ECOLOGICAL MONITORING DEPARTMENT

SPECIES PLANS

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1.0 JACKSON'S HARTEBEEST ACTION PLAN FOR OPC

Background information

Jackson's hartebeest (*Alcelaphus busephalus lelwel*) is a subspecies of the common hartebeest. These are medium sized horse like antelopes, whose herbivorous diet is composed mainly of grasses. They are found mainly on open plains and in scrublands. They prefer lowland to mountain areas and require regular water. Hartebeests are very alert and cautious in comparison to other plains ungulates and rely primarily on their vision to spot predators. Juvenile mortality is thought to be relatively low, despite the number of potential predators. Cheetahs and jackals prey on small calves, while young and adult hartebeests are killed by lions, hyenas, leopards, hunting dogs and people (Batty, 2002).

The hartebeest is one of the most sedentary antelopes (making it relatively easy to identify stable groups but also easy targets for lions), but move in larger groups during the dry season or in periods of drought in search of water and better grazing. Females occasionally form small groups of 5 to 12 animals. Mature males are solitary and territorial. Adult females do not form permanent associations with other adults but keep up to four generations of their young. Strong dominance relationships between females define the social organization for the entire herd. Young are born throughout the year, but conception and breeding peaks is influenced by the availability of food. The hartebeest female isolates herself in scrub areas to give birth and leaves the young calf hidden for a fortnight, only visiting it briefly to suckle (Kingdon, 1989). Although hartebeests are mainly found in medium to tall grasslands, they are more tolerant of high grass and woods than other plains antelopes. They feed almost entirely on grass, but not very selective and quite tolerant of poor-quality food.

Current status

Jackson's hartebeests are classified as Lower Risk: Conservation dependent (IUCN Red List, 2006) because they have small and mostly declining populations. They are found in the Ewaso region of central Kenya and Ruma National Park near Lake Victoria. The total population of Jackson's hartebeest is unknown but in Laikipia their numbers are estimated between 700-1000 individuals of which OPC contains an estimated 175 individuals (21%). The Laikipia population has fallen by 70% in the last 10 years. A study investigating different factors responsible for the decline, which included habitat change/loss, competition with livestock, disease and predation, indicated that predation was a major factor causing the decline (Georgiadis, pers com).

Causes of concern in OPC

Predation by lions and spotted hyenas is thought to be the biggest factor causing decline of the OPC hartebeest population. Between May 2005 and August 2006, hartebeests had the second highest recorded mortality on the ranch after the common zebras. This mortality represented approximately 14% of the hartebeest population. OPC has relatively high populations of other herbivores (especially plain zebra) that could potentially provide the prey base for the lions and spotted hyenas. Plains zebra are the preferred kill in OPC. It is however suspected that predators prey switching results in periodic predation peaks for certain prey species like hartebeests.

The two enclosures on OPC (in Sirima and Toki's boma) are not sufficiently predator proof; there have been cases of predators breaking in. To increase hartebeest numbers in these areas there is need to make them predator free and properly enclosed (especially Sirima).

Although all groups on OPC have been identified (from two aerial game counts), it's only about half of these that are seen regularly enough to allow monitoring of survival rates. On Mugie ranch in Laikipia, a hartebeest population was enclosed in a large predator free area with suitable habitat and the population doubled within two years. This high increase was mainly attributed to lack of predators (Georgiadis pers comm.). In the late 1990s some hartebeests were moved into former Sweetwaters Game Reserve from

the Ol Pejeta ranch and most were preyed on by lions (the Game Reserve had higher lion population density than the ranch). This attests to the hypothesis that enclosed individuals may develop predator naivety although it could also mean that hartebeests do not breed well where the lions or predator density is high.

Main Objective: To monitor herd demographics and establish probable predation pressure of hartebeests on OPC, and enhance breeding performance through establishment of a viable population within a predator free enclosure.

Work Objectives:

i) To identify herds, their demographics and monitor survival.
ii) To assess breeding performance of enclosed and non-enclosed populations.

Targets:

i) All groups of hartebeests identified by conducting twice monthly census loops and growth performance of enclosed and non-enclosed populations assessed periodically.

Management Action

Due to the rapidly declining population in OPC, 63 hartebeests were enclosed in Sirima; a predator area in January 2006 to maximize their breeding potential. Another population of seven individuals is enclosed in the rhino boma that shall also serve to boost the general population.

Actions and Work Program:

Current actions

- Twice monthly census loops are driven where all individual hartebeests are counted and aged. A database keeping a record of all individuals has been set up.

