3 INTERVIEWS IN THE MACHAKOS WILDLIFE FORUM (CCFK)

Interview data was collected from 15 individuals in the southern section of the Machakos Wildlife Forum, of which 8 were farm owners, 5 were ranch managers and 2 were community members.

Habitat/Wildlife

The area consists of open grassland, medium vegetation and thick bush. The region varies from grass plains to densely vegetated hills. There is a variety of game species that farmers reported seeing daily, including Thompson's gazelle, impala, Grants gazelle, buffalo, hartebeest, wildebeest and warthog.

Water

The area has few sources of water and is prone to drought. The farmers interviewed felt that both game species and livestock are negatively affected by drought but felt that predators were not negatively affected by drought.

Land Use

The land is used by ranchers and Kamba people who traditionally adopted a sedentary way of life. Crops are for both personal and commercial use. The majority (60%, n=9) of the farmers reported being a part of subdivided properties while the remaining fell equally (n=2) into each of the following categories: sanctuary, mixed livestock/wildlife farms and managers of group ranches. In many cases the livestock is taken to the field for grazing during the day and are kept in bomas or in corners of the field at night. Farmers use fences, guard animals, and herders as methods to protect and manage their livestock. Three different types of fencing were identified: livestock fence, game (non-electric and electric) fence, and live fence (includes living plant, stone, brick etc).

Livestock Management

Commercial livestock ranching is predominantly cattle while the residents of subdivisions have larger numbers of small stock. Cattle made up the majority of the livestock reported in the interviewed area.

General Predator Issues

Leopard and hyena have historically been a threat to livestock ranching in the area. Lions occasionally enter the area, but the cases have been infrequent in recent history due to their elimination in the early commercial sisal and cattle ranching development.

Cheetah Specifics

There were 42 cheetahs reported in 18 different sightings by five farmers in 2002-3, of which some of the farmers identified the sex of the cheetahs seen (Table 2). This number is only an indication of density and not a true density, as it is based on the maximum of 42 cheetahs. It is likely that the sightings over the year would have repeatedly seen the same cheetahs. A realistic estimate based on repeated sightings in the same region and time period would be 15 cheetahs.

Table 2. The Number of Cheetahs Sighted in 2002-3.

Sex/group	Number of sightings
Adult male	8
Adult female	0
# Litters (# cheetahs - dam and cubs)	16
Sex not identified	14
Adult group	18
Total Number of cheetahs	42

Cheetahs were identified as being responsible for the most losses with 46.6% of the ranches having lost livestock to cheetahs in the last ten years. When asked if cheetah are seen in the same areas/habitats as in the past, 40% (n=6) of the farmers felt that cheetah are still using the same areas while 27% (n=4) felt that cheetah were not in the same areas as they were in the past.

3.2.5 CHEETAH POPULATION SURVEY IN BARINGO BOGORIA ECOSYSTEM (KWS 2002)

An internal KWS report (2002) estimated 5 cheetahs in the Baringo-Bogoria region although had not discussed other factors affecting the cheetah from that area. This survey covered Lake Bogoria National Reserve and its surrounding areas extending to the shores of Lake Baringo and Koibatek Districts. The method applied was interviews and field observations. Respondents included wildlife administration staff, personnel of protected areas, farmers,

researchers, conservationists, traditional pastoralists, tour operators, hotel managers and guides.

Water

The area has been experiencing water shortage problems which are likely caused by an increase in human population settling near water sources and irrigation activities.

Land Use

The area is majorly under traditional pastoralism. Other minor activities include conservation, pastoralism and irrigation along river valleys and water sources.

Over the years human population has increased accompanied by an increase in livestock numbers especially goats.

Cheetah Specifics.

In the area the issue of livestock predation especially goats by cheetah was reported. In retaliation pastoralists speared the animal.

An estimate of 5 cheetahs was reported. The animals roam widely some going to as far as Laikipia ranches. The population in this area was reported as stable.

4.0 DISCUSSIONS

4.1 KWS INCIDENT REPORTS

The KWS data search aimed to establish areas of cheetah presence/absence supporting the field surveys. The first search by EAWLS staff was from the KWS Head Quarters (HQ) in Nairobi. The HQ record searches pulled information from all of Kenya, however for the purposes of this report only the incidents from within the Priority 1 region will be discussed.

Since not all incident records are sent to HQ, it was necessary to access records from field locations. KWS outpost rangers were asked to search records from 1994-2004. Data sheets (Appendix 1) were provided to outpost rangers for recording all predator incidents as well as cheetah specific information. Changing needs for KWS in dealing with wildlife issues often require mobile outposts, thus it was beneficial to ask KWS to be a part of the data collection rather than to attempt to search the records ourselves.

4.1.1 GENERAL INCIDENT EVALUATION

All of the information from both HQ and outpost records were compiled and compared. Data was collected from a total of 36 KWS outposts from seven localities within the Priority 1 region. A total of 2,790 conflict cases were recorded from the study site, covering cheetah, lion, hyena and leopard. The Tsavo West ecosystem reported the largest number of incidents (36.5%, n=1018) (Figure 4).

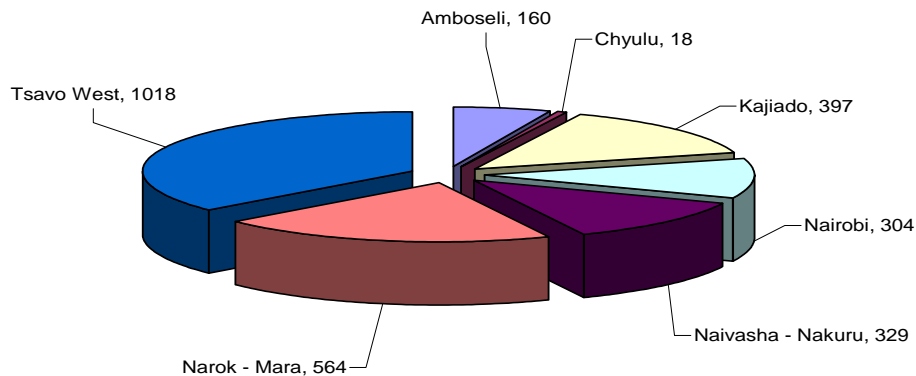


Figure 4: Predator Incidents Recorded from 1994-2004.

The number of conflict cases an animal is involved is often proportional to the population of that species. However other factors can influence the number of conflicts. In comparing the frequency of incidents recorded, 41.5% (n=1157) were accounts of issues dealing specifically with lions. Leopard were a source of conflict in 30.3% (844) and hyena were recorded in 20.7% (n=579) of the reports. Cheetah incidents accounted for about 6% (n=169) of the reported incidents (Figure 5).

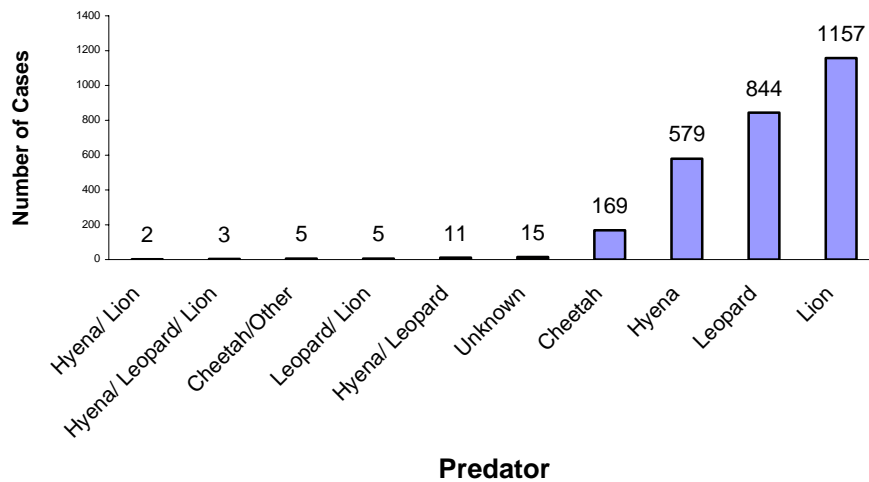


Figure 5: Number of Predator Cases Throughout Priority 1 Area 1994-2004

The conflicts reported were mainly livestock related. In 81% (n=2260) of the reports, livestock were killed (Figure 6). Human injury was reported in 86 cases (3.1%). Reports of threat to life or livelihood (human/livestock threat and property damage) were reported in 233 cases (8.4%). Wildlife poaching accounted for a very small percentage of the recorded incidents over the ten-year period (0.7%, n=22).

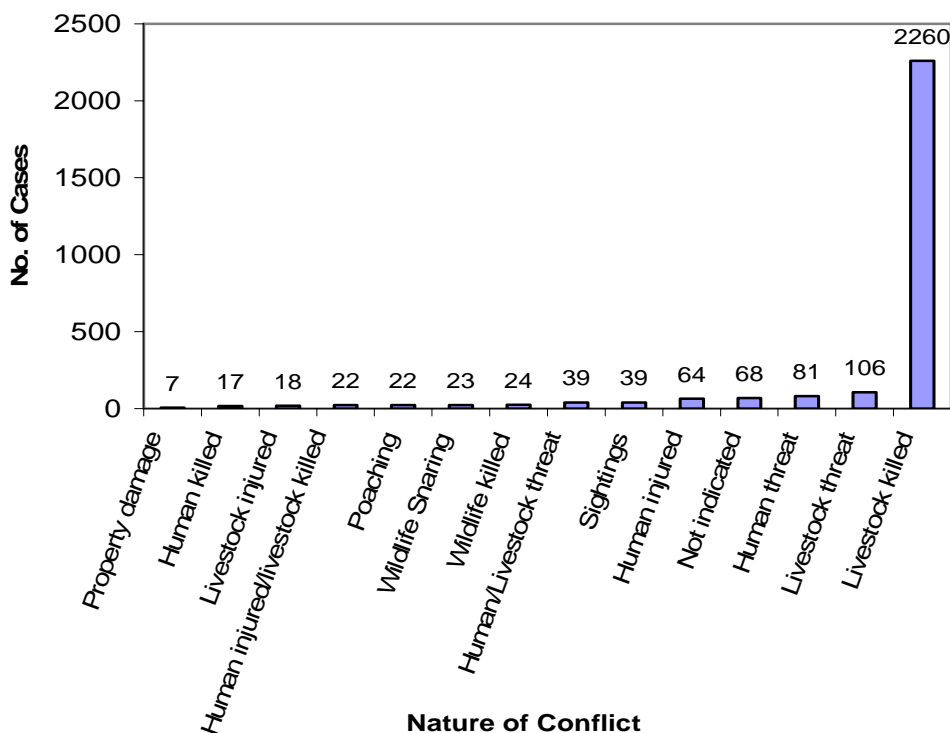


Figure 6: Numbers and Distribution of Predator Conflict Nature 1994-2004.

KWS responds to reports to the best of their ability with limited personnel and resources (i.e. transport, fuel). In some cases the reported incident was confirmed and in others the word of the person/people filing the report was recorded. Less than 17% (n=469) of the reports could not be attended by KWS personnel (Figure7). In many cases additional action beyond confirmation of the report was taken.

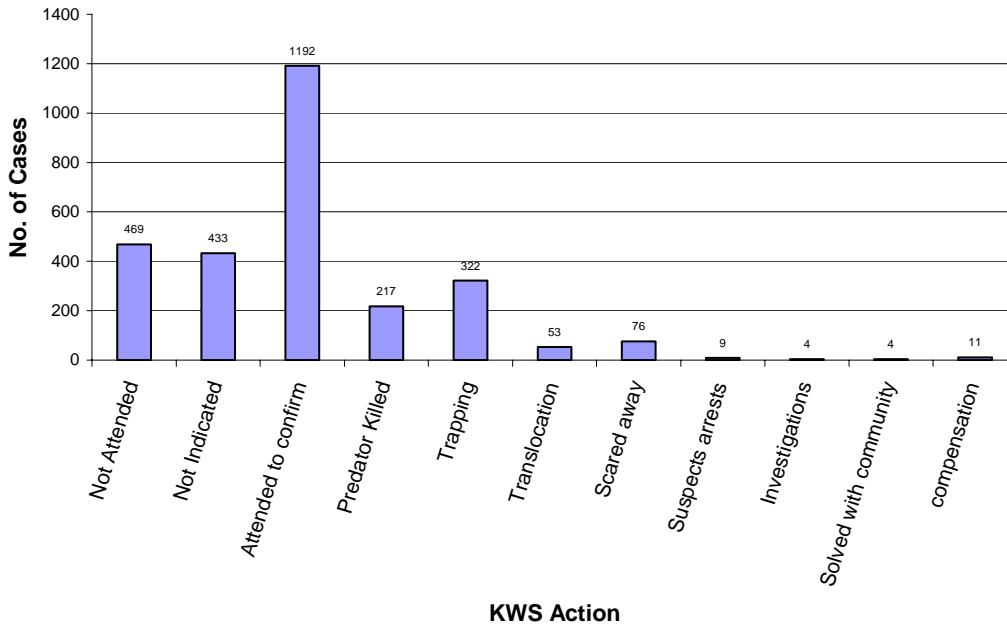


Figure 7: KWS Reactions to Predator Incident Reports in Priority 1 Region – 1994 to 2004

4.1.2 CHEETAH INCIDENT EVALUATION

Cheetah incidents were separated from the general predator information. In the conflict data collected, the areas were divided into seven ecosystems based on the KWS headquarter/main stations. Each part of the study area, had a different number of cheetah conflict cases. Cheetah incident reports over the seven ecosystems totaled 174 (169 positively identified as cheetah and 5 as cheetah/other). The largest number of cheetah conflict reports came from the Kajiado ecosystem (45.9%, n= 80), followed in frequency by Tsavo West (25.8%, n=45) (Figure 8)

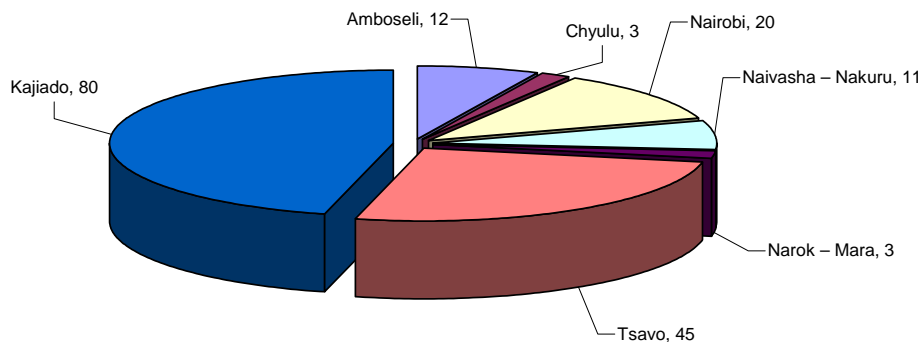


Figure 8: Cheetah Cases Per Ecosystem; 1994-2004.

Using the KWS incident records, it is possible to show presence of cheetahs in the area. (Figure 9). The map highlights the areas from which cheetah reports were found within the Priority 1 area. The assumption here is that the area with more conflict cases has the largest number of cheetahs, however investigation of other influencing factors should be considered.

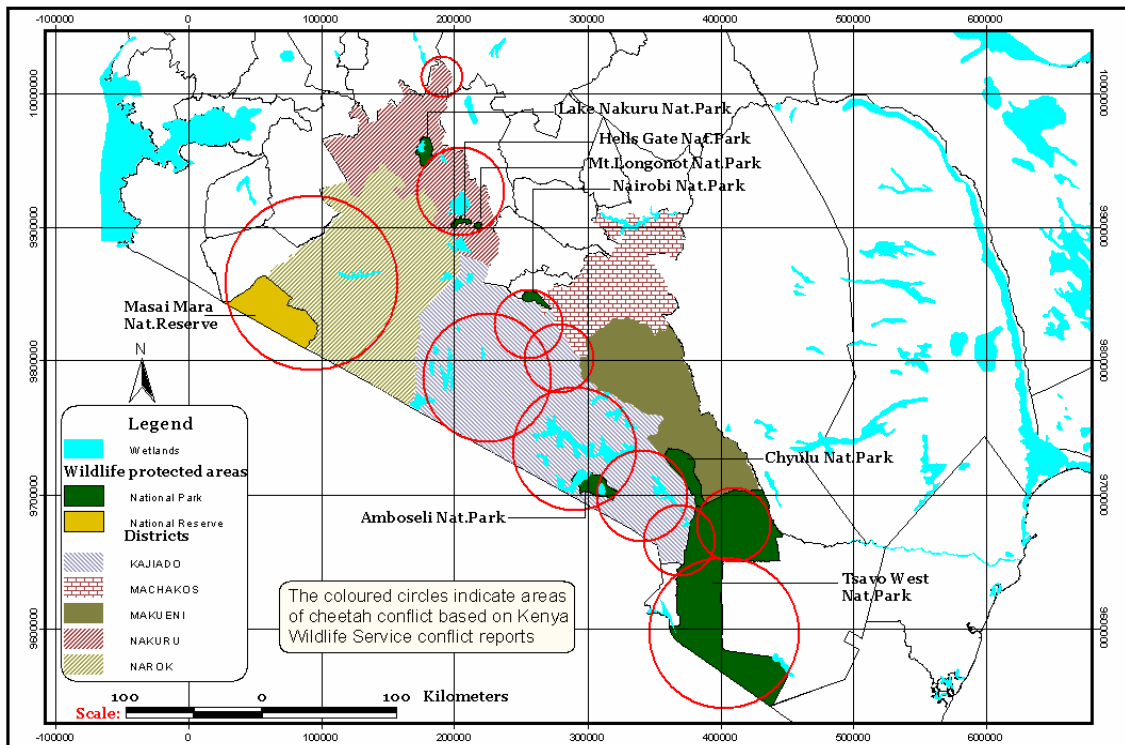


Figure 9: Areas of Cheetah Presence Based on 1994-2004 KWS Incident Reports.