Proposed actions

Action	Action by	Time frame
Identification of discreet herds and monitoring	EMD staff	Continuous
Assessment of breeding performance & predation pressure of enclosed and non-enclosed populations.	EMD staff	Twice annually
Causes for Prey preference, switching for lions and spotted hyena	External researchers	
Upgrade Sirima to become absolutely predator proof enclosure.	OPC logistics dept	Oct-December 2007

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The 2006 IUCN Red List of Threatened Species. www. Icunredlist.org
http://www.awf.org/wildlives/121
http://en.wikipedia.org/wiki/Hartebeest"
www.webkenya.com

2.0 BEISA ORYX ACTION PLAN FOR OPC

Background information
Beisa Oryx is one of the four large antelope species of the genus Oryx, having long straight almost upright horns and inhabits scrub country and semi arid areas - generally this species is one of the most desert-adapted large mammals, capable of subsisting in waterless wastelands where few other ungulates can survive. Densities vary greatly and home ranges from 150-300 km^2 have been recorded. The facial structure and dentistry of Oryx is adapted for the close cropping of coarse desert grasses. They prefer green but will eat dry grass. They occasionally browse and during droughts dig out tubers and roots with their hooves for moisture.

The males live in mixed groups with females, or with females and their young. Males that dominate are territorial to a degree, marking their areas with dung deposits. Groups are composed of 10 to 40 males and females of all ages and both sexes; herds of up to 200 are common in some East African habitats. There is a dominance hierarchy among Oryx which is based on age and size. Breeding is not normally seasonal – a female leaves the herd to give birth and hides the calf for 2 or 3 weeks, visiting a few times a day to nurse it. Calves are suckled for 6 to 9 months and reach maturity at 18 to 24 months. Most young males migrate out of their natal group to join other groups. Like other antelope species, Oryx primarily depend on flight to escape from predators such as lions, wild dogs and hyenas.

Current status
Three of four Oryx species in the world are found in Africa while the fourth is found in Arabia and Southern Israel. Small populations of introduced individuals exist in Texas and New Mexico, USA. Kenya's Tana River divides the range of East Africa's two types of Oryx - the Beisa Oryx (*Oryx gazella Beisa*) and the fringe-eared Oryx (*Oryx gazella callotis*). The Beisa Oryx ranges from Ethiopia through Somalia into northeastern Uganda and Kenya.

The Beisa Oryx is not endangered and numerous in the northern part of its range. OPC lies on the southern edge of its known range. In 1995, aerial game counts recorded around 200 individuals in SWGR. The population on the ranch was unknown but there was definitely a resident population. Currently, there are only 13 individuals on SWGR and at least 3 individuals are known to exist on the ranch.

Causes of concern on OPC
Oryx are not endangered although they are declining on the edges of their range. Encroachment of their habitats by pastoralists and competition from livestock could cause population declines in the future.

The drastic decline (~93.5%) of Oryx numbers in SWGR within the last ten years has resulted in a population that is too small, and thus unlikely to naturally increase in the near future. The reasons for this decline have not been clearly established although it is argued that the potential cause of the decline may have been due to high predation. This argument is supported by the fact that a neighboring property, Solio ranch, has a lower number of predators and high population of Oryx. OPC population is commonly seen in three small discrete herds of either females only, females and one male and males only, as opposed to a large mixed herd. Re-introduction of more Oryx to boost this population should therefore be complemented with efforts to address the predation pressure.

Main Objective: To monitor the remaining Oryx population on OPC and potentially increase the population by translocating individuals into OPC

Work Objective: To monitor Oryx numbers on OPC and explore the possibilities of translocation from other areas

Targets:

i) Continue monitoring of already identified individual Oryx by driving twice monthly census loops.
ii) Increase resident Oryx population through translocation from other area.

Management action:
Most Beisa Oryx populations occur outside managed areas and their populations are not in decline as such this species has not been actively managed. However, reintroductions of other individuals could be successful to boost the existing OPC population.

Actions and Work Program

Current actions

- All individuals within OPC have been individually identified using ear patterns and natural ear notches although in a larger population this method may become too complicated.
- Twice monthly census loops are driven where all individual Oryx are identified, counted, aged and where possible sexed.

Proposed actions

Action	Action by	Time frame
Monitor individuals on OPC	EMD staff	Continuous
Translocate more individuals into OPC	OPC, K.W.S. and L.W.C	2007
Establish predator plans to address the predator pressure issues	EMD staff	Immediate
Implement appropriate predator management interventions	OPC, K.W.S. and L.W.C	As appropriate

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Kingdon, A. 1989. East African Mammals: An Atlas of Evolution in Africa Volume III Part D (Bovids). Chicago: University of Chicago Press
The 2006 IUCN Red List of Threatened Species. www. Icunredlist.org

http://www.awf.org/wildlives/121
http://en.wikipedia.org/wiki/Hartebeest"

3.0 GREVY'S ZEBRA ACTION PLAN FOR OPC

Background information
In the 1970's it was estimated that there were over 15,000 Grevy's zebras in Africa; according to population surveys recently conducted in Kenya and Ethiopia, the global population of Grevy's zebra (*Equus grevyi*) now numbers fewer than 2,300 individuals and the population is still declining (Williams & Low, 2004). In Ethiopia, there are fewer than 150 Grevy's zebra remaining, representing a 90% decline since 1980 (Williams et al. 2003). In Kenya, the trend is similar with 1,700-2,100 individuals left, which reflects an 86-89% decline over the last 20 years (Nelson, 2003). The threats facing this species include

loss of range, poaching, competition with domestic livestock for critical resources, and predation (Njonjo, 2004). The range of the Grevy's zebra has been greatly reduced and only 0.5% of this species' remaining range falls within protected areas (Williams, 2002). Grevy's zebra is categorized as an endangered species on the IUCN red list and listed on Appendix I of the Convention on International Trade in Endangered Species.