The areas surrounding the Masai Mara where circles do not overlap are steep mountains and escarpments. While it is possible that cheetahs venture into such a transitional area, in determining areas for fieldwork on the ground these areas were not easily accessible by vehicle and dangerous on foot if someone is not familiar with the area or local languages and customs. The majority (85%, n=148) of the 174 cheetah incidents were reports of livestock killed. There were three cases of livestock threats, one case recorded as threat with no specification, three as poaching, and six cases recorded as threats to human. Two of the reported incidents were of cheetah sightings recorded by the ranger on duty. (Figure 10)

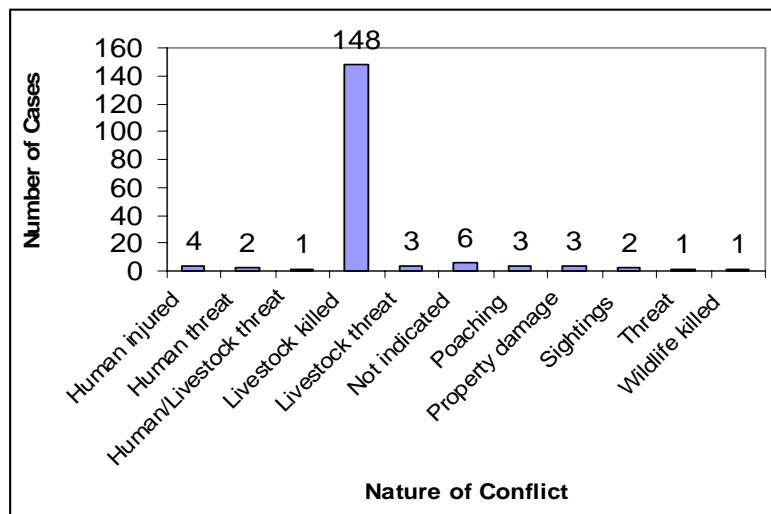


Figure 10: Nature of Human –Cheetah Conflict from KWS 1994-2004 Incident Reports

Cheetah conflict cases recorded in this study vary from one year to another but they seem to follow an upward trend over a period of ten years. In following the assumption that the larger number of incidents directly corresponds to the number of cheetah present this would imply that overall cheetah numbers are increasing (Figure 11)

Year	No. Of cheetah conflict cases
1994	6
1995	5
1996	8
1997	10
1998	9
1999	9
2000	48
2001	16
2002	10
2003	32
2004	21
Total	174

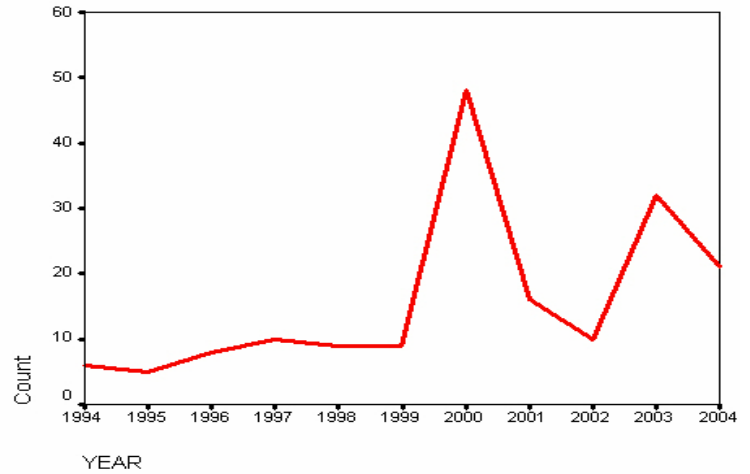


Figure 11: Overall Trend of Cheetah Conflict Reports Between 1994-2004

Dividing each area and looking at the 10 year trend in reported cheetah incidents it is possible to see which regions show an increase in the number of incidents (Figure 12).The Tsavo and Kajiado ecosystems show the largest increase in cheetah instances.

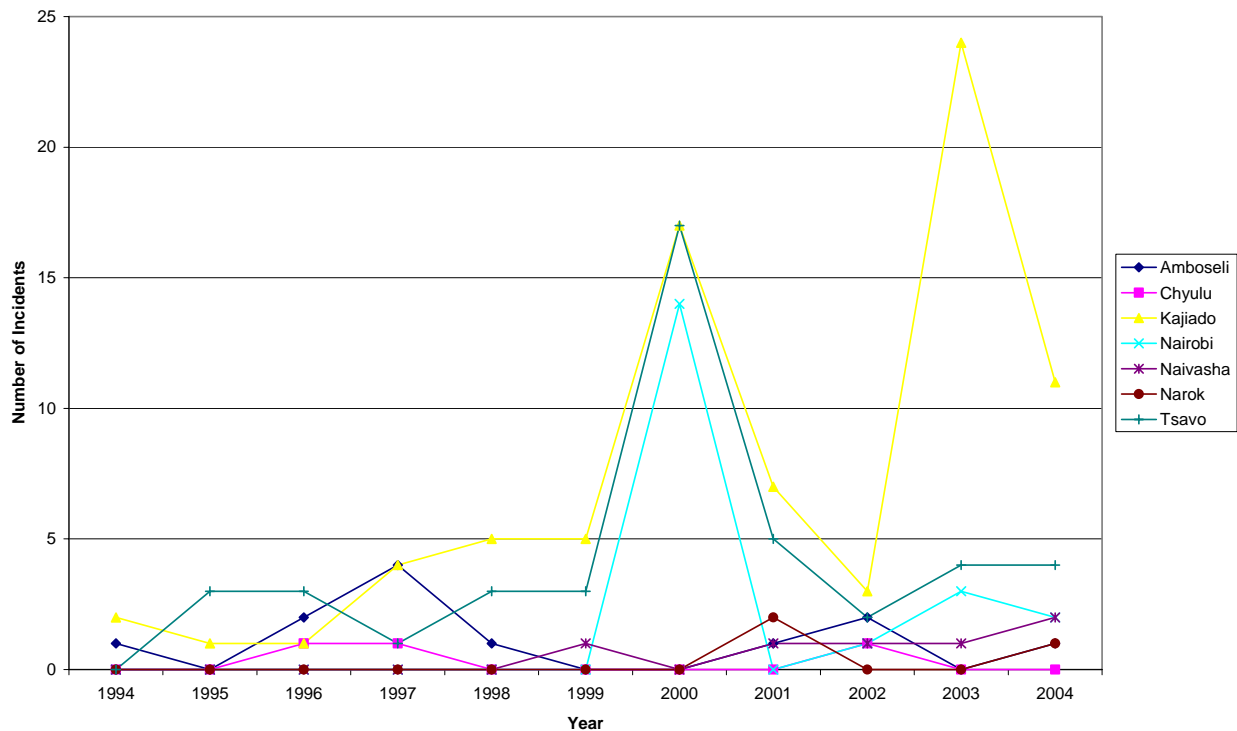


Figure 12: Yearly Cheetah Incidents in Seven Regions from 1994-2004

4.1.3 KWS INCIDENT SUMMARY

The goal of the incident evaluation was in looking at the trend in predator incidents in comparison to that of cheetah alone. Using the above maps and charts the project team could determine the areas where further evaluation could supplement the KWS records in determining cheetah presence. The regions showing the largest increase in cheetah related incidents were Kajiado, Tsavo and Nairobi ecosystems respectively. This would imply that there is a larger number of cheetahs in the Kajiado and Tsavo ecosystems, however other factors including increasing sedentary lifestyles, increasing livestock numbers and decreasing prey base would also attribute to the increasing cheetah incidents.

Using the incident report information it is not possible to give an estimated cheetah number, only an estimated region of presence (Figure 9).

4.2 FIELD EXERCISE

Cheetah census field work was initiated by CCFKK in July to evaluate dispersal areas from an area of case study in which cheetahs from the Kiu, Konza and Kima area were taking goats between 2002 and 2004. As funding through EAWLS became available the census efforts expanded to encompass the entire Priority 1 area. Field trips were conducted to supplement KWS incident data search and literature searches with the intent of confirming cheetah presence and habitat that can support cheetahs. Using these reports the census team determined the areas where data was missing or needed verification. Field trips were combined with distribution of KWS outpost data forms and other CCFK activities. There were no cheetah sightings recorded during the field trips; however spoor and reports of recent sightings and incidences involving the cheetah were recorded. The evaluation of each area included informal interviews to estimate cheetah presence, levels of tolerance and to determine relative densities. In the data analysis wildlife observed was grouped according to their relevance to cheetahs (Table 3).

Table 3: Division of Wildlife Noted on Field Exercises

Predators/ scavengers	Often cheetah prey	Seldom cheetah prey	Rarely/ not cheetah prey
Cheetah spoor	Dikdik	Francolin	Baboon
Hyena spoor	Duiker	Kongoni	Buffalo
Jackal	Gerenuk	Kudu	Duck
Lion spoor	Grant's gazelle	Monkey	Eland
Mongoose	Guinea fowl	Oryx	Elephant
Wild dog spoor	Hare	Ostrich	Flamingo
	Impala	Spurfowl	Goose
	Klipspringer	Warthog	Giraffe
	Steinbok	Wildebeest	Kori bustard
	Thomsons gazelle	Zebra	Marabou stork
		Bushbuck	Secretary bird
			Waterbuck
			Bird of prey

4.2.1 Methodology

The areas chosen for fieldwork were mapped and divided into 20 square kilometer blocks (Figure 13). In each section the need for field confirmation was determined and routes were chosen based on accessibility, availability for accommodation and safety.

Field data with GPS locations was collected from the road while traveling in the vehicle, averaging a speed of 30kph. (Appendix 2: Data Collection Form). Many of the roads were muram (dirt) or two-track that were seldom driven by other vehicles. Sighting information was entered into an Excel database from which Arc View could generate maps and SPSS and Excel programmes could generate tables and graphs. The Field Notes and GPS data was used to evaluate habitat and wildlife, water, land use, livestock management, predator presence and cheetah presence. In some recordings the scribe failed to record an estimate of the number of animals/people/buildings, thus, for the purpose of analysis if any of the category was recorded as singular, at least one was seen, when recorded in plural it was averaged that ten were seen, when recorded as "many" or "herd" (for animals) at least 50 were seen. For recordings of people and buildings plural was given a quantity of ten, recordings as "many," "village" or "settlement" were valued at 20. As the numbers were only estimates and not exact counts this assumption serves the purpose of evaluating presence and trends for each category. Random photos were

taken for habitat identification with GPS points recorded. The photographs and points are used in Arc View and Access to produce an interactive map and database.

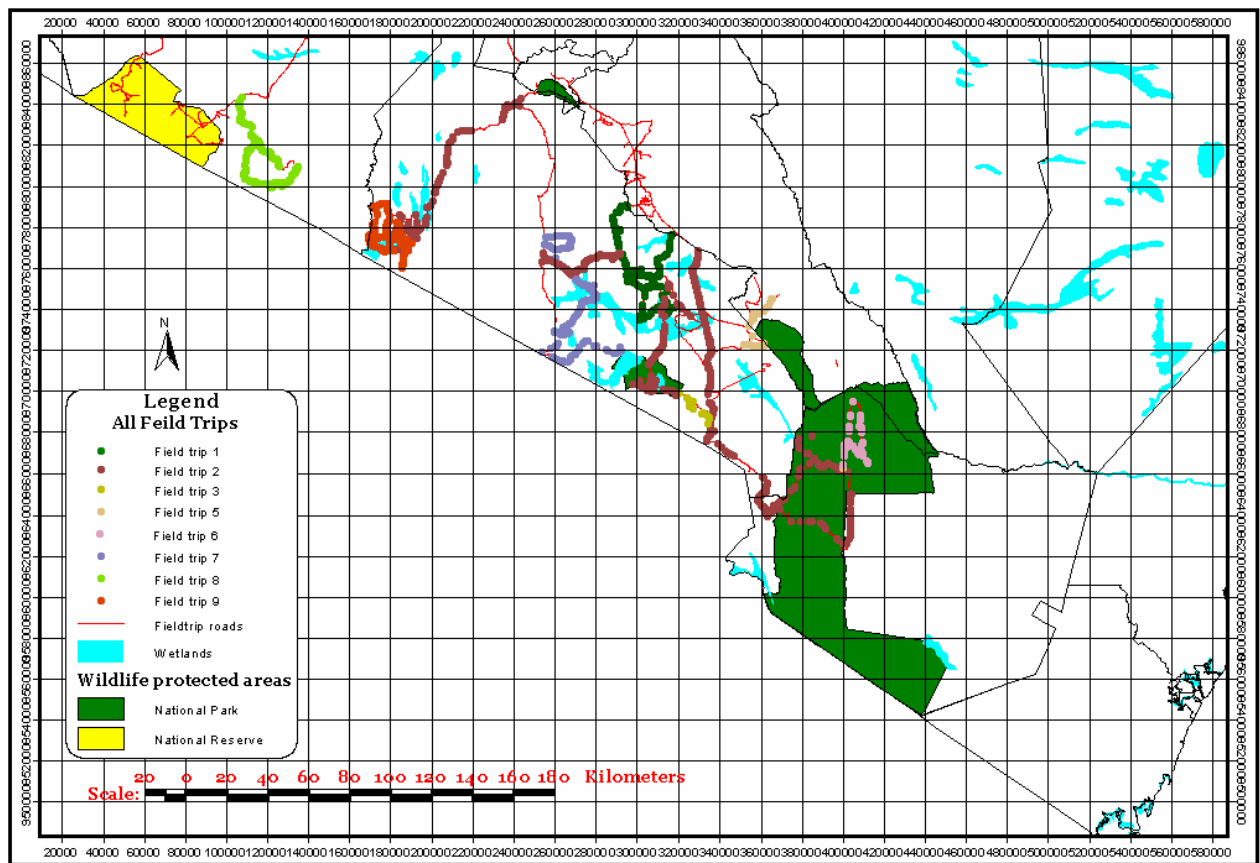


Figure 13: Priority 1 Map with 20 km Grids.

At the end of each field trip all team participants were required to submit a summary report. Notes on informal interviews, personal assessments and observations were compiled into field exercise reports. Each report included background on the area, methodology of the exercise, general notes on habitat, attitudes, management practices, water issues, notes specifically on cheetahs and conclusions on cheetah presence. These notes were then combined into three areas for evaluation in this discussion. This discussion uses the same format as the Literature Review section above.

For purposes of evaluation the study region has been divided by “Areas” covered (Table 4). The field exercises were conducted over an 8-month period of time. The discussions that follow will take each area from west to east in order and discuss the findings of the field surveys.

Table 4: Individual Drives and Areas Covered July 2004 - March 2005

Trip Number	Date	Area covered	District the area falls in	Team participants
1	1-4 July 2004	Area II: Kiu - Selengai - Sultan Hamud	Kajiado	Mary Wykstra-Ross ¹ , Cosmas Wambua ¹ , Lumumba Mutiso ¹
2	21 July- 3 August 2004	Area I, II and III: Emali - Loitoktok - Ilbisil - Magadi – Masai Mara	Kajiado, Transmara and Narok	Mary Wykstra-Ross ¹ , Cosmas Wambua ¹ , Lumumba Mutiso ¹
3	31 October - 4 November 2004	Area II and III: Mbirikani - Chyulu – Amboseli	Kajiado	Mary Wykstra-Ross ¹ , Cosmas Wambua ¹ , Milkah Kahiu ³ , Wallace Isoboke ³
4	22 - 24 November 2004	Area I: Naivasha - Masai Mara	Nakuru, Transmara and Narok	Mary Wykstra ¹ , Cosmas Wambua ¹ , Milkah Kahiu ³
5	11 - 13 November 2004	Area III: Chyulu Hills - Tsavo West	Kajiado and Taita Taveta	Mary Wykstra-Ross ¹ , Cosmas Wambua ¹
6	7 - 10 December 2004	Area II: Kajiado--Namanga	Kajiado	Cosmas Wambua ¹ , Wallace Isoboke ³
7	21-22 February 2005	Area I: Mara Loita	Narok	Cosmas Wambua ¹ , Melanie Dopfer ² , Milkah Kahiu ³
8	6-10 March 2005	Area I: Magadi - Shompole	Kajiado	Mary Wykstra ¹ , Melanie Dopfer ² , Crystal Morris ² , Liz Larsen ² , Wallace Isoboke ³

¹ Cheetah Conservation Fund Kenya, ² Cheetah Conservation Fund Kenya Volunteer, ³East African Wildlife Society

4.2.2 FIELD EXERCISE AREA I: MAGADI AND MARA LOITA

This area was covered in Field trips 2, 4, 7 and 8 (Figure 13). These drives covered 1578 km of roads in an area of 5227 km² (1,301,250 acres). Field trip #2 collected data from Magadi with a main focus on the Shompole Community Conservation area. This trip ended with a drive through the Masai Mara National Reserve and the surrounding areas, which were covered by the KWS in the Reserve study. Thus no data was recorded from the last day of that drive. Field Trip #7 was solely for visiting the Mara Loita area and Field Trip #8 visited the Shompole Conservancy and other group ranches. Safety issues and internal politics limited the extent of the visits, but majority of the areas were covered. Clan issues and mistrust require following political and cultural protocol. In Magadi guides and interpreters helped with driving, data collection and with interviews, hence the area was more thoroughly evaluated than most other regions where communication was difficult due to language barrier.

Field Trip #4 extended from Naivasha to the Masai Mara, but this trip was used primarily for KWS data form distribution. Field notes were submitted after the drive, but no GPS field survey data

was recorded on this field trip. The Masai Mara is known for hosting a relatively high concentration of both game and predators, including cheetahs. The Loita Hills area was not addressed in previous CCFK or by KWS Masai Mara Cheetah Research collection thus far. The area targeted was from Mswani settlements through Naikarra, Morijo Loita and Ilkerin Loita area. Previous personal contacts suggested the presence of cheetah along the foot hills, thus the field trip could confirm and estimate density for this area. Safety and road access were an issue in this region, thus the area covered was not great. There were reports of cheetah into the hills where the human population decreases as the land rises to the rugged escarpments however no numbers could be assigned.

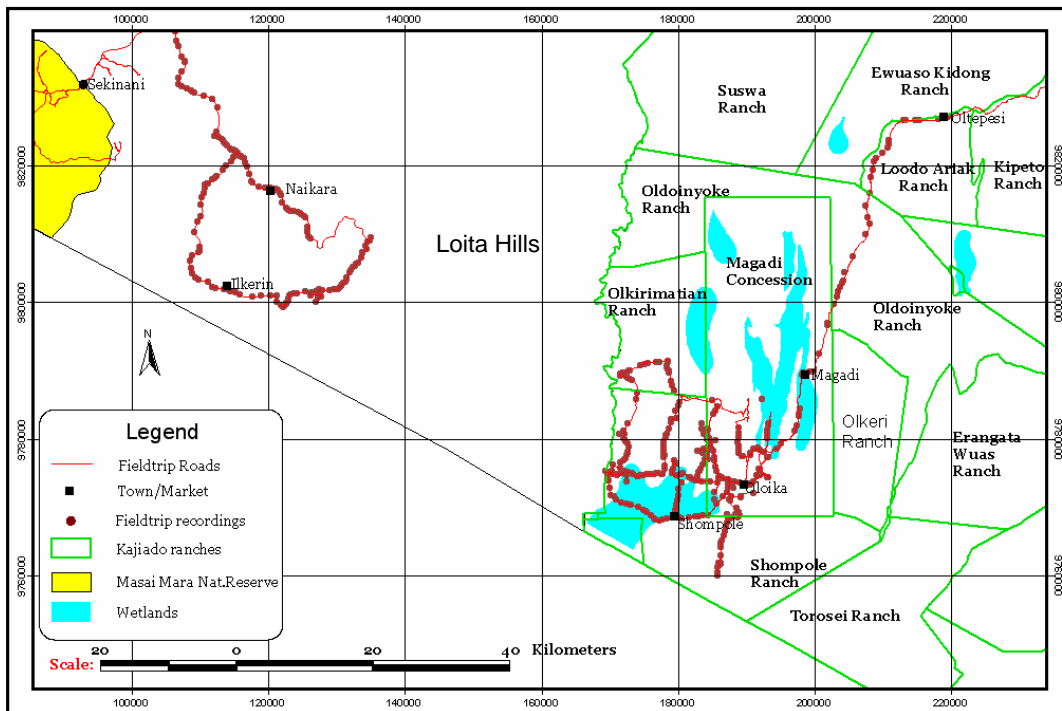


Figure 14: Field Exercise Area I with Points and Tracks

Total data for the area was 548 GPS points with 708 recorded observations (people, buildings, water points, game, livestock, predator spoor, and cheetah spoor) supplemented by 65 photographs. Human activity (people, buildings, dips) were recorded at 46% (n=325 whereby n=147 were people, and n=131 were buildings n=47 were water points.) Livestock were recorded in 23 % (n=166) of the observations while game accounted for 29% (n=207) of the observations. Only 1% (n=7) of the recorded observations were predator and 0.4% (n=3) cheetah related (Figure15).

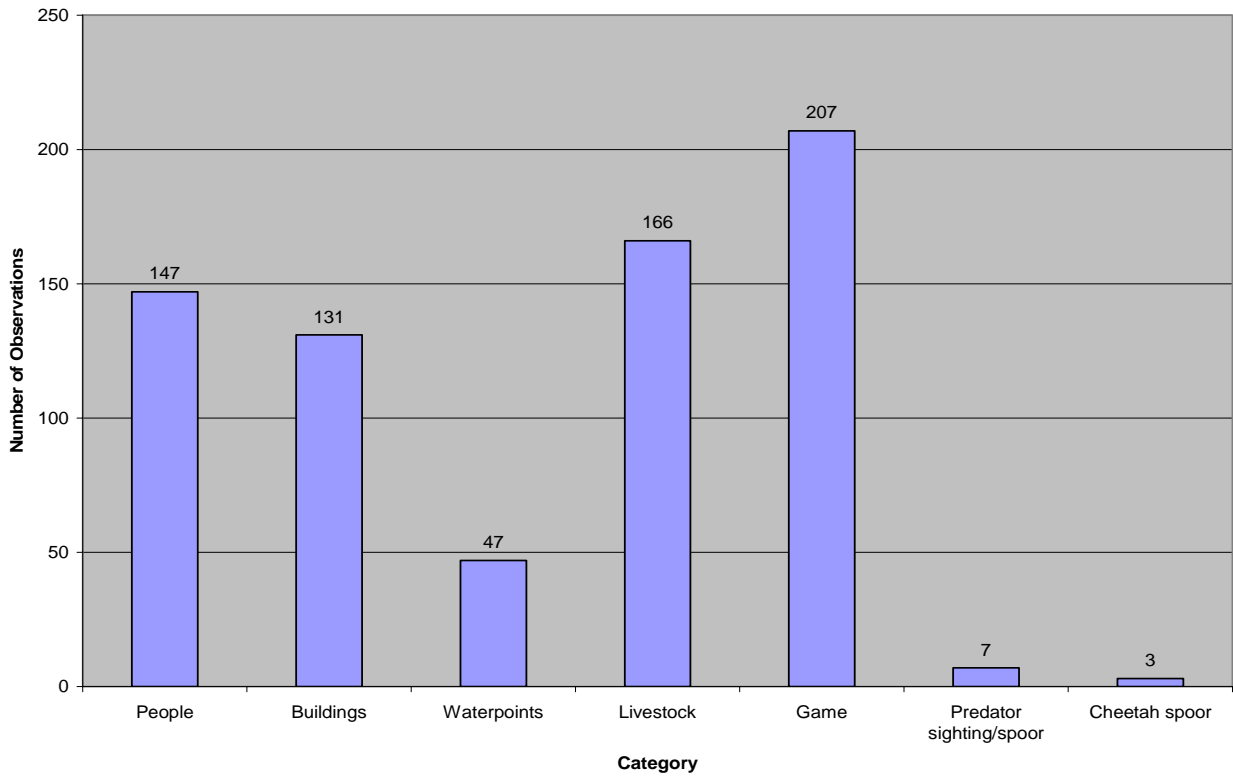


Figure 15: Data Collection GPS Points for Area I.

The sum of the information recorded shows a different picture than the number of points. The total individual subjects counted were 21093. (Figure 16) Livestock accounted for the largest percent (80%, n=16946). Game numbers were estimated as 2927 individuals (14%) of the total count. Human related numbers were 1199 (6%) of the recordings with people tallying 645, buildings 498, and water points 56. Cheetah and other predator sighting and spoor accounted for less than 0.1% (n=21).

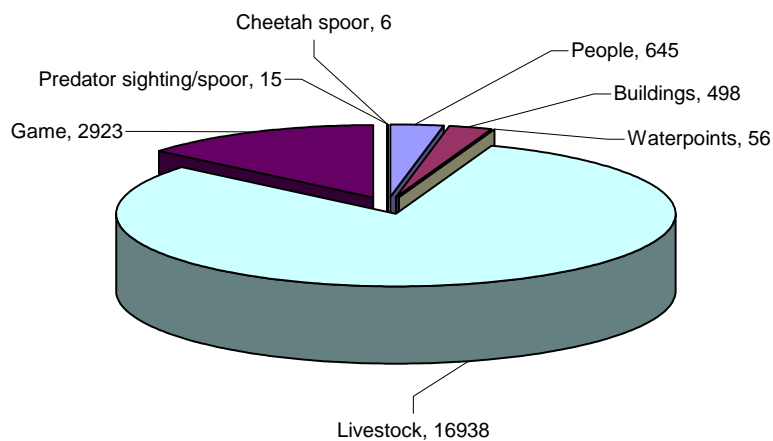


Figure 16: Individual Observations in Area I.

Habitat and Wildlife:

This region is a part of the Central Rift Valley. Several Escarpments surround Magadi and Nguruman and separate it from the Mara-Loita area (Picture P3080033). The Rift Valley is famous for vast valleys with plains and scrub areas known for past and current cheetah sightings.



P3080033 - Magadi Escarpment

The highway from Ilbisil to Kajiado is surrounded by open plains with scattered *Balanitis aegyptica*. The vegetation changes from grasses to woodlands of *Acacia tortilis* and *Acacia drepanolobium* and down to dry hills and rocky kopjes near Olonana and Kisamese. In Olendepesi the soil is chalky from Ensonoria up to the soda crater. From Magadi town to the conservation area is about 84 km along the soda lake and across rocky hills to Ololoika, the first market center in the Shompole Group Ranch.

Areas with the most grasslands and marsh were on the fringes of the Shompole Conservation area. These grasslands provide grass for wildlife reported and seen in Shompole, including: buffalo, wildebeest, lion, leopard, warthog, topi, ostrich, eland, Thompson's gazelle, giraffe, dikdik, Grants gazelle, cheetah, baboon, hippo and zebra.

Due to the steep Nguruman escarpment between Magadi and Loita Hills, the only means of traveling between the Masai Mara from Magadi by road is to return to Nairobi through Oserian and Rongai then travel through Suswa and Mai Mahiu to Narok.



Along the Suswa-Mai Mahiu road the vegetation is predominantly *Acacia drepanolobium* (whistling thorn) and other short acacia scattered across grassy plains. The land is relatively flat, and villages and manyattas are scattered in all directions. Driving from Mai Mahiu towards Narok the hills of the southern Cherangani Range are steep and rugged. From Narok to the Masai Mara Reserve the land flattens out with areas of thick acacia opening to grass plains. The Mara Loita vegetation varies from dense forest to open grass plains (Picture P2220013). Bush lands were full of acacia and croton.

Picture P2220013 - Mara Loita to Nguruman Range

Game is frequently seen along the Mai Mahiu - Narok highway; these include Thompson's gazelle, Grants gazelle, zebra, giraffe, impala and eland. Over the last few years people have reported seeing cheetah when heading to the Masai Mara for safari.

The biodiversity of the Masai Mara National Reserve and surrounding dispersal areas includes: wildebeest, zebras, giraffe, Grants gazelle, Thompson gazelle, eland, ostrich, topi, buffalo, hyena, warthog, elephant, hippo, dikdik, kudu, lion, cheetah, jackal and a variety of small mammals, birds and reptiles. Wildlife is a valuable commodity in the eyes of the Maasai people of this area, yet they do feel that they have been cheated by those held responsible for management of the Masai Mara and wildlife. Elephant has been a great problem in the area.

Residents in both the Magadi and Masai Mara areas claim that poachers entering from Tanzania pose a threat to the area's wildlife.

From recorded wildlife observations there were 2944 individual sightings. Cheetah preferred prey accounted for 801 (27%) of the recordings. For the animals categorized as seldom cheetah prey 1592 (54%) were estimated. Predator and cheetah sightings and spoor were insignificant.

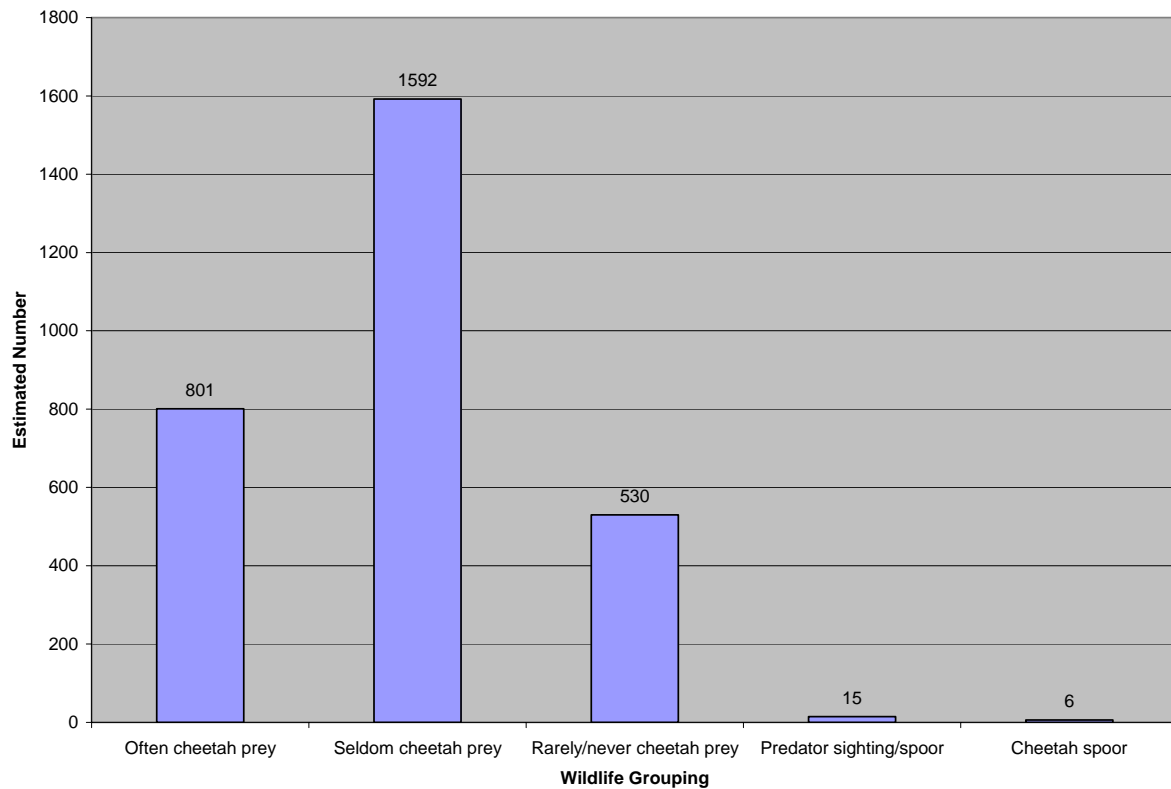


Figure 17: Wildlife Recorded in Area I.

Water:

Highly inhabited areas in both the Magadi and Mara-Loita areas typically had water sources nearby, either natural, borehole or piped. The recorded water points were earth dams, water tanks, rivers and piped water points. This is only a representation of the water availability in the area as other water points are found off the roads traveled for this survey.

Water in the Mara-Loita area is provided through seasonal rivers and boreholes at market areas and some private homes and camps. Livestock and wildlife share water at natural wells and artificial dams.

A unique asset of the Shompole ranch is the Ewaso Ngiro River whose source is in the Mau Forest. The river is permanent with plenty of water year round for both wildlife and livestock. From remote manyattas it can be a long trek to the river, thus most of the permanent human settlement has been developed along the river and its tributaries. Some dams also exist and, according to the residents, water may last for three months after a rainfall and are a source of water to livestock and wildlife as well. Along the shores of Lake Magadi the Shompole hot springs are another site of attraction for visitors to the area. This water has high soda content and is not potable.

Land Use (including People and Buildings):

Maasai in both the Mara-Loita and Magadi areas are still very strong in their cultural roots. Kiswahili and English are spoken only by a small percentage of the residents. Traditional Maasai customs are practiced with a strong focus on the role of livestock, especially cattle, in their community.

Market centers and permanent settlements in the rural areas typically include shops, butchery, school, dispensary, and water provisions. Soil erosion caused by livestock is evident near manyattas and livestock paths run to and from water points and primary grazing areas. Manyattas are moved regularly, and remain dispersed across the open areas.