Following the dramatic decline in the species over the last two decades, boosting depleted populations of Grevy's zebra is one of the management recommendations of the IUCN/SSC Equid Specialist Group's Status and Conservation Action Plan (2002). By creating a breeding sanctuary on OPC for Grevy's zebra, females and their offspring can be translocated out of the population to supplement smaller populations. Excluding predators from this breeding enclosure may enhance population growth, as several case studies have shown (Georgiadis and Rubenstein *pers comm*.).

Current status in OPC

Ol Pejeta Conservancy (OPC) introduced thirteen Grevy's zebras to the fully fenced game reserve from Lewa Conservancy in the early 1990's, of which only three now remain. Nine Grevy's zebras have since immigrated from neighboring ranches, and now inhabit the western sector. As such, the current population within the Conservancy totals thirteen animals. The population structure of Grevy's zebras comprises of six territorial males, one bachelor male, one two-year old male, four females, and a seven-month old foal. Two foals have been born in the last two years on OPC, only one of which has survived. The decrease in the population has been attributed to high predation.

Causes of concern in OPC

Studies of the OPC Plains zebra population within the enclosed game sanctuary have shown that the survival rate of foals is 8.2 %. Given this level of predation pressure in the Conservancy coupled with the small size of the population, the OPC's Grevy's zebra population should be considered unviable and therefore unlikely to increase. Creating a long term consolidated breeding facility using these individuals as a founder population will enhance their breeding capacity and thereafter be used to boost other populations.

Currently existing on OPC are what are thought to be Grevy's zebra/Plains zebra hybrids, some of which are thought to be fertile. Eight hybrids have so far been identified. Since OPC lies at the southernmost tip of the Grevy's zebra range and the population in OPC is small, matings between Grevy's and plains zebras may have resulted. To prevent potential future interactions between the Grevy's zebra population and the hybrids, the Grevy's zebra in the enclosure will not be released into the larger OPC. At the same time, Plains zebra with in the breeding enclosure will be removed to prevent this situation occurring again and to ensure that competition for resources between these two sympatric species is addressed.

Main Objective: to consolidate the small Ol Pejeta population to a predator proof enclosure (Sirima) to prevent a) hybridization b) loss of this marginal population through predation and c) to establish a breeding population to be used in future to re-stock core Grevy's areas, such as Sera.

Work Objectives:

i) To continually monitor survival of the current population.
ii) To monitor the impacts of translocation on Grevy's zebra's growth performance, behavior and population dynamics.

Targets:

i) To continually monitor survival of the current population.

ii) To monitor the impacts of translocation on Grevy's zebra's growth performance, behavior and population dynamics All individuals identified by conducting twice monthly census loops.
iii) Sirima area made predator proof by end of December 2007.
iv) Current population (supplemented by females from Lewa) consolidated in Sirima area by February 2008.
v) Growth performance of the consolidated population monitored periodically.

Management Actions

Creating a long term breeding facility

An approximately 7400 acre enclosure already exists on OPC (Sirima) and it the perimeter fence will be made predator proof by end of 2007. The habitat consists of open grassland with patches of light *Euclea divinorum* and *Acacia drepanolobium* woodland. There are several water troughs, dam and a seasonal river. To improve the suitability of the habitat for Grevy's zebra, periodic prescribed burning will be considered. Creating a stable population within this enclosure will maximize survival rates of foals in the absence of predation. Females will be allowed to breed and rear offspring in the enclosure for a period of one to two years. A limited period within the breeding enclosure is recommended to minimize the possibility of the zebras becoming predator-naïve. Groups of Grevy's zebras mainly composed of breeding females and their offspring from the facility will then be translocated to Sera, a community-led conservation initiative in Northern Kenya where the first release will take place.

In recent years security within Sera has improved; Sera carries low predator numbers and Grevy's zebras have recently begun moving from Serolipi to the east where the conservation area is demarcated. Translocations of female asses with their pre-pubescent daughters showed that fertility was enhanced in the daughters because they are able to learn their environment at a young age and adapt quickly with the support of their mothers (Rubenstein *pers comm*.). Since asses and Grevy's zebras live in the same type of society, we anticipate that movements of families will help accelerate population growth of the resident population. An enclosure will be built on Sera, where translocated groups will be initially released so that they can familiarize themselves with the vegetation and water in that area. After a period of one month they will be released. All animals going to the Sera enclosure will be pre-tested for infectious diseases and blood samples collected and analyzed by the Kenya Wildlife Service, Ol Pejeta Conservancy and Princeton University to assess the genetic variability of the translocated individuals being used to expand the Sera population as well as others.