Inhabitants of the Mara Loita area are traditionally pastoralists, but becoming more sedentary as nearly every manyatta/boma had its own crop plot.



P2200001 - Loita Settlement.

Naikarra, Morijo-Loita and Ilkiren market centres, although small are densely populated. Although this is deep in Maasai land, a lot of farming activities are noticeable with many shambas growing maize and bean crops for subsistence. Information on conflicts in this area collected by Friends of Conservation (FOC) show wildlife conflict cases are increasing due to the changing land use practices and due to the number of people encroaching into forests and wildlife corridors. Increasing settlement along the main roads from Mai Mahiu the areas of human population settlement are evident not only by the visible homes, but also by high amounts of soil erosion. Wheat farms skirt Narok to the north and west.

The Magadi division is made up of four group ranches; Olkeri, Oldo-nyokie, Olkiramatian and Shompole, each owning a portion of Lake Magadi. The Shompole ranch is divided into conservation and the ranch area. The Shompole group ranch is bordered to the northern side by Lake Magadi and the Tanzanian border on the south. In the conservation area the pastoralists shape the environment and projects for the wild animal population. According to local residents, there are few negative impacts on the Maasai land use on the wildlife values.

Other sources of income and activity supplement livestock keeping in the Magadi region. A Luo community staying in the area engages in fishing along Ewaso Ng'iro River for their own subsistence needs. Women in the area participate in basketry and bead work which are sold and worn. Trading activities included shops at certain locations and buying and selling of other commodities on market days. A few local made beehives were observed.

Olkiramatian Ranch, north of Shompole has initiated operations of a community based tourism concession. At the time of the Field Exercises, wildlife sightings were lower and the livestock damage was higher in this region, but with the tourism venture this area is expected to recover and game should become less timid.

Livestock Management:

Livestock keeping is the major economic activity of the Maasai people in these areas. However, in the Maasai community it is not appropriate to request the number of livestock kept. It was common to see herds exceeding 100 and there were reports of some individuals having herds exceeding 1000 cattle and 3000 shoats. Any numbers on the Field Trips required estimating on the part of the research team. Both areas suffer from cattle rustling by people from the Tanzania border.



P7280043 Magadi cattle

The Mara Loita livestock herds were large, consisting of shoats, donkeys, and cows. Members of this community construct night bomas to prevent leopard and lion attacks by using long cedar poles to support fences (over 6 meters high). The Ilkerin livestock-upgrading project has multi purpose breed of cow (Sahiwal) and Gala breed of goats, which can be purchased by the local people at subsidized prices. The livestock-upgrading project has been going on for 3 decades.

An increase in settlements along sanctuary boundaries means degradation and erosion has taken its toll on the land leaving the area in the Reserve as a better grazing area. Although the ranch has a large livestock population, soil degradation and erosion was not as serious as in some other regions. Livestock are allowed to graze within the Shompole reserve and Magadi conservation areas only with permission when it is dry.

The Shompole area is infested with Tsetse flies and specific programs conduct target projects addressing the problem. There are two species of Tsetse flies in shompole, *Glossina palidipese* and *Longipenis palidipese* with 200 traps in Shompole alone. Tse-tse flies cause a disease called Nagana (river blindness) in livestock and sleeping sickness in humans.

Of the 16938 estimated livestock, shoats (goats and sheep) made up the majority (79%, n=13366) (Figure 18). Cattle numbers at this time of the year may have been low due to drought conditions, but still accounted for 19% (n=3295). Donkeys and dogs were present and predominantly used for water transport and homestead guarding respectively. Only a few dogs were seen in the grazing field. Camels were seen only on one occasion.

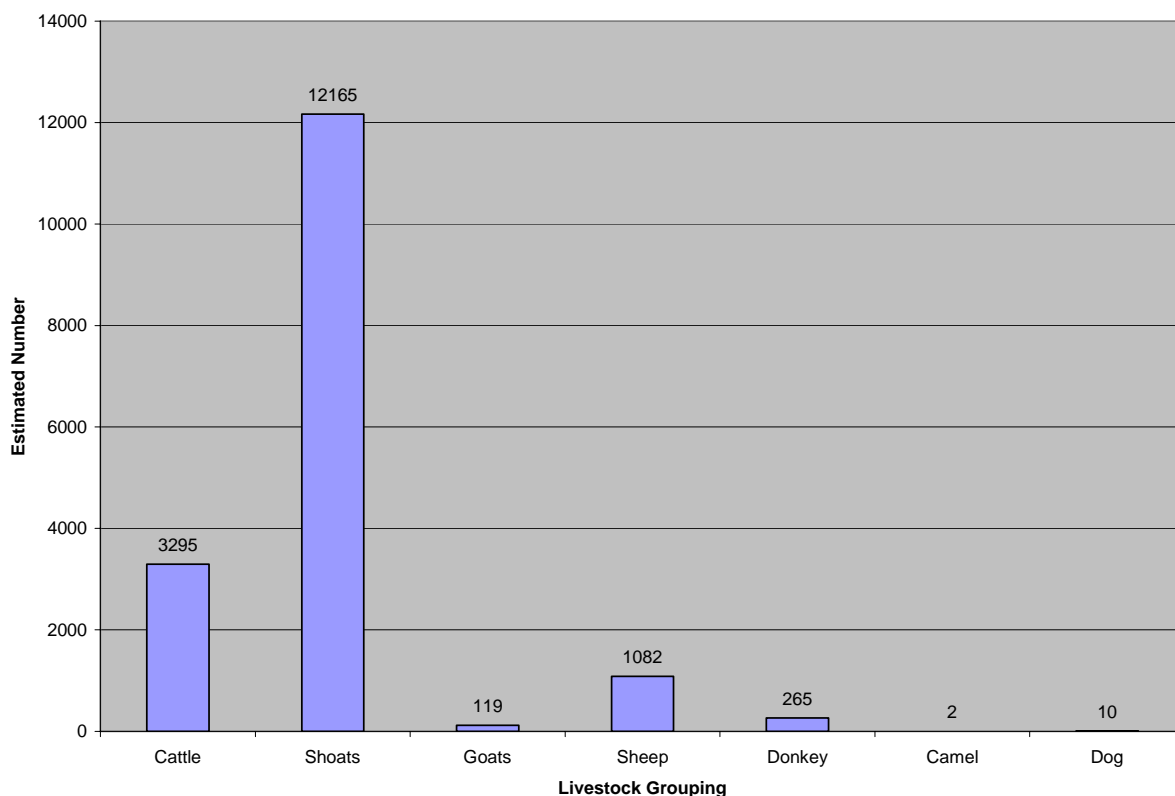


Figure 18: Livestock Observed During the Field Trips.

Predator Issues:

Human-wildlife conflict was reported to be high in the Mara Loita region. Locals reported that shoat losses were to cheetah, leopard, wild dog and hyena, but the worst menace to the area livelihood was from elephants and leopards. Cheetahs were not viewed a serious threat as it is easy to scare them away, although some herders reported that there were many cases of livestock depredation but could not tell which predator was involved. When asked what steps they take after a loss, most interviewed farmers say they track and kill it while some said that a KWS report is filed.

Lion, hyena, leopard, jackal and cheetah are both seen and heard by residents throughout the Shompole division. They also reported livestock attacks by leopard, cheetah, lion and hyena and occasional human attacks by leopard, lion and buffalo.

Olkiramatian Ranch naturalists and camp staff reported leopard and lion as the most frequent cause of livestock loss. Hyena were reported to be plentiful in the, but are seldom a source of conflict.

Cheetah Specifics:

Masai Mara has long been known for its high concentration of wildlife and the cheetah is a species frequently seen by tourists. Tour guides, KWS, Conservancy and area wardens report a



P7260015: Hyena Spoor

decrease in the number of cheetah sightings over the last 10 years. Rangers and guides believed the mortality rate of cheetahs had increased, thus the decline will continue unless measures were taken to better conserve the cheetah.

Ranches east of Narok and Masai Mara, Loita Hills and Suswa regions report cheetah presence. As this area to the west was covered by the 2002 KWS Masai Mara Cheetah Project, the evaluation of cheetah presence was not re-evaluated during the field trips. Outside of the Masai Mara the cheetahs are reportedly shy, thus, although presence may be known it is difficult to estimate numbers. It was found that the majority of cheetah reports claim that cheetah were occasionally seen in Mara Loita area but people do not view cheetahs as a big threat to livestock. The Mara Loita habitat has steep hills and larger game species, thus leading to the conclusion that few cheetahs live there.

The Kajiado District Warden reported cheetah skins confiscated from poachers earlier in the year. While they believed the skins were brought from Tanzania, some could certainly have come from within the Kajiado to Masai Mara regions.

The Magadi region was evaluated based on reports of cheetah sightings and tracks. Herders in Shompole claimed that the cheetahs do not move around much and are seen in the morning and in the late evening. In the area where a recent cheetah sighting was reported in the Magadi Concession area the field team located and collected faeces, which appeared to be from a large group of cheetahs. In the Magadi Concession, not far from the Olkeri Ranch boundary, another set of individual cheetah spoor was observed. Olkiramatian Ranch naturalists and camp staff were very interested in the cheetah, but rarely see them in their area. There were no recent sightings that could be confirmed as cheetah.

To the southern side of the Shompole Ranch towards the Tanzanian border a herder reported six cheetahs seen off and on probably sometimes migrating towards Tanzania. He said they attack his goats on some occasions and he was given a camera to try and take photographs of them.

No interviews were conducted along the Magadi road towards Nairobi, but there were reports from Magadi residents and tourists who saw cheetah crossing the road between Oldoinyoke, Loodo Ariak, and Ewaso Kidong Ranches.

Eleven cheetahs can be estimated in the Mara Loita area based on numbers given by people interviewed (Table 5). Presence was reported by three of the interviewees, but no numbers could be estimated, hence their reports are not included in the number estimate. In the Magadi and Shompole areas there were reports of 20 cheetahs in different social groupings of adults and offspring. There was one repeated report of a group of 2 adults in locations and times that would lead to the assumption that they were the same animals. To the north of Magadi along the Magadi-Nairobi highway the reports of cheetahs crossing the road would lead to a number of at least five cheetahs. This brings an estimate for the Mara Loita to Magadi region to 36.

Table 5: Cheetah sighting reports - Magadi -Mara Loita region

Year cheetah report	Occupation of reporter	Number of Cheetahs	Area specified	Comments
2002	Rhino Charge organizer	3	Mara Loita	Seen on hill while planning fundraising event - adults
2003	Rhino Charge organizer	1	Southeast of Ilbisil	Adult - at a distance
2004	Tour guide	1	Mara Loita	Caught in trap by KWS and moved into park
2004	Friends of Conservation (FOC)Field Officer	Present	Naikarra	Cheetah are seen on occasion, but seldom take livestock
2004	FOC Scout (1)	5	Morijo	On the road - mom with 4 sub-adults
2004	FOC Scout (1)	1	Naikarra	Just off the road
2004	FOC Scout (2)	Present	Naikarra	Occasionally take shoats
2004	Herder (1)	Present	Naikarra	Sees them occasionally, no number given
2004	Shompole Group Ranch Committee	3	Magadi Concession	Near Lake Magadi - from Oloika - mom with 2 sub-adults
2004	Shompole Group Ranch Committee	4	Magadi Concession	Near Ewaso N'gero River - in plains - mom with 3 cubs
2004	Shompole Group Ranch Committee	1	Magadi Concession	Seen in different areas of Concession
2004	Shompole Group Ranch Committee	2	Magadi Concession	Southern section of Concession - 2 adults
2005	Herder (3)	2	Magadi Concession	**Bakasi area (likely same as above)
2004	Herder (4)	6	Magadi Concession	Near Tanzania border - occasional threat to goats
2004	Herder(2)	5	Shompole Conservation area	Near manyattas December 2004
2004	Shompole Guide	1	Shompole Conservation area	Regular sighting in plains near Ewaso Ngero River
2004	Shompole Guide	2	Shompole Conservation area	Regular sighting in plains near Ewaso Ngero River
2004	Shompole Guide	3	Shompole Conservation area	Regular sighting in plains near Ewaso Ngero River
2004	Shompole Group Ranch Committee	2	Oldoinyoke	Crossing highway - adults
2004	Shompole Group Ranch Committee	3	Oldoinyoke	Crossing highway - mom with 2 cubs

4.2.3 AREA II: ILBISIL, NAMANGA, AMBOSELI, KIU, SULTAN HAMUD

This area was covered in Field Trips 1, 2, 3 and 6. These drives covered 1578 km of roads in an area of 6338 km² (1,578,004 acres). Field Trip #1 collected data from Kiu Market to Selengei and returned via Sultan Hamud. Car problems prevented coverage of the entire area intended. Field Trip #2 entered Maasai land via Emali. The researchers traveled through Mbirikani, Kuku, Selengei and Kimana Ranches in an effort to systematically cover each of the blocks. It also visited the Amboseli National Park. Field Trip #3 repeated some of the roads from the previous trips, but did not record data along those sites. This trip was mainly focused on contacting the Amboseli, Chyulu and Tsavo West KWS wardens for distribution of outpost record forms. Field Trip #6 finalized the area's data collection along the blocks between the conservation areas and the Namanga highway. (Figure 19) This entire region is a part of the Kajiado District.

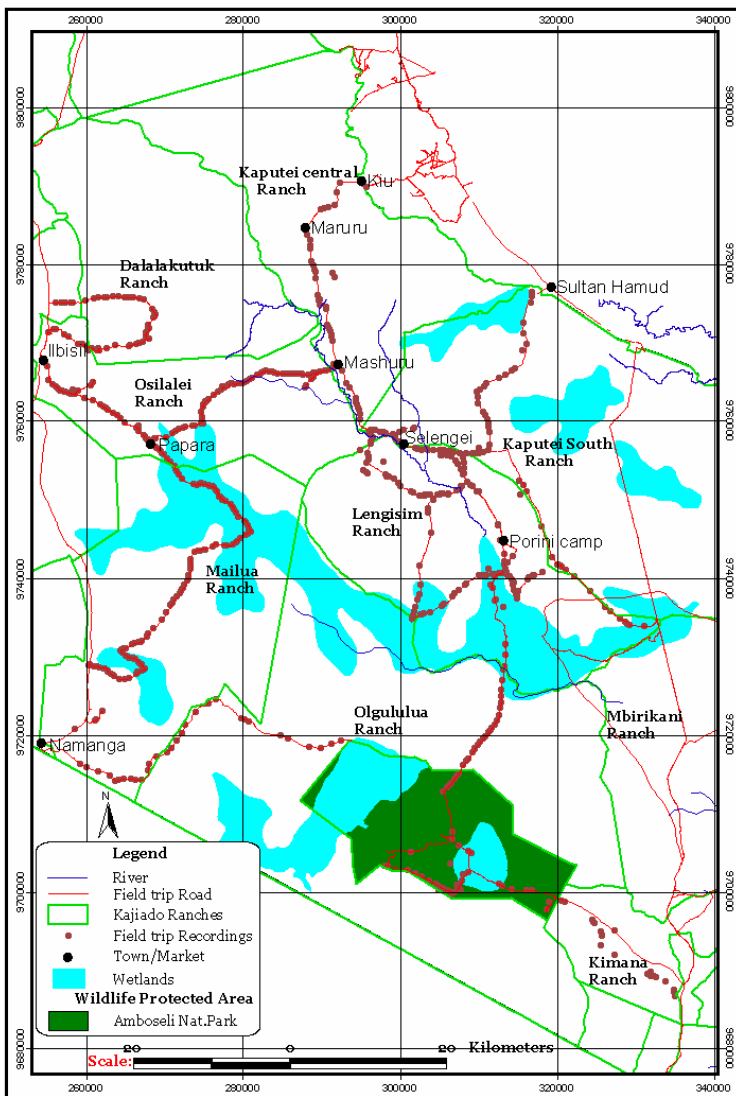


Figure 19: Area covered in Area II

In this area, Maasailand begins southeast of the railway line. The land is divided into schemes, with each clan occupying a scheme. There are 6 formal conservation schemes; Kimana, Lengisim (Selengai), Mbirikani ,Kuku, Kolarashi (Olorhs) and Rombo surrounding Amboseli, running along the southern borders of Chyulu and Tsavo West National Parks. This discussion encompasses all of Amboseli, Kimana, Selengai and Olorhs and a portion of Mbirikani and Kuku Ranches.

Total data for the area was 891 GPS points with 1163 recorded observations (people, buildings, water points, game, livestock, predator spoor and cheetah spoor) supplemented by 136 photographs and vegetation recordings (Figure 20). 42 habitat pictures were taken in this region. Human activity (people, buildings, water points) were recorded at 47% (n=555) whereby n=238 were people, n=242 were human settlement n=75 were water points. Livestock were recorded in 30 % (n=349) of the observations while game accounted for 21% (n=250). Less than 1% (n=8) were predator related and there was only 1 recording of cheetah spoor.