As bachelor males mature in the OPC's enclosure, older territorial males will be translocated out so that bachelor males can take over vacated territories. In this way a sustainable population of breeders will be created, inbreeding problems will be reduced and appropriate age and sex cohorts will be introduced to Sera and other northern areas of Kenya. Periodically, new stock from Lewa will be sent to the OPC's enclosure so that inbreeding is minimized.

If the model proposed here is as successful as expected, it could be used elsewhere as a means to increase efforts to repopulate the former Grevy's zebra range.

Actions and Work Program

Current actions

- Twice monthly census loops are driven where all individuals are identified, sexed and aged. A database keeping a record of all individuals has been set up.
- Assessment of breeding performance including mortality of current population done twice annually.

Proposed actions

Action	Action by	Time frame
Upgrade Sirima to become predator proof enclosure.	Logistics & Wildlife depts	Oct-Dec 2007
Pre- and post translocation monitoring	EMD staff	Continuous
Assessment of breeding performance & population dynamics of consolidated population.	EMD staff	Twice annually

References

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4.0 LION ACTION PLAN FOR OPC

NB: This action plan is based on the 'Conservation Strategy for the Lion in Eastern and Southern Africa'.

Background information

The pride size and gregarious habits of lions are specifically adapted for predation on the larger ungulates, although they occasionally scavenge. In most areas of abundant wildlife, only around 5 of the most numerous ungulates weighing between 50 and 300 kg make up ¾ of their prey. Lions that hunt cooperatively often succeed and they feed communally on large kills. However, single lions can also bring down large ungulates such as zebra. In most areas, females do most of the hunting while males defend the territory (Estes, 1991).

They are associated with any habitat except very dense forests and very dry deserts but are found in large numbers wherever there is a high prey density. Despite the declining lion populations worldwide, lion populations in protected areas can become too large for an area to support since emigration in many electric ring fenced protected areas is curtailed. This build up of lion population results to negative impacts on some herbivore populations.

Indiscriminate killing of lions, hunting of lion prey for subsistence or bush meat trade, small population size, and livestock encroachment have been identified as top threats facing individual lion populations (IUCN SSC Cat Specialist Group, 2006). Priorities for lion conservation have been identified as resolving human-lion conflicts and stemming loss of habitat and wild prey (Nowell and Jackson, 1996; Chardonnet, 2002; Bauer and Van Der Merwe, 2004). The IUCN SSC Cat Specialist Group cites management

decisions based on an understanding of lion distribution, status and population trend as well as research on other aspects of their ecology as important in resolving many problems of lion conservation.

Current status

The lion (*Panthera leo*) is the largest African carnivore and the only large cat in the world that is not endangered. The conservation status of the lion is considered Vulnerable (IUCN Red List, 2006) because a population reduction of 30-50% is suspected to have occurred over the last 20 years mainly due to hunting, poisoning and habitat loss (IUCN SSC Cat Specialist Group, 2006). Currently most populations are found in protected areas from South to East Africa.

The estimated number of lions in Africa is 23,000-39,000 (IUCN SSC Cat Specialist Group, 2006) with Kenya's lion population being estimated at 2280 (Bauer and Van Der Merwe, 2004). Laikipia-Samburu ecosystem's lion population is approximately 350 and described as viable and stable (IUCN SSC Cat Specialist Group, 2006). OPC has an estimated minimum of 50 lions. The lion population on the Western Sector however is more variable due to movement in and out of OPC through the corridors.

Causes of concern

In February 2002, SWGR was estimated to have 28 lions (Kones & Osoro, 2002) and by June 2002, the number had increased to 37 (Pobiner, 2003). The increase in lion population was considered to be too high to sustain the ungulate population within the Western Sector. The declining herbivore population over the past ten years has been correlated mainly with the increase in the lion population, excluding mortality from the big drought of 2001-2. In recent years for example, the population of plains zebra has fallen from ~1900 in 1995 to around 600 in 2005 while in 2003-4 foal mortality was 89%. Hartebeest and Oryx populations have also decreased dramatically. The internal fence dividing the former game reserve and the ranch acted as a 'partial' barrier preventing dispersal of lions onto the ranch thus artificially enhancing the predation pressure. Although this pressure seems to have reduced following the establishment of a corridor in 2003 and 2006 along the dividing fence line, pressure on the ranch between May 2005 and August 2006 has been increasing in spite of three northern corridors being set up in January 2006 to allow the dispersal of lions in and out of OPC.