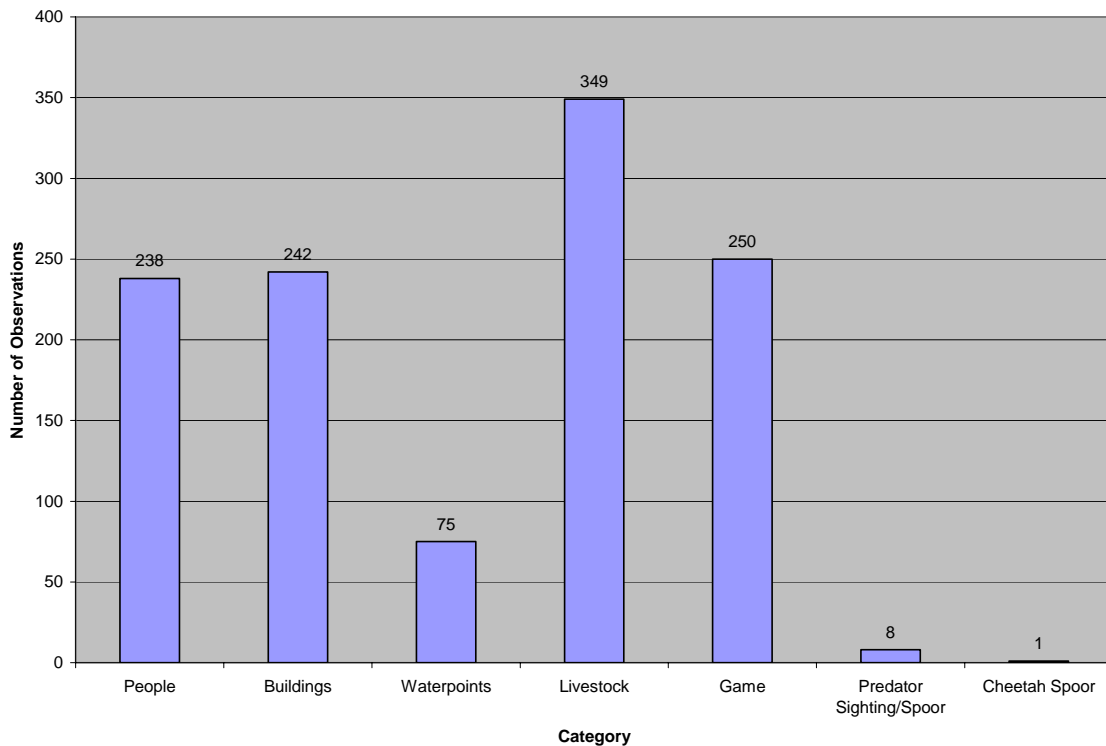


Figure 20: - Data Collection Points for Area II

The sum of the individual subjects counted was 25664 (Figure 21). Livestock accounted for the largest percent (80%, n=20516). Game numbers were estimated at 3137 individuals (12%). Human related numbers were 1989 (8%) of the recordings, with people tallying 896, buildings 1005, and water points 88. Cheetah and other predators sighting/spoor accounted for less than 0.1% (n=22)

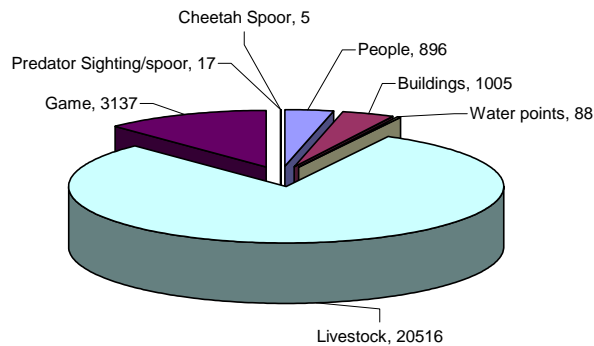


Figure 21: Sum of Individual Recordings in Area II Field Exercises.

Habitat and Wildlife:

A ridge of steep hills along the west cuts Area II from Magadi. It is also steep over the escarpment past Ilbisil to Mashuru with many seasonally dry lugga crossings where roads are washed away by rains. The area between the Nairobi-Namanga Road and the Maasailand group ranches is densely bushed and with very few roads.

The Amboseli National Park is characterized by three quarters swamp, with the remaining being barren hills, short grass plains and some woodland. Although the grass and trees can be quite green, the wind sweeps giant “dust-devils” due to dry ground.



P7030029 - Lengesim

The land from Mashuru to Selengai consist of grasslands and scattered woodlands with varying degrees of undergrowth. Scattered bush and woodland was predominantly *Acacia tortilis*, *Acacia mellifera* and *Balanites aegyptica*. Most of the schemes are overgrazed and erosion is visible in many areas. The further from the railway line, the more game could be seen. Near the railway, local Maasai blame the lack of game on Akamba poachers. All wildlife numbers are reportedly declining, with game being poached and predators being killed as vermin. It was reported that poison is used to kill lion and hyena, also causing a trickle down of deaths in vultures, jackals and other scavengers.

Maasai blame wild game for overgrazing and erosion problems in some areas. Wildlife here is seen as a conflict for resources, a threat to human life and as a catalyst of disease. Farmers from Maruru to Selengei noted problems from migrating wildebeest during birthing season leaving the placenta. With a reduction in scavengers, the placenta rots in the sun and harbors disease.

The highest concentration of small game was reported in the Kimana and Porini sanctuaries and in Amboseli and the dispersal area. The sanctuaries and water sources provide refuge for permanent and migratory game. Wildlife sighted, spoor seen and reports include; Thompsons gazelle, eland, dikdik, Grants gazelle, waterbuck, wildebeest, ostrich, zebra, cheetah, porcupine , lion, baboon, giraffe, hyena, lesser kudu, elephant, buffalo, topi, rhino, warthog, and impala.

From recorded wildlife observations there were 3159 estimated sightings of prey and predators. (Figure 22) Cheetah preferred prey accounted for 794 (25%) of the recordings. For the animals categorized as seldom cheetah prey 2194 (69%) were estimated. The predator spoor/sighting was observed at less than 0.7% (sighting of cheetah spoor n=1- recorded as multiple cheetah tracks- which in this case was estimated as 5 cheetahs, and 17 predator sightings/spoor).

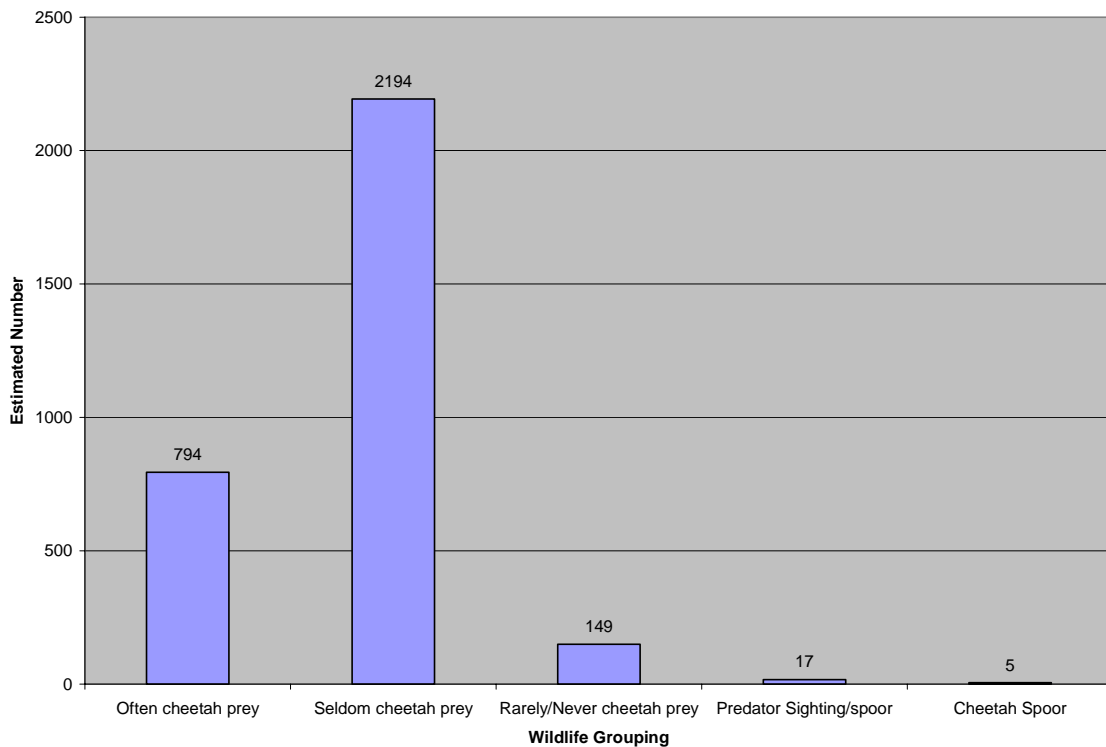


Figure 22: Sum of Prey, Cheetah Reports and Spoor Recorded in Area II

Water:

Throughout this area, droughts are frequent and leave a wake of death if the animals do not disperse at the right time. Many dry dams were noted, and the Kilimanjaro pipeline supplies water through much of Area II. Along the line there are many watering points. While the people have a constant supply of fresh water, vandalism was witnessed in different points along the water pipeline, and the broken lines in some cases created large pools of water.

Near the large markets there are water tanks and boreholes providing water supply for local residents. The troughs and dams are used by livestock and wildlife. Livestock paths and erosion were evidence of the large number of livestock taken to the water points.

Land Use (including People and Buildings):

Throughout the region there was increasing references to conflict between the interest of conservation of large wild animals and the process of fragmenting land holdings to farmland plots. The best lands (most fertile and with water sources) are becoming privately owned by farmers. Subdivided areas are settled by Maasai, Akamba, Kikuyu tribes and others who purchase from the selling shareholder. These plots are mainly developed for commercial agriculture. Areas of cultivation and permanent shambas are concentrated near the larger villages and permanent water sources. Near the towns, settled shambas grow maize. The number of livestock observed in the area increased. Scattered manyattas also increased near the towns.

Ilbisil is an urban village on the highway from Nairobi to Namanga past Kajiado. Large wheat fields, market centers and small plots are scattered along each side of the highway. Towards the escarpment in the Magadi direction the subdivisions decrease as muram roads lead in the western direction and end in the hills. In the eastern direction roads lead over the escarpment. An area of large wheat, maize and cow pea farms skirt the westward inclines near a town called Parapasha. In some places most of the individual parcels of land are totally fenced with permanent buildings. In others, the land was fenced with thorns but no sign of activity was evident.

After passing through the dense forest towards Maruru and Mailua acacia branches were used as property boundary markers, but little settlement was evident. In some cases the road disappeared as diversions skirt recent subdivisions. Several small villages were scattered through the area.

Maasai group ranches form the corridor between Amboseli and Tsavo National Parks. The Kimana, Mbirikani and Selengai ranches have developed land use policies including wildlife and conservation programmes which drive their tourism business. There were varying degrees of development in the tourism industry from less than basic camp sights to modern lodges within the different group ranches. The level of community organization was evident through the infrastructure within designated conservation areas. Large farms grew onions, tomatoes, maize and other green vegetables by irrigation from a large river running through the area.



PB030018: Kimana Region

In the Olirahn Group Ranch large manyattas were near the road to Amboseli. Large herds of shoats and cattle leave a network of tracks along and near the roads leading to water points. The area between Kimana and Amboseli is characterized by scattered homesteads but the land opens until the settlement area of Kimana. In the Kuku Ranch,

large blocks of conservation areas have been set aside, but the settlements among the “free” areas are increasing and the traditional pastoral life is being replaced by permanent shambas and growing villages. In an airplane flight over Mbirikani, Kimana and Kuku ranches, the amount of open space seems vast, but severe erosion points can be seen near subdivisions, water points, dips and market centers.

A campsite at Selengei had no amenities and although, the community council owns the campsite area, individuals claim fees from campers accusing each other of not being entitled to collect the fees. In the past, the area had game birds and pigeon shooting blocks. Kimana addressed elephant conflict by building an electrified game fence around the agricultural subdivisions.

Within all of the group ranches, members of the community are employed and trained in wildlife and anti-poaching to promote community involvement in wildlife conservation. Large dams, tolerance for wildlife and a lack of overgrazing were reported as reasons for these high game numbers.

Livestock Management:

Ilbisil is a livestock market centre through which most of the livestock sales take place. Along the pipeline there were several dipping stations that appeared well attended. The area surrounding the Selengai market center was overgrazed and dry dams were visible from the road. Still large herds of shoats and cows could be seen on each side of the road.

On each of the drives in this area there were large numbers of livestock mixed with the herds of game. (Figure 23). Of the 20516 estimated livestock, shoats (goats and sheep) made up the majority (58%, n=11873). Due to drought conditions, cattle numbers may have been lower than usual, but still accounted for 40% (n=8231). Donkeys were often seen in groups of 10 or more carrying water containers and market items. Dogs were seen near homes and a few were with herders. No camels were seen in this area.

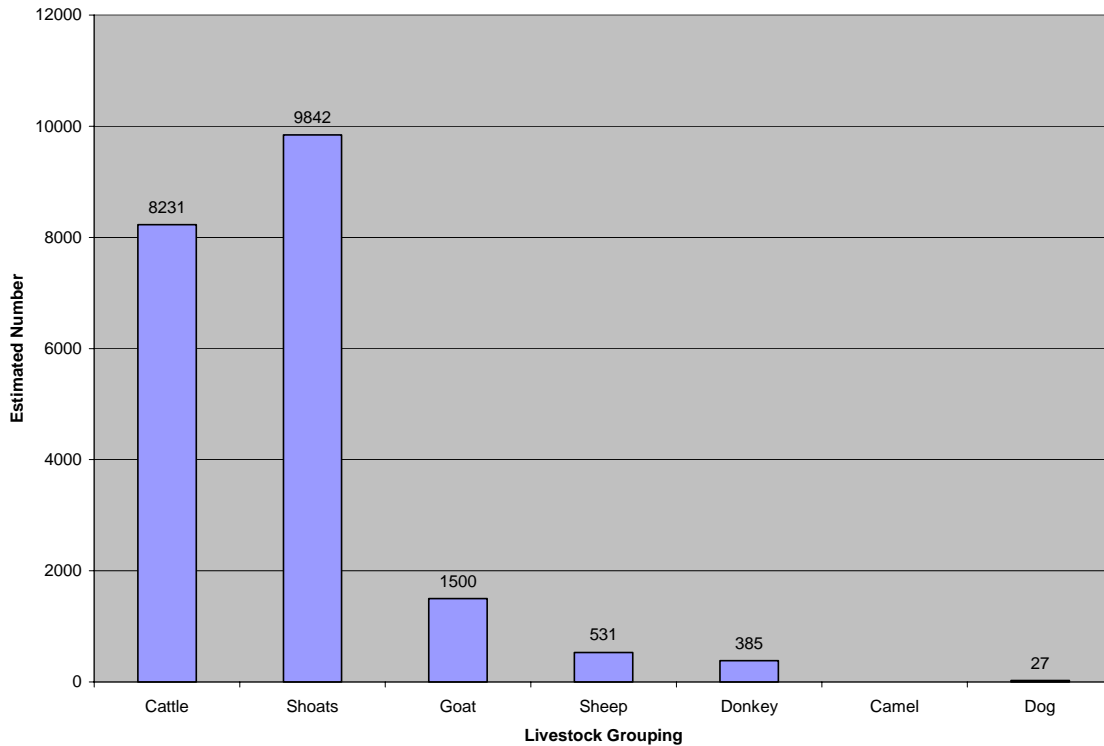


Figure 23: Livestock Observed During Area II Field Trips.

Many of the herders seen tending the shoats were small children. Often there were two or more children who were close to the road while the herd was scattered in the bush.

At the time of the study the majority of the people had reportedly moved their livestock northwards because of a drought that had persisted in the area for most of 2004. Many livestock had died due to the drought and several carcasses littered abandoned manyattas. Most of the carcasses had rotted naturally with no sign of scavenging.

Predator Issues:

Reports of predator conflict varied within the area. The more densely populated areas along the hills reported less problems while interviewees closer to the Parks reported an increase in predator, elephant, warthog and buffalo problems. The reports of lion and hyena attacking livestock also varied with habitat and proximity to the Parks. In all regions there were reports of cheetah and leopard taking livestock.

Most of the interviewees from Maruru to Selengei said that cheetah do cause problems but their biggest problem was hyena. Generally speaking, the majority of the interviewed residents felt elephant were a greater threat to their livelihood than predators. Two people near Namanga reported a recent incident of a lion killing a young herder.

Cheetah Specifics:

Cheetah were reported to be seen in the Mashuru area and over the escarpment to Ilbisil, but no numbers could be estimated. Reports continued into the escarpment, but

the interviewed persons had difficulty, differentiating cheetah from leopard. Namanga residents also reported several groupings of cheetahs in the grazing area north of the market. They claimed cheetahs were seen more frequently than leopard and would take livestock when game disperses.

Amboseli lodge personnel, guides and tourists reported several different groups of cheetah. Consistency in social groupings and areas allows for lumping reports to avoid duplication of sightings. Reports say the main difference between the resident and migrant cheetahs are that the former were habituated to vehicles while the latter flees at the sight of a car. Some of the tourists complain to the lodges that cheetahs cannot be photographed from the road because they flee. Naturalists felt that a large number of hyena pose a threat to cheetah numbers in the Amboseli Park.

From Maruru to Selengei residents report that cheetah cause few problems. In the Selengei Ranch, KWS and conservation area scouts reported regular cheetah sightings and random incidences of cheetah killing livestock. The Secretary of the Selengei Group Ranch scheme had 5 goats attacked by cheetah in July 2004 (one surviving had bite wounds consistent with the cheetah's style). He also claimed that a group of three cheetahs lay in wait near the nursery area where members of the ranch leave young stock in a boma while taking the adults out to graze. Cheetah tracks were seen by the research team less than 2 kilometers from the village.

The Kimana Warden, who was in his position for 2 years, remembered only 1 or 2 cheetah-incident incidences in the Kimana Group Ranch. The majority of the people talked to in the group ranches felt that the population of cheetah had increased, and that there is a recent increase in small stock losses to cheetah.

Although no interviews were conducted with people who live in Kuku, reports of cheetah incidences from Kuku residents were made.

The Mashuru and Namanga area interviewees accounted for 17 cheetahs in different social groupings. (Table 6) Amboseli rangers, naturalists and tourists report 10 resident and 7 transient cheetahs seen on a regular basis. In the Selengei area two residents report an adult female. The Porini scouts believe that there are 16 cheetahs seen in different social groupings in the Selengei ranch. Kimana scouts report 4 resident cheetahs with an additional 6 that move between the group ranches and spend most of their time in Mbirikani. This makes an estimated total of 60 cheetahs in this area.

Table 6: Reported Cheetah Numbers in Area II Region.

Year of report	Occupation of reporter	Cheetah Numbers	Area specified	Comments
2004	Namanga resident (1)	3	Namanga	Adults
2002	Namanga resident (1)	4	Namanga	Mom with 6 cubs, but now only seeing her with 3
2004	Namanga resident (2)	1	Namanga	Stalking goats
2004	Namanga resident (3)	6	Namanga	Seemed to be all adults
2004	Namanga resident (4)	3	Namanga	Killed his goats in December 2004
2004	Herders	Present	Mashuru	Reports without numbers given
2002	KWS - Selengai	1	Selengai	Trapped for killing livestock - moved elsewhere
2004	Porini Camp scout	16	Selengai	Cheetahs seen on and off in different social groupings over the last year
2004	Selengai Group Ranch Secretary	1	Selengai	Killed 4 goats, injured one. Bite wounds still seen when research team visited.
2004	Kimana Game Warden	2	Kimana Ranch	Two adult males
2004	Kimana Game Warden	2	Kimana Ranch	Mom with one cub
2004	Kimana Game Warden	1	Mbirikani Ranch	* Adult - saw all 6 in different area on same day
2004	Kimana Game Warden	1	Mbirikani Ranch	* Adult - saw all 6 in different area on same day
2004	Kimana Game Warden	4	Mbirikani Ranch	* Mom with 3 cubs - saw all 6 in different area on same day
2004	Kilimanjaro Research	4	Mbirikani Ranch	* Mom with 3 cubs - same area as Kimana Warden, likely same family
2004	Amboseli Naturalists at several different lodges	10	Amboseli National Park - Resident	Adults
2004	Amboseli Naturalists at several different lodges	2	Amboseli National Park - Resident	Adults
2004	Amboseli Naturalists at several different lodges	4	Amboseli National Park - Resident	Mom with 3 cubs
2004	Amboseli Naturalists at several different lodges	3	Amboseli National Park - Resident	Mom with 2 cubs
2004	Amboseli Naturalists at several different lodges	7	Amboseli National Park - Transients	Other adult and family groupings reported in park on occasion

4.2.4 AREA III: ROMBO, MBIRIKANI, CHYULU, TSAVO WEST

This area includes a portion of Mbirikani Group Ranch, all of Rombo Group Ranch, Chyulu Hills National Park and Tsavo West National Park. (Figure 23) The area was covered in Field trips 2, 3 and 5. These drives covered 1311 km of roads in an area of 5267 km² (1,311,339 acres). Field Trip #2 covered from Loitokitok into Tsavo West via Rombo and Njukini villages. Field Trip #3 collected data beginning at Mbirikani with one research vehicle going to Amboseli to distribute KWS incident forms and another to Tsavo West where data points were collected by both. On the second day data forms were taken to Chyulu Hill Warden. Field Trip #5 was intended to collect the KWS forms from Chyulu and Tsavo West and included data collection in the Northeast, Ngulia, section of the Park.

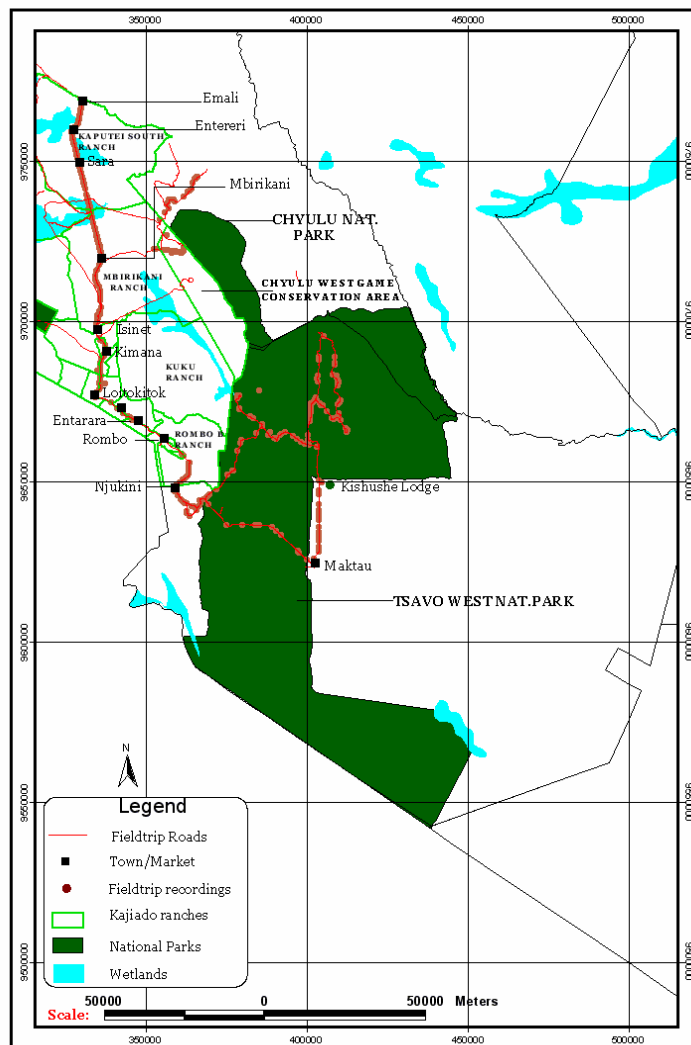


Figure 24: Map of Field Exercise Area III

Total data for the area was 260 points of which 307 counts supplemented by 33 photographs (Figure 25). Human activity areas were recorded at 23% (n=72) whereby n=29 were people, n=33 buildings, and n=10 water points. Livestock were recorded in 14 % (n=44) while game accounted for 57% (n=175) of the observations. Predator sightings/spoor were noted at 4% (n=13) and cheetah spoor were recorded at 0.9% (n=3) of the observations.

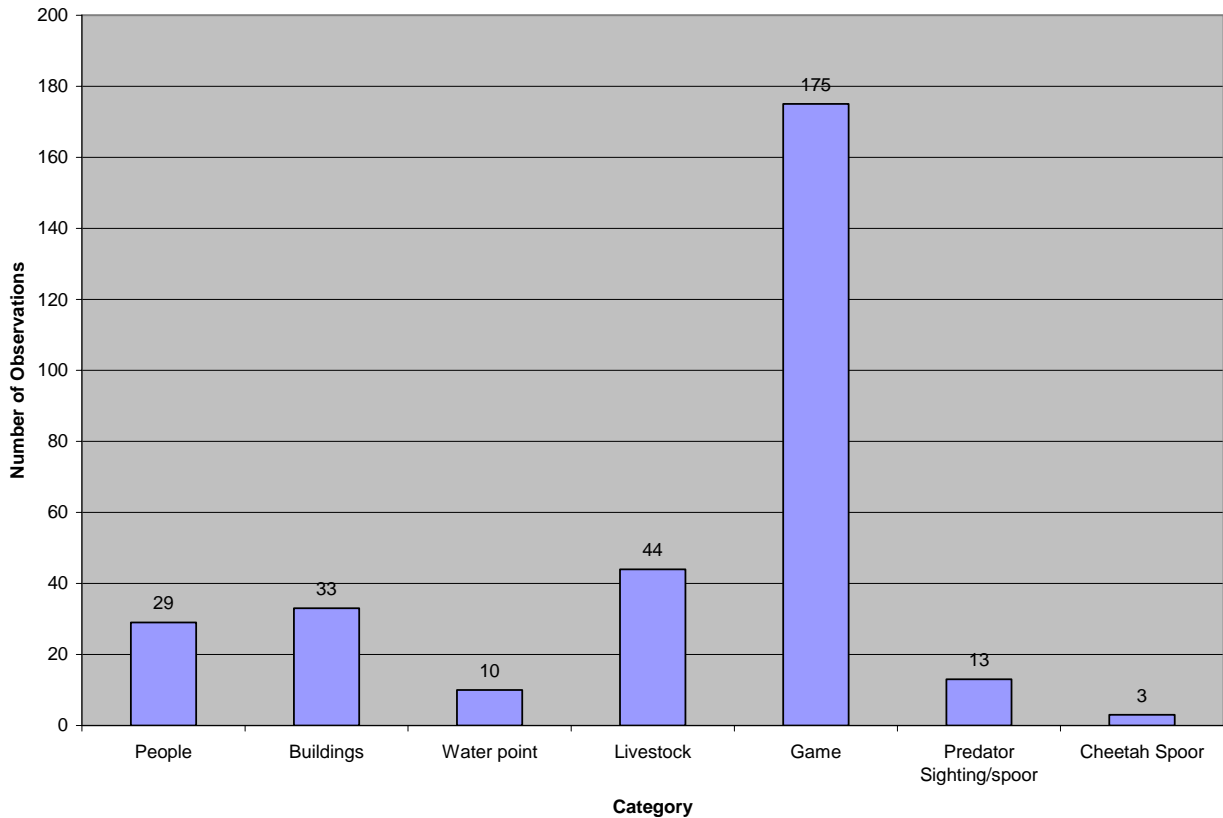


Figure 25: Data Collection Points for Area III

The total individual subjects counted were 4567. (Figure 26) Livestock accounted for the largest percent (71%, n=3251). Game numbers were estimated as 987 individuals (22%) of the total count. Human related numbers were 305 (7%) of the recordings with people tallying 148, buildings 147, and water points 10.

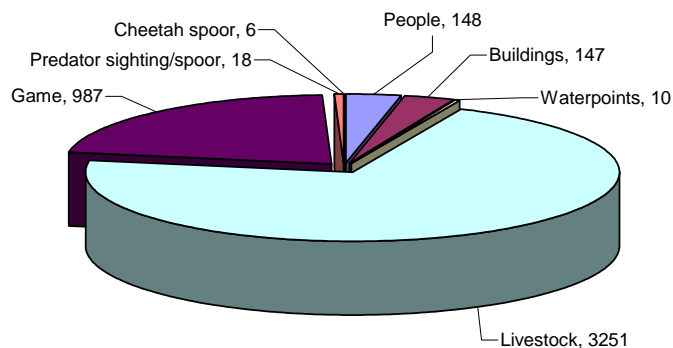


Figure 26: Sum of Individual Recordings in for Area III Field Exercises.

Habitat and Wildlife:

Near Loitokitok baboons were reported as a problem because they were eating sheep tails and raiding crops along the outskirts of town. Elephant also move along the edges of the subdivision, raiding crops. The vegetation in the Rombo Group Ranch varied with the dominant wooded plant species being *Acacia mellifera*, *Acacia tortilis* and *Balanites aegyptica* with varying degrees of

undergrowth. The road from Rombo travels through Njukini and enters the Tsavo West National Park through a privately managed ranch, which supports conservation efforts through ranch activities.

In Tsavo West National Park grassland plains make up a small percentage of the land cover while the rough terrain supports Commiphora and Acacia woodland, occasional large trees and prominent bushes. The permanent rivers host several kilometres of acacia and doum palm (*Hyphaene compressa*) forests. The Ngulia section of Tsavo West is primarily wooded, varying from thick to medium bush.

Mbirikani Ranch had outcroppings of nearly impenetrable volcanic *kojpe*'s. Vegetation comprised of tall and short grass plains and woodland of *Acacia tortilis* and *Acacia geraldii*. The area bordering Mbirikani Ranch and Chyulu National Park is characterized by areas of thick *Acacia mellifera*, *Acacia drepanolobium* interspersed with open tall grass plains. Chyulu National Park is known for its dramatic habitat characterized by rough terrain consisting of volcanic rocks and varied from scant to impenetrable vegetation through lava flows.



Little wildlife was seen or reported from Loitokitok to Rombo. As human settlement decreased between Rombo and Njukini the wildlife numbers increased. This continues to be the case through to the Tsavo West Ziواني Gate. Tsavo West National Park hosts a large biodiversity from Ziواني Gate to the Maktau gate and north to Kishushe. Wildlife varies seasonally and includes dikdik, zebra, elephant, buffalo, warthog, baboon, topi, gerenuk, steinbok, Thompson's gazelle and Grant's gazelle. Tracks of lion, cheetah, leopard, jackal and hyena are seen regularly on several of the roads. Along the road to the KWS Park headquarters a large number of predator tracks were seen including jackal, hyena, leopard, lion and cheetah.

The wildlife from Mbirikani town to the Ol Donyo Waus Camp is seasonally sparse and includes Grant's gazelle, Thompson's gazelle, zebra and wildebeest. There were a few carcasses of starved cattle, but no signs of scavengers. The Maasailand Preservation Trust conducts conservation education, which is hoped to expand the benefits from wildlife to local communities, such as creation of a community hospital and scholarship fund for needy students from the region.

Along the western edge of the Chyulu National Park, groups of impala and zebra were recorded. Also bushbuck, stein buck and reedbuck were seen.

From recorded wildlife observations there were 1011 estimated sightings of prey and predators (Figure 27) Cheetah preferred prey accounted for 351 (35%) of the recordings. For the animals categorized as seldom cheetah prey 449 (44%) were estimated. Cheetah and other predator sighting/spoor totaled 24 (3%).

II

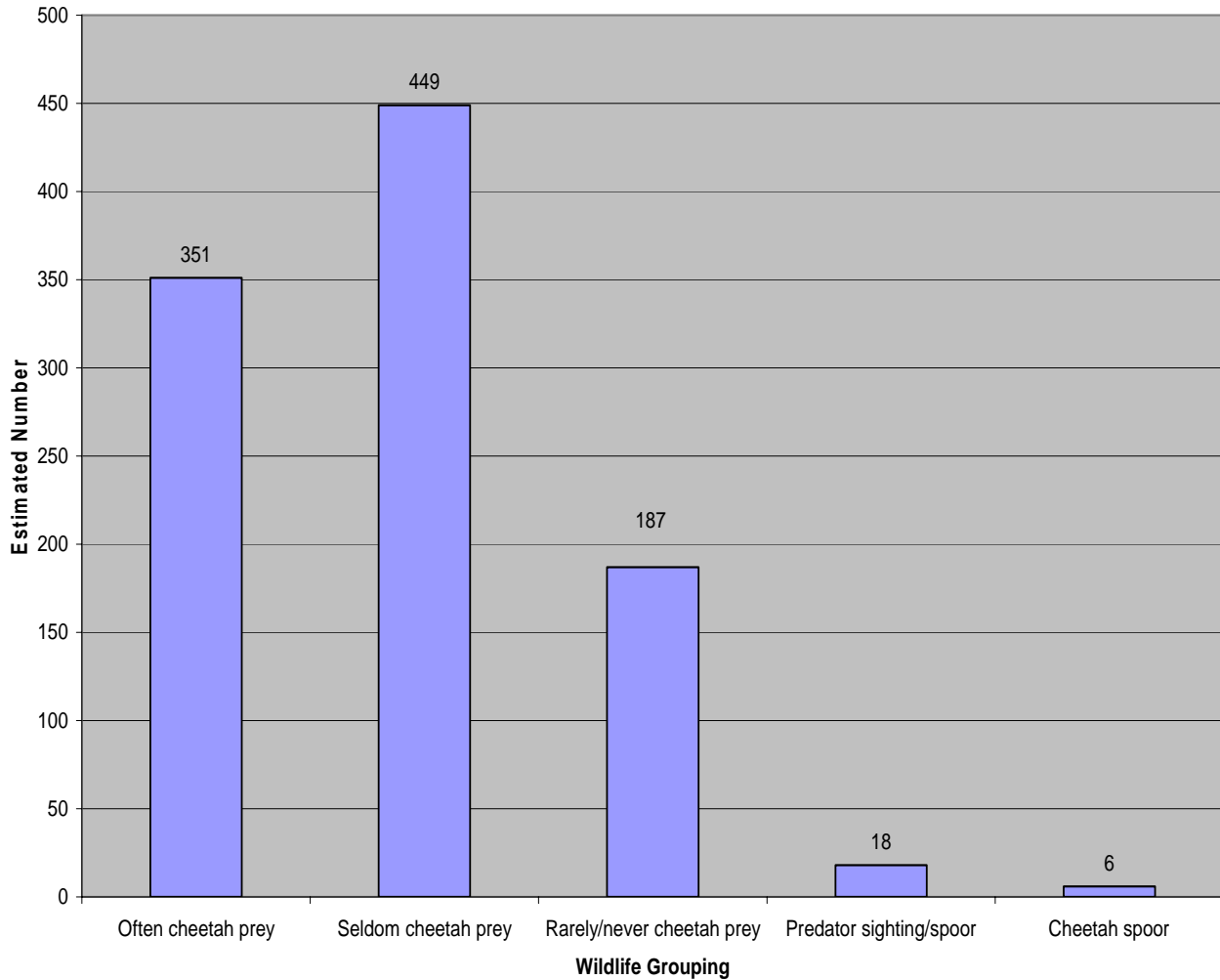


Figure 27: Bar Graph of Wildlife Observed in Area III.