OPC has been established to combine ecotourism, biodiversity conservation and cattle ranching values. Lions are central to these values as increased lion numbers means increased lion sightings by tourists. However, increased lion numbers are likely to have a negative impact on both cattle and herbivore populations. There is therefore need to prevent major prey species populations falling below sustainable levels which would reduce the biodiversity of OPC. Similarly if prey abundance reduces to levels that can not sustain the lion population, there is a high risk of rhino calves being immediate targets for lion predation. The lion population therefore needs to be monitored so that appropriate preventative interventions can be taken to maintain a desirable equilibrium. The current threshold limit for the whole of OPC is 35 lions using a density of 12 lions per 100 sq km which is slightly higher than the estimated density of 10 lions per 100 square km in the general Laikipia District (Lawrence Frank, pers comm.). The current high density of 0.17 lions/Km^2 (approx 50 lions) is most likely sustained due to variation in rainfall and herbivore populations. A further concern is the potential conflict with neighboring pastoralist communities should the lion population become too large and naturally start dispersing outside OPC.

Goal:

The goal for OPC is to maintain a sustainable lion population without diminishing wild prey base while recognizing their potential social, cultural, ecological and economic benefits.

Main Objectives:

i) (Management): To ensure effective conservation management of lions, their habitats and prey species.

ii) (Mitigation): To minimize and where possible, eliminate lion related conflicts through appropriate management interventions.
iii) (Socio-economics): To provide benefits of long-term lion management to relevant stakeholders.

Management actions:
The management of large carnivores such as lions is becoming increasingly important since most lion populations are now mainly confined to conservation areas leading to isolated and fragmented populations. Most protected areas are not big enough to ensure the long-term survival of viable populations of lions. Lions also need huge ranges and hunting territories and only a few national parks in Africa are big enough to supply them. This means that lions often wander across park boundaries and are killed when they resort to killing livestock.

OPC has reduced this conflict by putting up an electric fence around its boundary and by erecting sturdy enclosures for livestock at night since most killing occurs at night (Ogada, Woodroffe, Oguge & Frank, 2003).

OPC therefore endeavors to integrate conservation and development factoring lion and prey needs through careful land use planning and habitat management. The rapidly increasing lion population in OPC from an estimated density of 0.01per Km^2 to 0.17 per Km^2 (68%) from 1995 to June 2007 and which has caused a significant reduction of key prey species in the recent past however calls for a more proactive approach in controlling their numbers.

Actions and Work Program

Current actions

Objective 1 (Management): To ensure effective conservation management of lions, their habitats and prey species.

Target 1.1:
Monitoring programme to obtain accurate estimates of population size, structure and trends of lion numbers on OPC set up, implemented and maintained.

Activity 1.1.1: A predator monitoring research assistant recruited to monitor lions and other predators.
Activity 1.1.2: Appropriate monitoring equipment procured.
Activity 1.1.3: All individuals on OPC are monitored, identified and a photographic database of the individuals created and information updated continuously.
Activity 1.1.4: All sightings of lions found are reported by patrol teams, SWTC night game drive vehicles and Ecological Monitoring staff and where possible these are individually identified.
Activity 1.1.5: Suitable prides for collaring are identified and collared when necessary and tracking of collared lions regularly undertaken by Ecological Monitoring.
Activity 1.1.6: OPC is collaborating with Laikipia Predator Project in radio tracking collared individuals.
Activity 1.1.7: Spoor transects surveys have been done; this is useful in correlating true density with spoor density once sufficient sampling is done.
Activity 1.1.8: Updated lion numbers, prides and their distribution reports produced monthly and quarterly.

Target 1.2:
Monitoring to obtain estimates of predation impacts on certain key prey species implemented and maintained.

Activity 1.2.1**:** Direct and indirect assessment of predation impacts on prey species by lions using kill data analyzed and reports produced periodically. Kill data collected by patrols and EMD staff is analyzed monthly to give an indication of impacts on different prey species especially species of special concern to OPC. Quarterly and annual reports produced to give trends.
Activity 1.2.2: Supplementary information on lion impacts on key prey species is provided by third party researchers.

Objective 2 (Mitigation): To minimize and where possible, eliminate lion related conflicts through appropriate management interventions.

Target 2.1:
Measures taken to reduce high predation on certain key prey species (including livestock) and predation levels reduced by at least 30% from the current levels within 5 years.

Activity 2.1.1: Recommended threshold levels of lion numbers based on monitoring results continuously updated.
Activity 2.1.2: The viability/sustainability of key prey species continuously revised and reports produced to management and KWS.
Activity 2.1.3: Electric fence dividing Western and Eastern sectors removed in March 2007; this to hopefully reduce the high predation pressure on certain species in the Eastern Sector and the whole of OPC.
Activity 2.1.4: Three northern corridors to allow animal movement including lions in and out of OPC thereby creating access to the wider Laikipia ecosystem implemented in January 2006. This is expected to have the effect of reduced predation pressure within the Conservancy.
Activity 2.1.5: A predator free area for enhancing performance of endangered species set up; 45 hartebeests enclosed in the area in February 2005.
Activity 2.1.6: Mechanisms developed to reduce livestock predation by lions; sturdy enclosures (predator proof bomas) for putting livestock at night implemented from 2006.
Activity 2.1.7: Electric fence around OPC's boundary put up and made predator proof in certain sections where lions wandered across OPC's boundaries into community areas where they killed livestock.

Objective 3 (Socio-economics): To provide benefits of long-term lion management to relevant stakeholders.