Water:

Springs near Rombo town provide water for human and livestock consumption. Water is collected by both Kenyan and Tanzanian residents. Shoats and cows are taken to drink from the same collection points. Rombo and Njukini are both built around the water sources. Unsustainable water use is beginning to create dramatic water issue conflicts. The pastoralists move their manyattas and livestock according to seasonal rains.

Wildlife in the Parks are provided with water through dams and some boreholes. Permanent rivers provide adequate water for wildlife within the Parks and local residents along the perimeter.

Water shortage is however a major issue on Mbirikani ranch. People buy truckloads of water from Mbirikani market centre and transport it to the grazing fields for their cattle.

Land Use (including People and Buildings):

Loitokitok is a large town bordering the slopes of Mt. Kilimanjaro and it is quite with subdivisions extending several kilometers in all directions. Large numbers of shoats, cows and agricultural plots are side by side. Soil erosion was a serious problem. Power lines extended for several km along the road from Loitokitok. The Rombo ranch falls within both the Kajiado and Taita-Taveta; includes 96,000 acres under the Kajiado district and 4,500 under the Taita-Taveta district. Portions of Rombo Ranch are subdivided and a conservation area has been a source of conflict among the community. This made discussions on the wildlife, land and predator issues difficult. KWS in the area mainly focus on elephant conflict issues. Hyena were reported as a problem, so many dogs are kept to alert the herdsman. Most dogs appeared in poor condition, dehydrated and malnourished.



P7250013 - Rombo Landscape.

With Njukini's water source, agriculture was irrigation based. Rombo KWS rangers reported elephants were causing frequent conflict on the riverside farms, getting into the area in search of water. Crops were for commercial sale; predominantly tomatoes, sunflower, cowpeas and onion. Water exploitation and illegal tapping had depleted the water flow to the downstream areas. Farming activities decreased further from the river.

A private 5000-acre ranch (Kiboko block 3) separated a portion of Rombo and Tsavo West. Intensive mechanized farming was being practiced in a portion of the farm, growing tobacco, vegetables and mango trees enclosed in an electrified fence and partially surrounded by a stream, which flows into the wetland. The ranch also supports livestock, and allows game including predators, especially along the wetland area.

Tsavo West and Chyulu Hills National Parks support tourism, wildlife and habitat preservation activities. Along the south and western Park boundaries there were many vacated manyattas due to the drought, which persisted in the area. The Chyulu National Park had a relatively low tourism visitation rate. Enforcement of no-grazing policy had been weak. A rough road weaves in and out of the Park along the western boundary and human settlements increased nearer to the main highway by Makindu. Livestock being grazed in the park also increased near areas of higher human settlement. There were abandoned manyattas and bomas inside the park on the northern boundary.

Along all the Park dispersal areas, conflict between the interest of conservation of wildlife animals and the process of fragmenting land holdings to farmlands plots is intensifying. The best lands (most fertile and with water sources) are becoming privately owned by farmers. Subdivided areas, settled by Maasai, Akamba, Kikuyu tribes and others who purchase from the selling shareholder are mainly developed for commercial agriculture. This is a time of decisions for these communities who debate on the long and short-term benefits of subdivision and on the issues of human wildlife conflict.

Livestock Management:

Rombo community members reported at least 48,000 heads of cattle, 150,000 shoats and a large number of donkeys in the Rombo Group Ranch alone, a much higher number than the research team counted from the road.

Grazing is not permitted in National Parks, but the thick woodlands of the Tsavo West and Chyulu Hills National Parks make it difficult to control illegal grazing along the settlement Park boundaries. Thick vegetation make it difficult to count the large herds of livestock along the Chyulu western boundary. Large herds of cattle were also being moved through the northern edge of the park where a large holding boma and dipping post is located just outside the park boundary.



P7210023 - Njukini Sheep Management.

Of the 3001 estimated livestock shoats (goats and sheep) made up the majority (68%,n=2212). Due to drought conditions, cattle numbers may have been lower than usual, but still accounted for 31% (n=1004). Donkeys (n=30) were often seen in groups of 10 or more carrying water containers and market items. Dogs (n=5) were seen near homes and a few were with herders. No camels were seen in this area. (Figure 28).

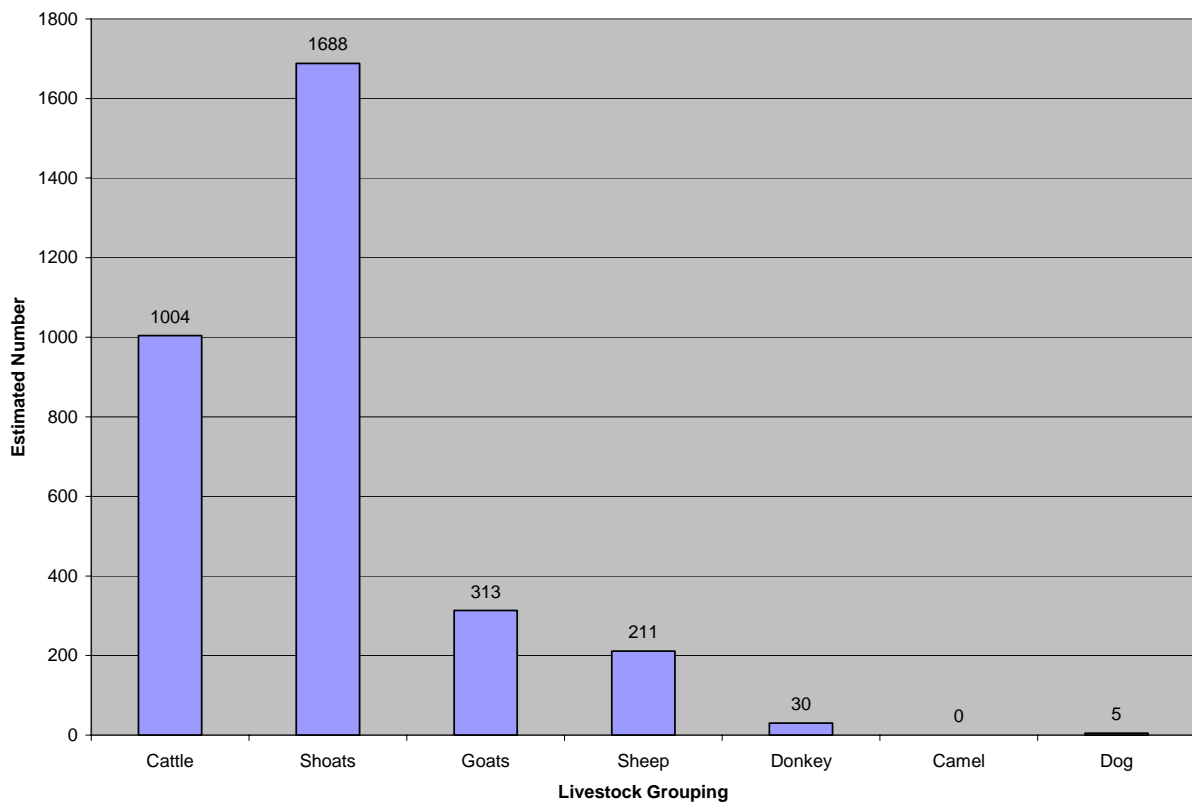


Figure 28: Livestock Observed in the Area III.

With an increase in tourism benefits and a compensation program in place through the Mbirikani Preservation Trust there was more cooperation regarding no grazing areas and research is showing an increase in wildlife issue tolerance through the halt of lion killing on the ranch. The erosion levels near the market center and water points were evidence of the extremely large numbers of livestock even during this time of drought.

Predator Issues:

Wildlife conflict in this area is high, but the larger area of concern is elephant. Interviewees reported hyena, leopard, lion and cheetah issues, but these were overshadowed by crop damage issues in Rombo and Njukini.

Chyulu National Park Warden reported few predator conflict cases reported to the park headquarters. On Mbirikani a compensation scheme carefully compiles claims of livestock loss with intent for developing better livestock protection and encouraging a higher tolerance for predators. While the program focus is lion, compensation is given for losses to hyena, leopard, cheetah and wild dog as well. Strict guidelines are followed on how the kill happened and lost animals are not fully compensated. Payment of compensation is on the understanding that no wild animal will be killed for taking livestock and also the value of the lost livestock decreases according to how many times a person reports losing animals. The lion population in the group ranches has declined due to poisoning over the last several years. The Kilimanjaro Lion Project indicated that the mortality of predators in Mbirikani due to conflict has dramatically gone down since the inception of the compensation scheme.

Cheetah Specifics:

Rombo residents claimed cheetah to be killing young goats and sheep by day and raiding bomas by night. Reports were mainly of solitary animals and from looks of the area would more likely be leopard. People involved in proposed conservation area claimed there were several cheetah in the area that move from Tsavo West, however no accurate numbers could be given.

The rough terrain of Tsavo West does not seem like cheetah territory. However, by conducting interviews with naturalists and guests it was found that cheetahs have been reported on the southern edge of the Ngulia section, throughout the "Serengeti Plains" and even along the rivers where there is thick vegetation. There were no cheetah sightings recorded in the Ngulia Lodge guest book by tourists who often spend most of their visit in the northeastern section of the Park. KWS officers indicated that cheetahs were regularly sighted in the park though the rangers were not obligated to collect data. Tour guides of Tsavo West reported regular sightings of cheetah near the Voyager camp area, "Serengeti Plains", near Maktau Gate and outside the border in the direction of Kishushe.

In Chyulu National Park cheetahs were occasionally seen near the Rhino Camp but they were reported to spend most of their time on Mbirikani Ranch. The KWS Senior Warden for Chyulu Park reported an incident of a cheetah cub killed near the park offices by what appeared to be another predator. The Chyulu Warden said that cheetah rarely come into the Chyulu park because of the rough terrain, regular burning, frequent wildlife movements and dryness (few water sources). If they come at all it would be the plains that are near Mbirikani ranch. The KWS Chyulu Deputy Warden was also not aware of any cheetah inside the park. He believes cheetah would be hindered in hunting in the thick Chyulu Park forests. He confirmed that cheetah had been seen in the plains on the western side (Mbirikani) bordering the park. At the Chyulu Rhino Unit outpost a ranger however reported seeing 4 cheetahs hunting in the plains.

The Kilimanjaro Lion Project reports that cheetah were the second largest cause for the compensated losses in the Mbirikani scheme in 2003-4. Researchers believed that one mother had given birth to 2 or more litters in the last several years and had taught her young to kill goats. Male cheetahs had been seen in a group of 2 and as an individual. Other females were reported in the Amboseli direction. One resident reported seeing cheetah occasionally, especially during the rainy season. He reported that they have minimal problems with the cheetah because it is easy to scare.

The Rombo cheetah reports claim that the animals move in and out of Tsavo West along the Ziwani area. The Chyulu Park and Mbirikani reports supplement recordings from the discussions on Area II above and are likely to be the same animals, hence are not included in this count. The naturalists and tourists from Tsavo West have seen various social groupings totaling 11 animals. (Table 7).

Table 7: Summary Reported Cheetah Sightings in Area III.

Year	Occupation reporter of	Cheetah Numbers	Area specified	Comments
2004	Rombo residents	1	Rombo	One cheetah near Rombo who waits near water hole
2004	Rombo residents	1	Rombo Conservation area	Several cheetahs which move in and out of Tsavo West Park
2004	Tourist	4	Ziwani area of Tsavo West	Photographed mom and 3 cubs July 2004
2004	Ngulia Lodge naturalist	1	Ngulia area of Tsavo West	Seen along Ngulia edge, but not up in the hills
2004	KWS Tsavo West Warden	1	Tsavo West	Park rangers are not asked to collect cheetah sightings, but they did mention seeing cheetahs on occasion
2004	CCFK	3+	Tsavo West	Cheetah tracks on road - at least 3 sets.
2004	Chyulu Warden	1 (included in Area II)	Chyulu KWS HQ	Cub killed by predator near HQ
2004	Rhino Unit	4 (included in Area II)	Chyulu Hills	On plains near rhino unit
2004	Chyulu Deputy Warden KWS	Present (included in Area II)	Mbirikani	Cheetahs not in Chyulu, but along border at Mbirikani
2004	Mbirikani resident	Present (included in Area II)	Mbirikani	Cheetahs occasionally seen, but minimal threat

4.2.5 FIELD TRIPS SUMMARY

Taking points from the road results in somewhat biased information as the roads are the transport areas for people, central positions for moving livestock and where markets are focused. However it is felt that these drives provided enough information for this initial analysis on cheetah presence and factors influencing trends in cheetah population.

Looking at the information from the field drives it is apparent that such a short term program plan for census is not accurate when driving is not accompanied by formal or informal interviews.

Interviews were gender biased as only men were interviewed. Generally the women could not be seen during the day drives as they were attending to household chores. Also, it was difficult to communicate with the women who often spoke only in the Maa (Maasai) language. In areas of estimated high cheetah presence further studies would be required which would include hiring an interpreter or local person for data collection and spending enough time to gain a trust with the community members.

Habitat throughout the three areas is pocketed with cheetah favourable terrain, vegetation and prey base. Regular cheetah sightings as well as livestock loss reports confirm the presence of cheetahs throughout much of the area. In most of the area can give estimated cheetah numbers based on the number of interviews conducted. Additional bias in data collection would also result from daytime drives in that both animals and people avoid the heat.

Seasonal wildlife dispersal should be accounted for in trend analysis, thus this study is only accurate for assessing trend of cheetah in these areas and the estimated number is only an indicator of the trend. Also, people gave conflicting information; while some felt cheetah numbers have increased (due to perceived increase in the issue of conflict cases), others felt that the cheetah numbers have decreased (due to decreased sightings). Regional differences in cheetah population changes were also evident - for instance, while most informal interviews reported cheetah to be declining, the Selengai and Magadi regions claimed that sightings and conflict incidences with cheetahs are increasing in the last 5 years. Tour guides and naturalists reported less sightings in Tsavo West and Masai Mara regions. This therefore calls for the need of a further detailed research in specific areas with reported high cheetah sightings.

5.0 GENERAL CONCLUSION

The combination of Literature Searches, KWS incident evaluations and field surveys can be used to produce an evaluation for the Priority 1 study area. This area was chosen for the first priority on the basis of anticipated presence of cheetahs and to fill in the gaps within the area where recent studies had covered. Filling in the gaps without overlapping the existing studies has proved to be much more difficult than anticipated. Choosing routes and selecting appropriate data has taken more time than anticipated, however the results of this methodology does show the presence areas and can be combined to estimate numbers.

The Priority 1 region ranges from short and long grass plains to thick bush, from flat terrain to impenetrable mountains and lava fields and from Parks (i.e. Nakuru, Nairobi, Chyulu Hills, Tsavo West and Amboseli), Reserve (i.e. Masai Mara) and sanctuaries (a variety of private ventures were mentioned above) to pastoral ground (Group ranches and other regions mentioned above) and densely inhabited cities and villages (i.e. Nakuru, Narok, Naivasha, Magadi, Nairobi, Loitoktok).

The abundance of game throughout the Priority 1 region is pocketed into protected areas, however, game numbers which can support predator populations are scattered across the Priority 1 region. While large game species were the most frequently recorded the abundance of animals classified as “often cheetah prey” were plentiful in pockets across the region and in the protected areas within the study area. From recorded sightings and interview reports there were 7114 recordings of prey and predators (Figure 29). Cheetah preferred prey accounted for 1920 (27.3%) of the recordings. For the animals categorized as seldom cheetah prey 4312 (61.2%) were estimated. There were 17 accounts of cheetah spoor/report. 44 other predators and or their spoor were seen.