Target 3.1: While actively managing lion numbers, enhance visitor viewing satisfaction.

Activity 3.1.1: Lion tracking with tourists implemented.
Activity 3.1.2: Location of lion sightings communicated to tourists.

Proposed actions

a) Consolidate remaining Grevy's zebras in the predator free area.
b) KWS to act on implementing lion control measures to reduce the high density and especially a pride that is attacking black rhinos.

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5.0 SPOTTED HYENA ACTION PLAN FOR OPC

Background information

The spotted hyena (*Crocuta crocuta*) inhabits semi-desert, savannah, open woodland, dense dry woodland and mountainous forest. The social organization of this species is variable but generally individuals live in territorial clans, dominated by females. Despite their reputation as scavengers, they are good hunters and eat virtually everything from their kills and the carcasses they find. One hyena can eat up to 18kg in one sitting (Estes, 1991). Clans live in communal dens and can live in clans of up 80 individuals in a society characterized by a strict dominance hierarchy. Females usually remain in their natal clan, while males disperse at about two and a half years of age. Spotted hyenas are non-seasonal breeders and females generally have 1-2 cubs which are kept at a communal den and suckled by their mother until they are a year old. Spotted hyena clan members frequently wonder alone or in small groups and rarely meet in large numbers. The spotted hyenas' major competitor is the lion. Humans are the main cause of mortality, but naturally, mortality is usually from predation by lions and conspecifics.

Current status

The spotted hyena is classified as Lower Risk: Conservation dependent (IUCN Red List, 2006) The world population is estimated at between 27,000 and 47,000, (with several subpopulations exceeding 1000 individuals) and a range of well over 20,000 km2 (Mills & Hofer, 1998). Despite these figures, the rapid decline of populations outside conservation areas due to persecution, disease (especially rabies) and habitat loss makes the species increasingly dependent on the continued existence of conservation areas.

Most populations in southern Africa are considered stable, whereas those in western Africa are declining mostly due to incidental snaring and poisoning. It has continuous distributions over large areas in Ethiopia, Kenya, Tanzania, Botswana, and Namibia. In Kenya it was historically widespread throughout the country, but currently not found in agricultural areas and along the entire coast. It is rare in populated areas along the shores of Lake Victoria and in the wider Nairobi area. Its endangered risk status is distinctly different for protected and unprotected areas; it has a lower risk in protected areas and is threatened elsewhere. Illegal shooting, snaring, spearing and trapping are the main causes for population decline. On OPC spotted hyena numbers are suspected to be low. In the game reserve the high lion population which has probably limited hyena numbers whereas on the ranch many individuals (over 60 individuals in the last 5 years) have been killed for predating livestock.

Causes of concern on OPC

The spotted hyena is the only hyaenid species which has the potential to play an important role in population regulation of ungulates. However, this depends on the area and many other factors. Spotted hyenas compete for prey with other species that are of special concern to OPC such as lions, cheetahs, and leopards. On OPC, spotted hyena numbers are suspected to be low (see 'current status'). Since there is very limited knowledge about the population status and impacts on prey species of spotted hyenas on OPC, a long term monitoring is important. Tourists do not rate hyenas very highly and they still suffer from a bad public image. If considered, this is an opportunity for OPC to generate revenue by taking tourists to baiting sites with habituated hyenas to enlighten tourists and add to their experience.

Main Objective:

To determine accurate population estimates and monitor population trends of spotted hyena within OPC and predation impacts on key prey species.

Work objectives:

To identify as many individual spotted hyenas as possible (using physical characteristics such as spot patterns, nicks in ears etc) and to build up master identification files of individuals thus enabling reliable population estimates.

Targets:

i) Identify all communal clans and individuals in OPC.
ii) Continually bait hyenas near den sites in order to obtain population estimates.
iii) Undertake periodic spoor transects (twice annually) to monitor population trends of the spotted hyena population on OPC.
iv) Indirect assessment of predation impacts on prey species by hyenas using kill data done periodically.
v) Threshold levels of hyena numbers based on monitoring results continuously updated.

Management actions

Predator control is an essential management practice in stock farming areas – however, the aim should be to seek methods to reduce predator damage, rather than to increase predator mortality (Mills & Hofer, 1998). The importance of domestic stock as a food item to spotted hyena may depend on accessibility i.e. stock keeping practices, availability of alternative prey, and availability of human-associated sources of rubbish. In a study in Laikipia, 90% of all kills by spotted hyena were made outside the protection of thorn fences (Frank L.P.P., 2003). In OPC, hyenas have been associated with stock predation in the ranch and as such over 60 individual have been eliminated in the past. Currently OPC seeks to establish the population status and dynamics.

Actions and Work Program

Current actions

- All sightings of spotted hyenas and any kills found are reported by patrols, SWTC night game drive vehicles and R&M staff.
- Baiting near known den sites have been set up sporadically (whenever there is bait) which attracts individuals. This enables clan individuals to be counted and identified.
- A database for recording sightings has been set up.
- A photographic database keeping a record of all individuals has been set up.
- Spoor transects have been carried out to assess spotted hyena presence and if these are done repetitively population trends can be assessed.

Proposals for action

Action	Action by	Time frame
Continue to record all spotted hyena sightings	Patrols, SWTC vehicles, EMD staff	Continuous
Identify as many individuals as possible and which clans they originate from	EMD staff	Continuous
Continue baiting near newly identified dens or newly used dens	EMD staff	Continuous
Bait at new sites and call individuals in to identify those individuals not living in clans	EMD staff	Continuous
Spoor transects over the whole of OPC	EMD staff	Every six months

References

Estes, R.D. (1991) The Behavior Guide to African Mammals. The University of California Press. London.
Mills, M.G.L. & Hofer, H. (compilers). (1998) Hyaenas. Status Survey and Conservation Action Plan. IUCN/SSC Hyaena Specialist Group, Gland, Switzerland and Cambridge, UK. Vi + 154 pp.

The 2006 IUCN Red List of Threatened Species. www. Icunredlist.org

6.0 ELEPHANT ACTION PLAN FOR OPC

Back ground information

The African elephant's diet consist different proportions of herbs and tree or shrubbery leaves and grass. They ingest up to 225 kg of vegetal matter and drink over 190 liters per day. In their feeding-oriented whereabouts, elephants knock down trees and rip apart all kind of plants. This "wreckless" feeding behaviour is a liability to most enclosed ecosystems and causes extensive habitat modifications that take years to recovery. Nonetheless they also play an important facilitating role for small mammals by influencing habitat density and structure.

The family group in both Asian and African elephants is one that is stable and a rich source of social interactions. A complex, fluid, fission–fusion society is known in the African savannah elephant (*Loxodonta africana*), the basic unit of which is the mother–offspring unit, two to three such units comprising a family group headed by a matriarch. The matriarch is generally the oldest adult female in a family and often a repository of critical ecological information the matriarch's experience influencing and guiding the movement patterns and habitat utilization by the family group. While the matriarch is generally dominant in competitive and cooperative situations, the degree of leadership exhibited by the matriarch may vary from one family to another (unpublished long-term records of the Amboseli Elephant Research Project, http://www.elephantvoices.org/).

Obviously much remains to be learnt about the role of the matriarch as this has not been examined in other populations, and the effect of ecological conditions on the importance of matriarchal leadership and the dominance and reproductive fitness of matriarchs in comparison to other adult females may be topics to begin with. In the African savannah elephant, members of a family group spend a significant (over 80% in the Amboseli population) percentage of time together, interact and behave in a coordinated manner and exhibit cooperation in group defense, acquisition of resources, and care of offspring (Mistry, 2000, http://www.elephantvoices.org,). A few related families may show significant social association amongst themselves and constitute 'kinship groups' or 'bond groups', usually formed due to the fission of a large family in the past. OPC elephants belong to *Loxodonta africana* species.

Current status

The African Elephant (*Loxodonta africana*) is listed as vulnerable in the IUCN Red List of Threatened species. Populations in Africa range from less than 50 to more than 100,000 with varying levels of cohesion or isolation. Elephants are currently found in 37 sub-Saharan countries with the largest populations concentrated in Southern and Eastern Africa. The Kenyan elephant population in 1963 was 170,000 and this declined to 26000 in 1996. The AfESG report in 2002 estimated the total African elephant population in Kenya as 22,036 in the definite category (Blanc *et al*, 2002). The Tsavo and Samburu-Laikipia ecosystems contain the largest Savanna populations while the main forest populations are in Aberdare Range and Mt. Kenya forests. The Savanna elephant populations have been increasing at a rate of 3-4% per annum (Kahumbu *et al*., 1999; Omondi *et al*., 2002). Total aerial count in 2002 estimated elephant population in the Samburu-Laikipia ecosystem as 5447 (Omondi et al., 2002).
The estimated population of elephants in OPC is 291 (March 2006 total aerial count) giving a density of 0.8 elephants per square km.

Causes of Concern in OPC

Acacia xanthophloea and *Acacia drepanolobium* woodlands largely contribute to the ecological status of OPC and continued damage by the elephants is of concern to the management.
In the former Sweetwaters Game Reserve between 1997 and 1999, the net reduction in *A. drepanolobium* tree numbers was 16.3% which translates to an annual loss of 5.4% (Birkett A. & Barry Stevens-Wood, 2005). This damage reduced significantly to a net loss of 0.7% and growth increased to 6.31cm in 2004 attributed mainly to the translocation of 50% of the elephant population in 2001. OPC is keen to monitor the level of habitat destruction against set thresholds and this determines the viable elephant population. Threshold levels of *Acacia drepanolobium* have been set at minimum rate of growth of 10cm and maximum net tree loss of 5 % per year. The annual tree loss of *A. xanthophloea* by elephants was 7.5% from 2002 up to 2005 (Gatimu, 2006) and the threshold level set by OPC for maximum net tree loss is 5.6 % per year.