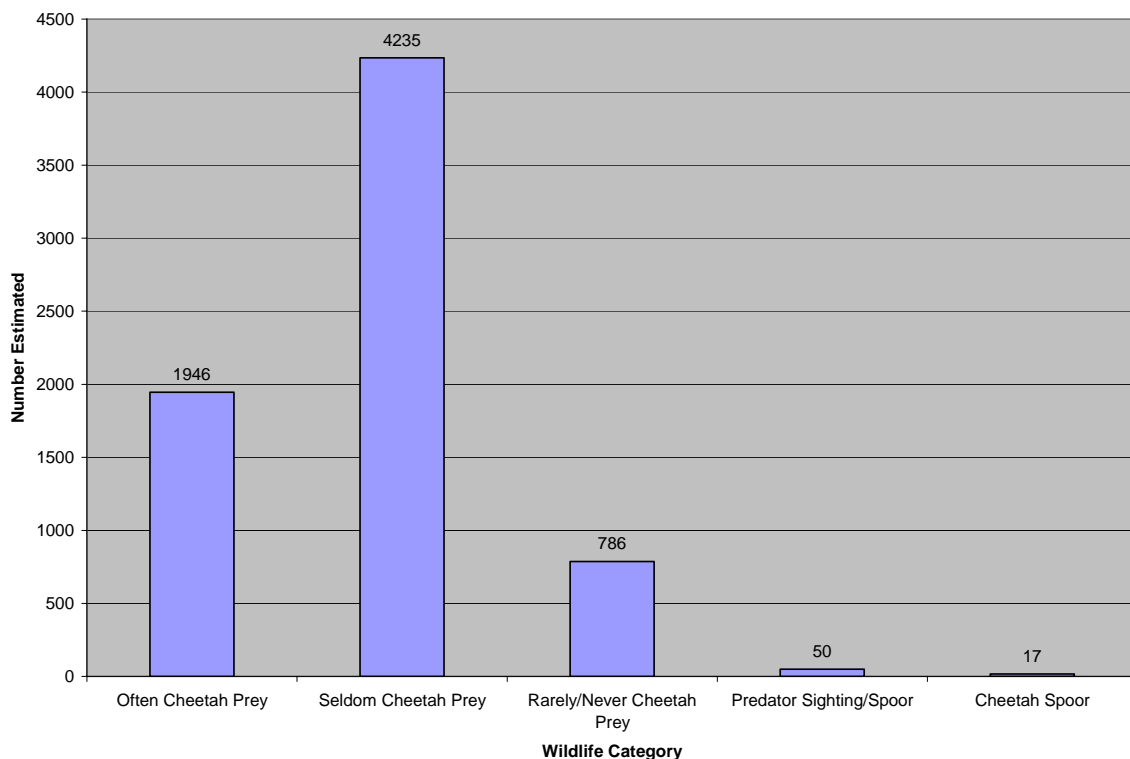


Figure 29: Wildlife Recorded in Priority 1 Areas

Human-wildlife conflict issues are nothing new. Throughout history and in any country where people inhabit regions of wildlife there is conflict for space, resources and life. Regions where mixed livestock and wildlife management is practiced with benefits from tourism have a higher tolerance for wildlife conflict. Areas surrounding the Parks, Reserves and conservation concessions where livestock benefits are minimal or exploited by corruption show less tolerance. The desire and need for financial resources has created political conflict between government authorities (i.e KWS), group ranches where benefit sharing is practiced accountably, and the people who fail to see or receive the direct benefits. Unfortunately when frustrations occur the fault is placed on the wildlife, which has no control of how the benefits are shared. It is unfortunate that wildlife suffers where politics are concerned.

National Census records can be used to estimate the human population densities although classification of the above information has provided an estimate of human population along the field drives. Market centres are formed where there is a need for commerce, health care and education. Tolerance for competition with wildlife decreases when wildlife competes for increasing resource requirements or causes direct negative impact on the financial security of the inhabitants of developing markets. Where direct benefits of living with wildlife are strong the people are more supportive of predators as a part of the picture. Generally the losses that occur as a result of the wildlife are less of an inconvenience when infrastructure and financial revenues are available. Compensation and consolation schemes are in place and being developed in some communities and are under consideration in the current governmental policy change recommendations. While such schemes can create a short-term tolerance they often fail to address the issue of prevention or reduction of the conflict.

In the Priority 1 area the number of KWS conflict cases involving predators averages 5.3 cases per week from 1994-2004. While the cases involving cheetahs (174) may be low in comparison to the overall number of cases, predators in general are considered a threat to livelihood where traditional or commercial livestock values are in place. This study does not look at the overlap of predator incidences, thus further conclusions of overall predator impact are left for a future study.

Throughout the study the range of livestock grazing had little limit. Parks and conservation concessions are a source of conflict when land resources surrounding the conservation areas are depleted beyond sustainability. Illegal grazing and poaching are a constant source of conflict between conservation of managed wildlife areas and local communities.

The creation of water points (piped supplies, dams, boreholes) has allowed the development of an increased number of market centers and a more sedentary lifestyle than was traditionally practiced in the region. Even with the limited availability of water there are now allowances for increasing the numbers of livestock. Although many of the regions covered are still poverty ridden, the overall wealth of the country is increasing. By traditional value, this is realized in the form of increasing livestock numbers. This increase places a higher demand on resources where traditionally little demand would have been placed.

The main objective of the programme was to evaluate areas of anticipated presence of cheetahs. The comparison of KWS incident reports and overall cheetah estimates produce similar maps. While it is often the case that loss of livestock to predators is not reported to KWS, an increased awareness as to the needs for reports to reach the appropriate body of action can be emphasized in the results of this study.

While an increase in incidents should have a correlation to an increase in predators this may not be the case. The Kajiado region showed the highest increase in incidents, yet some of the interviewed members of the community report a decrease in cheetah sightings over the last 10

years. Human development in making the shift from pastoralism to agricultural permanent settlements has had the largest impact in this region.

Using the combined methods of census, Literature searches, KWS Incident Reports and Field Evaluation the study can take the census one step further and provide a roughly estimated cheetah population (Table 10).

Table 10: Estimated Cheetah Population in Priority 1 Region.

Location	Cheetah numbers
Nakuru/Naivasha (CCFK and KWS)	12
Baringo/Bogoria (KWS)	5
Masai Mara - KWS	38
Nairobi/Athi/Kapiti (KWS)	13
Kapiti/Makueni (CCFK)	15
Mara Loita	11
Magadi	20
Oldoinyoke	5
Namanga	17
Amboseli	17
Masailand Group ranches (Kajiado)	26
Tsavo West	11
TOTAL	190

Highlighted estimates from CCFK and KWS detailed surveys of the areas: 83 cheetahs.
Mara Loita takes into consideration the interviews
Magadi also considers duplication of sightings based on areas and social groupings: 20
Oldoinyoke reports of cheetahs crossing the road: 5
Namanga regional reports show consistency: 17
Amboseli includes 10 residents and 7 transients: 17
Masailand Group Ranch (Kajiado) reports show consistency in social grouping: 17
Tsavo West estimate based on naturalist and KWS ranger interviews: 11

Cheetahs are often recognized as being less of a threat than the other predators, however since cheetahs hunt during the day, their conflict impact is difficult to control. As frequently witnessed during this study, high livestock numbers and low preventative measures have increased the opportunistic availability of livestock for predators. Tolerance for human wildlife conflict is decreasing for political and economical reasons throughout Kenya. Areas around the Reserves and Conservancies receive the highest amount of attention. Predators bear a large brunt of the blame for livestock losses and are persecuted as a result. From the interviews conducted it was clear that some people could not tell apart the leopard from the cheetah.

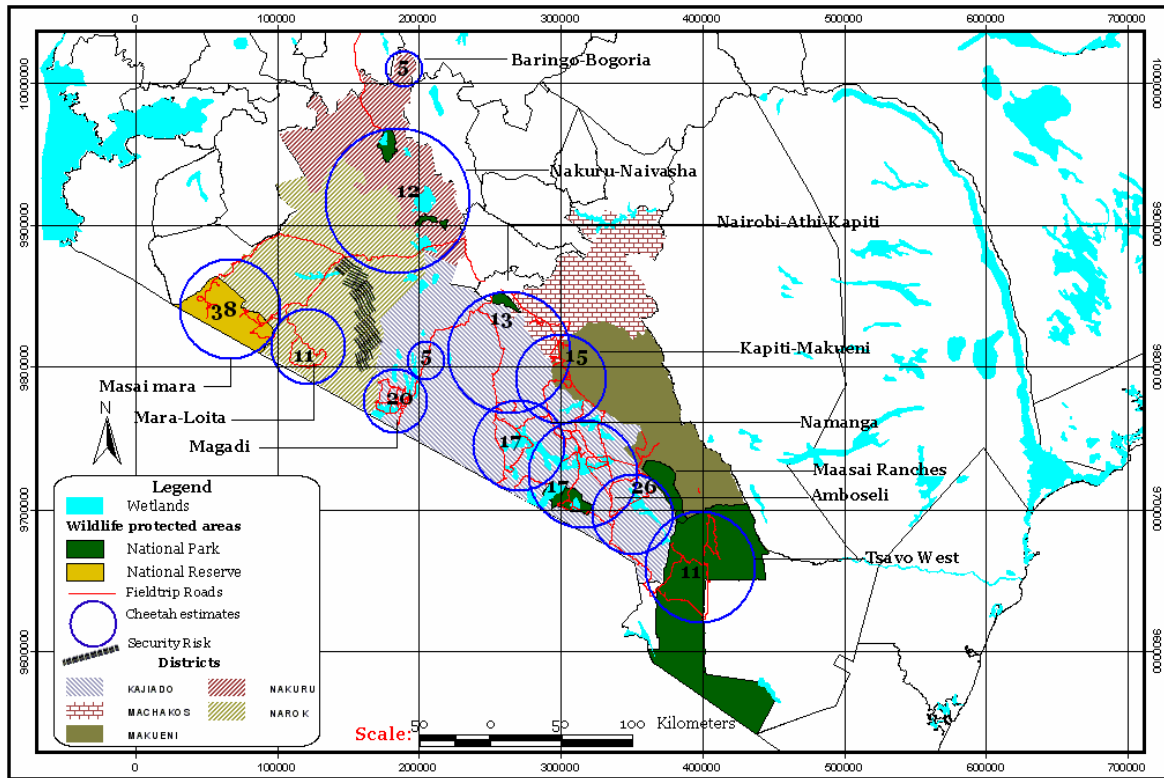


Figure 30: Map of Cheetah Population Estimates in Priority 1 Area.

Wildlife is mixed in with the grazing livestock meaning that any predator in search of food will have opportunity to choose livestock. The growing numbers of livestock cause a decline in grazing area for livestock and wildlife, thus a decline in the area accessible for predators as well.

While traditional pastoral life was quite tolerant of wildlife the demand for wealth in the form of larger livestock herds among a growing human population will continue to result in a decreased tolerance for wildlife in conflict for land and resources unless local people can receive direct benefits. The simplest answer to the problem is careful land use planning with programs to aid the communities in understanding the aspects of animal (wildlife) behaviour. Proper herding with the use of guarding animals and capable herders, healthy stock and good night bomas will decrease the conflict, but will never eliminate it.

It is the human impact that has become a threat to cheetah movements. Newly developed market centers, settlement areas and constantly increasing livestock activities throughout dispersal areas and wildlife corridors continue to threaten not only cheetah, but wildlife in general. Without a land use policy and protocols for livestock numbers and grazing regulations the land cannot support the Kenyan wildlife.

5.1 CHALLENGES

During the census exercise the following challenges were encountered:

- Language barrier during field surveys.
- Inaccessible regions due to poor/no road network, or high level of insecurity.
- Lack of a dedicated vehicle for fieldwork.
- Lack of trust from local residents.
- Areas of thick bush limited ability to count game and livestock and prevented predator sightings.

6.0 RECOMMENDATIONS

Using the results of the above study the following recommendations can be made for furthering cheetah conservation efforts in Kenya:

- 1) Conduct census in the remaining regions of Kenya based on priority regions set in 2004. Using the methodology from this region the remaining areas can be addressed. The issues needing to be addressed in completing the Nation-wide census are:
 - a. Dedicated funding for completion of Priority 2 and 3 regions, including a vehicle.
 - b. Faster response time in acquiring KWS 1994-2004 records.
 - c. Address language and safety barriers prior to field drives.
 - d. Dedicated time frame for data analysis.
- 2) Utilize information from census work to develop education and awareness programmes in key cheetah habitat regions. Target audiences should include:
 - a. Schools
 - b. Local community and the general public.
 - c. Tourists
- 3) Develop programmes for conflict resolution including:
 - a. Policy development for livestock management and predator conflict situations.
 - b. Program planning for increasing benefits of living in predator habitats.
 - c. Evaluate consolation programs for dealing with livestock losses.
 - d. Build capacity within KWS as the managing authority on problem animal control.

Appendix I: KWS Predator Incident Survey

PREDATOR INCIDENT SHEET (Cheetah, Lion, Leopard, Hyaena)

Name of Station:
(Kituo unachorekodia)

Recorder's Name:

Date(Tarehe ya kujaza form):

#	DATE OF REPORT/ INCIDENT	NAME OF PREDATOR	ACTION BY KWS (Hatua ya KWS)	EXTENT OF DAMAGE (SPECIFY) (Madhara iliyotendwa- nambari ya mifugo, binadamu na mengine)					LOCALITY & EVIDENCE (Kijiji na thibitisho la mnyama aliyehusika kwa uharibifu.)	COMMENTS (Maoni)
	Day/mo/yr			CATTLE (NG'OMB)	GOATS (MBUZI)	SHEEP (KONDOO)	DONKEY (PUNDA)	OTHER (WENGIN)		
1										
2										
3										
4										
5										
6										
7										
8										
9										
0										

Appendix II: Field Data Form

DATE/ TIME	RECORDER NAME	GPS	PEOPLE/ BUILDINGS	GAME unknown or male:fem:juv	LIVESTOCK	VEGETATION/ COMMENTS

Appendix III: Workshop Report

The cheetah and predator workshop was held in Nakuru – Delamere Farm (Jersey Hall) 8 -10 February 2005. The aim of the workshop was to discuss the issues affecting the Kenyan predators and the way forward, with main emphasis on the cheetahs. The workshop was coordinated by CCFK and sponsored by EAWLS and AWF.

42 people attended all or part of the workshop representing different NGOs, CBOs individuals and the government attended. Different researchers gave presentations regarding carnivore studies done inside and outside the parks. Later group discussions were held on issues and solutions then presented to the larger group.

Specific cheetah presentations included an initial summary of the joint census work with EAWLS, CCFK and KWS, Specific outcomes of cheetah studies in the Masai Mara (KWS), Samburu cheetah identification (Save the Elephant), Nakuru, Machakos and Laikipia Wildlife Forum comparisons (CCFK), CCFK Education and Awareness Campaigns, Mangle treatment of cheetahs in the Masai Mara, and Issues facing cheetahs in Captivity (Namibia/Global Cheetah Master Plan).

Outcomes of the workshop:

- Suitable predator census methods discussed: during the workshop the predator census methods were discussed and rated according to the most suitable and applicable in Kenya.
- Predator-working group: this group was initiated to address predator issues in Kenya
- Dissemination of cheetah information: this workshop was used as a forum for disseminating information on issues affecting the cheetah in Kenya.
- Networking: the workshop was a good tool for networking among researchers in other fields who in future will be willing to collect information on cheetahs in their respective areas of study.

Appendix IV- Budget

EAWLS Expense Report.

The balance will be carried into priority 2 Budget in receipt of additional funding.

Expense Category	Justification	Value (in Kshs)	Credit (in Euros)
		KSh. 768,000.00	8,000
TRANSPORT	Transport within Nairobi and CCFK offices	4,710.00	
CAR HIRE	EAWLS vehicle hire	50,846.50	
STATIONERY	Office supply, photocopying, printing	18,900.50	
TELEPHONE	Mobile Calls	657	
EQUIPMENTS	Computer, Camping equipment, GPS, Binoculars	211,226.00	
INSURANCE	All risk and liability policies.	10,837.50	
SALARIES	7 months Salary and 3 Months Volunteer allowance	241,300	
FIELD TRIPS EXPENDITURE	Fuel, transport to field sites, lodging, Ranger Allowance, Food.	102,018.45	
WORKSHOP	Speaker accommodation and food.	39,020.00	
	GRAND TOTAL	679, 515.95	B/C 921.7

CCFK Expense Report:

60 days dedicated to census work July 2004 - July 2005. These are expenses NOT reimbursed by the EAWLS Stichtings Grant.

Expense	US Dollars	Value in Euros
PI	\$2000	2560
Research Assistants	\$1500	1920
Lodging - field days	\$100	128
Lodging - office days (rent/utility 30 days)	\$200	256
Food - field days only	\$90	115
Fuel - CCF field work prior to EAWLS funding	\$150	192
Office Supplies	\$10	13
TOTAL	\$4050	5184

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