Generally, elephant populations are under threat due to poaching, habitat loss and defragmentation from increasing human populations limiting natural dispersal opportunities or concomitant range expansion which consequently results in increases in local densities leading to human-elephant conflict. In OPC conflicts with the surrounding communities have been alleviated by several management actions (discussed below) top most being monitoring of problem individuals.

Main Objectives

i) To monitor elephant impacts on the habitat to ensure sustainable growth rates of minimum 10cm per annum and minimum damage levels of 5% per annum for *Acacia drepanolobium* and *Acacia xanthophloea* minimum damage levels of 5.6% per annum in the long term.
ii) To identify and monitor problem elephants, facilitate management of the problem at the local level and assess effectiveness of the management interventions.

Work objectives:

i) To quantify annual growth rates and damage levels of *Acacia drepanolobium*.

Targets:

i) Maintain annual monitoring of *Acacia drepanolobium* in OPC for at least up to 2010.
ii) To quantify annual damage and recovery levels of *Acacia xanthophloea*.
iii) Exclude degraded areas (exclusion zones) by end of 2007
iv) Maintain annual monitoring of damage and recovery in OPC for at least up to 2010.
v) To continually monitor and quantify elephant - human conflicts.
vi) Identify all habitual fence-breaking elephants.

vii) Record all fence breakage and crop raid incidences.
viii) Assess effectiveness of management interventions.

Management actions

Concerns over the ecological and socio-economic impacts of elephants have made people consider different management options. These include culling, cropping, translocation, range expansion and contraception in various parts of Africa. In OPC, the control measures implemented include electric fencing, translocation, movement corridors, monitoring to eliminate rogue individuals, and deterrent actions such as thunder flashes. The latest management intervention implemented in 2006 was GSM collaring done in collaboration with Save the Elephants (STE) to monitor movements and fence breaking activities.

Actions and Work Program

Proposals for Action

Action	Action by	Time frame
Monitor *A. drepanolobium*	Earthwatch	Twice annually
Set up *A. xanthophloea* exclusion zones and monitor recovery	EMD, Earthwatch.	Once annually
Monitor & quantify human-elephant conflicts	EMD staff	As often as the breakages occur
Implement management interventions	Wildlife & Security department.	Whenever required.
Assess effectiveness of management interventions	EMD staff	After implementation of the interventions.

References

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http://www.elephantvoices.org.

7.0 GIRAFFE ACTION PLAN FOR OPC

Although gregarious, the individual is the social unit in giraffe society. Bulls are non-territorial and exhibit a dominance hierarchy. Males become sexually mature at about 42 months but seldom have a chance to breed until 8 or more years old. Females first conceive in their fifth year of age. Gestation is

about 15 months. Birth weight is 100-150 pounds; height is 6 feet. Home ranges are large, about 46 sq. miles.

Giraffes feed primarily on a variety of acacias depending on what is seasonally available. Although mostly leaves and shoots are taken, giraffe also eat flowers, vines and herbs. Averages of 16-20 hours per day are spent feeding and up to 140 lbs of fresh browse are taken. Giraffe form scattered herds, the compositions of which are constantly changing. Offspring begin browsing in their first month and are rarely observed to suckle after they start eating leaves. Lions are the major predator, but calves may be taken by hyenas, leopards and African wild dogs. Life expectancy is 25 years.

Current status

Reticulated giraffes range throughout sub-Saharan Africa in open woodland and wooded grassland. They are confined to north-eastern Kenya, eastern Sudan and Eritrea. Giraffe are still common in East and South Africa, although their distribution in West Africa has been fragmented by poaching. The tourist trade in giraffe hair bracelets has encouraged poaching. Included in the Lower Risk category; conservation dependent . Of the IUCN populations greater than 2000 individuals in kenya

Cause of concern

Reticulate giraffes and elephants have been sited as the major destroyer of *Acacia drepanolobium* habitats in Ol Pejeta. Research findings by Alan Birkett and Barry Stevens-Wood (2005) revealed that heavy browsing of A*cacia drepanolobium* by giraffes reduces tree growth rates and increases their susceptibility to drought. However over the last 10 years the giraffe population in OPC has been dropping, aerial census done in March this year, giraffe numbers dropped from 132 to 111 against set threshold of 248 individuals. The cause is not established but repeated annual counts will give informed population estimates.

Objectives:

i) Establish population trends through annual aerial counts and when necessary specific giraffe counts.
ii) Boost the population by introducing more individuals.

Actions and Work Program:

i) Population estimates obtained through annual aerial counts.
ii) Introduction of 30 individuals from Solio planned for 2007.

Action	Action by	Time frame
Aerial counts	Wildlife/EMD	Once annually
Effect of expansion on the density and distribution of giraffes and impacts on habitats.	Third party researchers	

Reference

Birkett A. and Barry Stevens-Wood (2005) Effect of low rainfall and browsing by large herbivores on an enclosed savannah habitat in Kenya African Journal of Ecology, Afr. J. Ecol., 43, 123–130.